

**INTEGRATED GREEN, ENVIRONMENT AND
ENERGY AUDIT FOR THE ASSESSMENT
CY 2021 IN LINE WITH NAAC REQUIREMENTS**



**Central Institute Of Business Management Research &
Development, Nagpur**



**14/01/2022
Version 01**

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



From Principal's Desk





We have always been passionate about environmental issues and have always endeavored to contribute towards conservation of the environment. In this we have tried to inculcate in our students the same desire of preserving the environment by carrying out awareness programs about waste management. The institute also practices recycling of bio waste for generating fertilizers. We practice the three R's – reduce, reuse & recycle for plastic and such other related material.





Hence, as an institute we are proud to conduct an annual green audit and showcase our status in this. Needless to say, we have shifted to solar power and rain water harvesting. We try our level best to lead by example before the young generation which comes to us for admissions.

I wish for a cleaner and safer earth for all of us.

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">✓ Awareness Camps✓ Blood Donation Programs✓ Health Check-up Camps
	<ul style="list-style-type: none">✓ Refer our SSR Report



<p>7 AFFORDABLE AND CLEAN ENERGY</p> 	<ul style="list-style-type: none"> ✓ We have installed Solar Pv Plants in our campus.
<p>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</p> 	<ul style="list-style-type: none"> ✓ We are giving saplings to our guests in place of bouquet ✓ We have banned use of single use of plastic in our campus ✓ We serve the RO water in place of single use plastic bottle ✓ We have planted lot of trees inside and our side the campus ✓ Organic composting ✓ Energy efficiency projects (Sensor Based Lighting) (Refer Annexure V)
<p>13 CLIMATE ACTION</p> 	<p>We are promoting energy savings, reduction in water consumption, augmenting water harvesting, we have installed renewable solar energy plant of 20 kW, energy-efficient lighting (LED), 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>15 LIFE ON LAND</p> 	<p>We have implemented the projects of</p> <ul style="list-style-type: none"> ✓ Plantation of trees ✓ Rain water harvesting

We sought the help of Green Audit Team (Mr. Swapnil Thanekar, Ms. Bhakti Thanekar and Mr. Ashish Soni) 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. Amishi Arora
Principal



Acknowledgement



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Chairman	Shri. Ranjeet Deshmukh
Director	Dr. Ashish Deshmukh
Principal	Dr. Amishi Arora
IQAC Coordinator	Dr. Yogita Sure
Asst. Professor	Ms. Aarti Kulkarni
Asst. Professor	Mr. Athar Ali
Asst. Professor	Dr. Anup Suchak
Asst. Professor	Dr. Ravindra Gharpure
Asst. Professor	Dr. Sagar Khursange
Asst. Professor	Dr. Krunal Parekh
Asst. Professor	Mr. Virendra Disawal
Librarian	Dr. Rajendra Chore
Computer Operator	Mr. Ashwin Meshram

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Profile of Audit Team Members and Independent Reviewers

Mr. Swapnil Thanekar

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

Ms. Bhakti Thanekar

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

Mr. Ashish Soni

Graduate with 16 years' experience in Chemical Sector

Mr. Ajinkya Anjekar

M. Tech, Chemical Engineering, IIT Hyderabad (Observer, Reviewer)

Mr. Sushant Deshkar

Electrical Engineer, Assessment Team Member



DISCLAIMER

Green Audit Team has prepared this report for Central Institute Of Business Management Research & Development, 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.

Technical Review by:
Bhakti Thanekar
Bureau of Energy
Efficiency Registration
Number –
EA-14451



Ashish V. Soni
Onsite Assessment
Team Leader.

Prepared by:
Swapnil Thanekar
Bureau of Energy Efficiency
Registration Number –
EA-4416



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 tCO₂ 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 12th January 2022 to 14th January 2022 for CY 2021 (01 Jan. – 31 Dec.) 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
7.1.2 The Institution has facilities for alternate sources of energy and energy conservation measures:		
1. Solar energy	✓	Refer chapter 8 and Annexure –IX: Solar Panel Installations
2. Biogas plant		
3. Wheeling to the Grid	✓	
4. Sensor-based energy conservation		Annexure –XI: Solar Passive Structure
5. Use of LED bulbs/ power efficient equipment	✓	
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		
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):		
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		
7.1.4 Water conservation facilities available in the Institution:		
1. Rain water harvesting	✓	Refer chapter 06 and Annexure –XII: Water Management
2. Bore well / Open well recharge		



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	✓	
2. Use of Bicycles/ Battery powered vehicles		Annexure –XIII: Waste Management SoP: Green Initiatives by College
3. Pedestrian Friendly pathways		Chapter 13 and Annexure –XIII: Waste Management
4. Ban on use of Plastic	✓	
5. Landscaping with trees and plants	✓	
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	✓	Chapter 1 and 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		



Clean Campus¹

Sr. No.	Aspect	Reference
1.	Cleanliness in and around the campus and waste minimization	<ul style="list-style-type: none"> ➤ Chapter No. 1 & Annexure No. IV ➤ Chapter No. 1 & Annexure No. XIV
2.	Water conservation and management including <ul style="list-style-type: none"> ➤ Waste water management and reuse ➤ Rain water harvesting, etc. 	<ul style="list-style-type: none"> ➤ Chapter No. 12 & Annexure No. XIII ➤ Chapter No. 6 & Annexure No. XII
3.	Environment-friendly activities adopted and practiced by the campus	<ul style="list-style-type: none"> ➤ Chapter No. 1 & Annexure No. IV ➤ Chapter No. 1 & Annexure No. XIV
4.	Greenery within the campus to provide pollution free air and carbon-sink	<ul style="list-style-type: none"> ➤ Chapter No. 13 & Annexure No. XIV

Smart Campus²

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"> ➤ Digital library ➤ Digital leaves ➤ Digital attendance ➤ Digital Meetings ➤ Digital notes ➤ Digital papers ➤ Online conferences and classes ➤ Double side printers ➤ Efficient electronic equipment's like LED screens, LED projectors. For details, please refer annexure VIII ➤ Procurement of energy efficient equipment ➤ Techno commercial stages of the Solar PV
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 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>

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

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



		<ul style="list-style-type: none"> ➤ Installation of smart photo sensor to regulate the night lighting ➤ Digital notes ➤ Cloud is used for Admission process, data entry, TC and all administration process
<p>3.</p>	<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, though 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 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, and 16 National webinar during COVID lock down. We had connected people (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

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

Reference list of Websites

Sr. No.	Websites
1	IEEE 519 - http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=2227
2	http://mnre.gov.in/solar-energy/ch2.pdf
3	BEE - http://www.beeindia.in/
4	ECBC - http://beeindia.in/content.php?page=schemes/schemes.php?id=3
5	http://www.energymanagertraining.com/new_index.php
6	http://www.usalighting.com/stuff/contentmgr/files/1/92ffeb328de0f4878257999e7d46d6e4/misc/lighting_comparison_chart.pdf
7	https://www.bijlibachao.com/lights/use-energy-efficient-lights.html
8	http://www.imd.gov.in/section/climate/climateimp.pdf
9	http://www.bijlibachao.com/air-conditioners/air-conditioner-selection-understand-tonnage-eer-cop-and-star-rating.html
10	http://www.thehindubusinessline.com/opinion/time-to-focus-on-more-crop-per-drop/article9778971.ece
11	http://www.agri.mah.nic.in
12	http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Roof%20Top%20Rain%20Harvesting Presentation 2006.pdf
13	http://www.imd.gov.in/section/climate/climateimp.pdf
14	http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
15	http://cdm.unfccc.int/
16	http://database.v-c-s.org/
17	https://cibmrd.edu.in/
18	https://www.mahadiscom.in/
19	https://www.mahaurja.com/meda/
20	https://offset.climateutralnow.org/vchistory/details?orderId=15798
21	https://www.aicte-india.org/Initiatives/clean-green-campus



Introduction of the College

Central Institute of Business Management & Research Development comes under the umbrella of Vidya Shikshan Prasarak Mandal's Academy of Higher Education. The sanstha was founded in the year 1970 and today it spreads about 60 educational institutions. CIBMRD is now a 27 years old institute having been established in the year 1994. The journey so far has been very rewarding as we can now boast of well-placed alumni and a distinct brand image among the student's fraternity. The institute has been offering quality education, providing for good placements and encouraging entrepreneurship. The institute is accredited by NAAC with a B+ in its first cycle.



Objective of Green Audit

The Green Audit Team focused on Material³ 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. Carbon Footprint
12. Waste Management
13. 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.

³Definition: as per Global Reporting Initiative: **GRI 101: FOUNDATION2016**

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 Nature Conservation Club is already in place. This club is also formally coined as "Green Audit Committee".
If yes, who are the stakeholders?	Yes, it included stakeholders. The stakeholders include <ul style="list-style-type: none"> o Administration o Teaching Faculty o Students o Facility manager (from Accounts Department) o Canteen manager o Volunteers However, Green Campus Team 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 of improvement of environmental performance are always welcomed by Management. Installation of solar lighting, rain water harvestings, tree plantation at various locations around the college, health related camps, etc was also discussed as part of brain storming sessions within the meetings.
Have you established an environmental mission/vision for your campus?	The Environmental mission/ vision is integrated part of the College. The principal of college is persistent and resolved to make the campus eco-friendlier in due course of time. Efforts 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"> o education campaigns? o Posters, placards, messages o incentives? o contests? o awards? 	College conducts various activities to create awareness amongst the students and society on environment safety and protection. <ul style="list-style-type: none"> ➤ Online workshop was organized on the occasion of Menstrual Hygiene Day on 29th May 2021 in which 23 members participated. ➤ Online workshop was organized on the occasion of World Environment Day on 05th June 2021 in which 32 members participated. ➤ Online workshop was organized on the occasion of Yoga Day on 21st June 2021 in which 21 members participated. ➤ Online workshop was organized on the occasion of World Ozone Day on 01st September 2021 in which 35 members participated.



	<ul style="list-style-type: none"> ➤ Online workshop on Waste Management was organized on 02nd October 2021 in which 35 members participated. ➤ Covid-19 Vaccination Drive was organized on 27th October 2021 in which 34 persons got vaccinated. <p>Please refer Annexure IV and XIV for details.</p>
<p>Is the college staff modelling sustainable behaviour for students, peers, and community?</p>	<p>During interviews it was confirmed that There are 23 staff members in the college, out of which:</p> <p>Teaching & Non-Teaching Staff:</p> <ul style="list-style-type: none"> • 70% Staff of the college utilize 2-wheeler vehicle • 16% use 4-wheeler vehicle for commuting • 10% of the faculties are using bicycle and • 4% commute by walking <p>Please refer above assessments for additional details.</p>
<p>Do students model sustainable behaviour for staff, peers, and community?</p>	<p>Total 350 students are enrolled for 2020-21 session. Due to Approximately:</p> <ul style="list-style-type: none"> ➤ 70% students of the college commute by their college by their own 2 wheelers. ➤ 30% students of the college commute by public transport (Star Bus / City Bus) <p>Please refer above assessments for additional details 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"> o Posters, placards, messages? o assemblies? o classroom presentations? o training/professional development? o posters/bulletin boards? o newsletter? o website? 	<p>Data is shared via posters, placards and messages.</p>
<p>Does the college offer energy conservation lessons?</p>	<p>Energy and Environment conservation and management seminars are arranged by the college.</p>
<p>Is the college sharing its learning externally via</p> <ul style="list-style-type: none"> o Paper presentations? o newsletter? o website? 	<p>The students are encouraged to follow practices for conserving energy and environment. The college is also going to make the Green Audit Report public so that learning's of college are shared.</p>
<p>Further Scope of Improvement: At organization level, the college needs to Establish long term improvement objectives to further reduce energy consumption, water consumption and fuel consumption and reflect the same in form of dedicated Environment Policy.</p>	



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.
- Establishment of the dedicated Environment Policy in line with material aspects to achieve long term improvement objectives and continual improvement needs to be initiated.

2. Creation of Awareness

<p>Are the objectives of green audit clearly understood by the institute</p>	<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"> ➤ To sensitize them how to address the situation at the local and personal level by conducting programs, camps and other means as feasible. ➤ To reduce the negative environmental footprint. ➤ To explore possibilities to use renewable energy sources to avoid GHG emissions and also reduce power cost. ➤ To continue the use of efficient LED based lighting. ➤ To introduce the automatic controls on the lighting systems. ➤ To mitigate the carbon emission or offset them. ➤ To increase the green cover. ➤ To vigorously and responsibly position the institute for active contribution in Clean India Mission undertaken by the Governments. ➤ To identify ways and means to sustainably contribute and reduce gaps and become environment friendly. ➤ To support community to combat various environmental and social issues as feasible. ➤ To align the college activities to be in line with the requirements of the Clean and Smart Campus Initiatives (https://www.aicte-india.org/Initiatives/clean-green-campus). <p>Recommendation: College should apply for the Clean and Smart Campus Initiatives award</p>
<p>Are there posters/guidance displayed to remind students and staff of good practices?</p>	<p>Yes</p>
<p>Are the students aware of energy sources?</p>	<p>There are 2 sources of energy Grid Electricity & Solar Electricity. Students are aware of the source of energy which are utilized by the college.</p>
<p>Is college tracking its electrical energy usage?</p>	<p>There is 1 meter, 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?	<ul style="list-style-type: none"> ➤ College has created awareness among the faculty and students to reduce energy wastage. ➤ The college has appropriately disabled the screen savers and programmed the computers for sleep mode operations. ➤ 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. <p>Please refer Annexure V and VI for details.</p>
Do students and staff know where their water comes from?	The only source of water is borewell which is utilized for drinking (after purification) and in the wash rooms and for cleaning purpose.
Is college encouraging responsible water use via: o posters, placards? o incentives? o contests? o awards?	Yes, by posters, placards, contests.
How is trash managed outside the campus?	The waste is given to the Municipal Corporation (NMC) for disposal.
Further Scope of Improvement <ul style="list-style-type: none"> ➤ College may calculate the water footprint to compare its performance with national and international consumption standards and communicate with its stakeholders. ➤ College should apply for the Clean and Smart Campus Initiatives award. ➤ Water footprint may be calculated in future. 	
Conclusion <ul style="list-style-type: none"> ➤ Visible communication on environmental issues. ➤ Effective use of notice boards and signs. 	

3. Lighting

How college is utilizing daylight?	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.
Is college utilizing any incandescent lights? Can they be replaced with compact fluorescents (energy saving bulbs)?	<p>The college timings are from 11:00 AM to 5:00 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>



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. coating (67-77)	Offices, shops, hospitals, homes
Compact fluorescent lamps (CFL)	40-70	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
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 light⁴ 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/1/92ffeb328de0f4878257999e7d46d6e4/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?	No. The college is not utilizing sensor-based lighting system. Recommendation: <ul style="list-style-type: none"> • The students and staff washrooms can be equipped with the proximity sensors to control the lighting arrangements. • The college should utilize sensor-based lighting system.
Can main lighting ever be	As such there are no dedicated lamps which can replace overhead

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



switched off and dedicated lighting be used?	lighting. However, redundant lighting can be switched off when it is not required.
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?	Yes, the window and skylight are clean. Cleaning is with utmost care and regular cleaning schedules were observed by the Audit Team during the course of Audit.
Has the college installed lighting occupancy sensors?	No, lights are negligibly operated during day time. The lights are operated manually.
Is there mechanism in place to immediately report inoperable occupancy light sensors?	NA as no light sensor is installed.
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	
<ul style="list-style-type: none"> ➤ The students and staff washrooms can be equipped with the proximity sensors to control the lighting arrangements. ➤ The college should utilize sensor-based lighting system. 	
Conclusion	
<ul style="list-style-type: none"> ➤ 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 ⁵) 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 (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)
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	There are 12 number of ACs in college. Based on interviews, it is confirmed that the practice of closing doors and windows is

⁵<http://www.imd.gov.in/section/climate/climateimp.pdf>

⁶<https://timesofindia.indiatimes.com/city/nagpur/Nagpur-records-all-time-high-temperature-at-47-9-C/articleshow/20216419.cms>



conditioning is on?	maintained when air conditioning is in operation.
Is there a scenario where air conditioning is wasted in unused spaces, such as cupboards, corridors?	There are no such instances observed. Arrangements are duly implemented to avoid losses.
Are Efficient and energy labelled ACs utilized for cooling purposes?	<p>There are 12 number of ACs in the college out of which 4 are 3 stars and 8 are 2 stars. These AC's run for 5-6 hours during summer and rainy season.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> • 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). • College must ensure that condenser of AC's are not exposed to direct sunlight. <p>Below guidelines can be considered by college in future while selecting between the AC and evaporative cooling.</p> <p>Evaporative Cooling System (for computer lab)</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>Further Scope of Improvement</p> <ul style="list-style-type: none"> ➤ 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). ➤ College must ensure that condenser of AC's are not exposed to direct sunlight. ➤ Evaporative cooling can be availed for computer lab. 	
<p>Conclusion</p> <ul style="list-style-type: none"> ➤ The 2-star AC needs to be replaced by at least 3 Star AC or better at the end of their technical lifetime. ➤ Evaporative cooling can be availed for computer lab. 	

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	The college is availing the services of the Green Audit since 2019. The college has appropriately disabled the screen savers and programmed the computers for sleep mode operations. Please refer



during the day?	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, printers etc.)	No, the college has the administrative rights. Such changes cannot be initiated by users.
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.
Conclusion:	
➤ The Electrical Equipment's are well operated. Redundant operations are avoided.	

6. Water Management

Are any water leaks identified?	The urinals are flushed periodically and manually. The urinals need to be equipped with push button taps. Please refer below recommendation.
Are taps left running? Are there any dripping taps? Do taps need maintenance?	No such instance was observed.
Are push button taps utilized?	Toilet washrooms are not equipped with the push buttons. Please refer below recommendation.
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?	Recommendation: The college Management needs to consider dedicated flush at urinals (in place of periodic manual flushing), low-flow faucets, automatic faucets, and/or faucet aerators as the replacement for the existing conventional taps.
Has the college installed low-flow shower heads at Hostel?	NA
Has the college harvested rainwater?	Yes, the rain water is harvested over the college building but not stored. Recommendation: College needs to collect the harvested water in tank or recharge



	the existing well and reuse it.
Is the college collecting the condensation from A/C units for onsite watering needs?	No. Recommendation: College needs to collect the condensed water from the AC and reuse it for watering plants.
Has the college optimized its irrigation system for gardening to <ul style="list-style-type: none"> operate at night or early morning hours to minimize evaporation? water the minimum time and frequency necessary for the applicable vegetation? 	No. 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: <ul style="list-style-type: none"> College needs to install the metering arrangement to measure the water drawn from bore well. College needs to install drip-irrigation system for watering the plants.
What is amount of rain water harvested?	Total area of roof top of college building is 473.55 m ² . The rainfall for Nagpur City is approximately 1018.2 mm. Total rain water harvesting is 433 m ³ at the run off coefficient of 0.9. The college has also laid the cement blocks. This enables the rain water falling on the cement blocks to get recharged in the ground. The area under the cement block is approximately 800 m ² . The run off coefficient is considered as 0.3 based on the Manual on Artificial Recharge of Ground Water, issued by Government of India, Ministry of Water Resources, Central Ground Water Board, September 2007. The water rain water harvested from the cement blocks is 244 m ³ . Total quantity of water harvested = 433 + 244 = 677 m ³ Please refer Annexure XII and XVIII for details.
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 rd Party Water?	No.
Further Scope of Improvement:	
Long Term Measure:	
<ul style="list-style-type: none"> ➤ The college Management needs to consider dedicated flush at urinals (in place of periodic manual flushing), 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 harvested water in tank and reuse it. ➤ College needs to collect the condensed water from the AC and reuse it for watering plants. 	



- Toilet urinals can be equipped with the push buttons.

Conclusion:

- The college is having 01 no. of borewell.

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?	No. Recommendation: The college needs to conduct 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 Solar PV System of 20kW.
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?	Students: Total 350 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 of last assessment: Approximately: <ul style="list-style-type: none"> • 70% students of the college commute by their college by their own 2 wheelers.
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	<ul style="list-style-type: none"> 30% students of the college commute by public transport (Star Bus / City Bus) <p>Faculties: There are 23 staff members in the college, out of which:</p> <ul style="list-style-type: none"> 70% Staff of the college utilize 2-wheeler vehicle 16% use 4-wheeler vehicle for commuting 10% of the faculties are using bicycle and 4% commute by walking
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?	No vehicle is driven inside the campus every First Saturday. Recommendation: College Management should encourage use of bi-cycle and mass transport systems amongst faculties.
Further Scope of Improvement:	
<ul style="list-style-type: none"> College Management should encourage use of bi-cycle and mass transport systems amongst faculties. 	
Conclusion:	
<ul style="list-style-type: none"> The college management, its employees and the students observe satisfactory practices of transportation/ commutation. 	

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.
Further Scope of Improvement:	
The college should further emphasize on the purchase of:	
<ul style="list-style-type: none"> no- to low-odor (VOC) markers no- to low-VOC paints? (Via Facilities) 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"> ➤ Computers ➤ Lighting ➤ Air-Conditioning ➤ Fans ➤ Pumps ➤ Other Lab Equipment
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"> ➤ To study electricity bills ➤ Study of lighting system and its measurement. ➤ Identification of energy saving opportunity and energy conservation.
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>Below energy conservation measures are suggested</p> <ul style="list-style-type: none"> ➤ The one switch for college concept should be implemented in the college. This will avoid unwanted operation and wastage of electricity. ➤ There are 40 W tube lights with copper chokes. 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 40-20 = 20 watt/fitting. As per study there are 63 tubes of 40 W in college and library. After the replacement based on failure the energy savings will be approximately 1753.92 kWh/year. ➤ All Class Rooms must sensitize students regarding optimum use of electrical appliances in the room like, lights, fans, and computers. ➤ 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.
Has the college calculated its carbon footprint?	<p>The data applicable to Scope-2 emission (electricity purchase from grid) is available. The emissions pertaining to Scope-01 are limited to HSD use in DG, buses and LPG usage in Labs.</p>
How college is	<p>Not applicable. There is no internal transportation within the college.</p>



promoting zero emission transportation options?																																											
Are all the applicable emission sources calculated?	<p>The emission source pertaining to grid-based electricity source is calculated. Scope-01 emission source data pertaining to DG, HSD consumption in DG, LPG consumption in labs is calculated, Scope 2 emission on account of electricity imported from grid is considered.</p> <p>Scope-01 Emissions:</p> <table border="1"> <thead> <tr> <th>Year</th> <th>HSD Consumption in DG</th> <th>LPG consumption in Labs</th> </tr> </thead> <tbody> <tr> <td>Session</td> <td>lit</td> <td>kg</td> </tr> <tr> <td>2020-21</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p>Equivalent Scope-01 Emissions are as below⁷:</p> <table border="1"> <thead> <tr> <th>Year</th> <th>HSD Consumption in DG</th> <th>LPG consumption in Labs</th> <th>Total GHG Emission (Scope-1)</th> </tr> </thead> <tbody> <tr> <td>Session</td> <td>tCO₂</td> <td>tCO₂</td> <td>tCO₂</td> </tr> <tr> <td>2020-21</td> <td>-</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p>Scope -2 Emissions are tabulated as follows⁸:</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Annual Electricity Consumption</th> <th>Total GHG Emission (Scope-2)</th> </tr> </thead> <tbody> <tr> <td>Session</td> <td>kWh</td> <td>tCO₂</td> </tr> <tr> <td>2020-21</td> <td>1338</td> <td>1.34</td> </tr> </tbody> </table> <p>Total CO₂ emissions for financial year 2020 - 21 = Scope-01 + Scope-02</p> <table border="1"> <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>tCO₂</td> <td>tCO₂</td> <td>tCO₂</td> </tr> <tr> <td>2020-21</td> <td>-</td> <td>1.34</td> <td>2.00 (Rounded value)</td> </tr> </tbody> </table>	Year	HSD Consumption in DG	LPG consumption in Labs	Session	lit	kg	2020-21	-	-	Year	HSD Consumption in DG	LPG consumption in Labs	Total GHG Emission (Scope-1)	Session	tCO ₂	tCO ₂	tCO ₂	2020-21	-	-	-	Year	Annual Electricity Consumption	Total GHG Emission (Scope-2)	Session	kWh	tCO ₂	2020-21	1338	1.34	Year	Total GHG Emission (Scope-1)	Total GHG Emission (Scope-2)	Total GHG Emission (Scope-1+2)	Session	tCO ₂	tCO ₂	tCO ₂	2020-21	-	1.34	2.00 (Rounded value)
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⁷With 10 % uncertainty

⁸With 10 % uncertainty



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 class room are well ventilated and spacious. This minimizes suffocation to students by improving air changes and hence the air quality.

➤ 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 into the scrap bin and given to the agency for proper disposal. MoU of waste handling with **Maitri Parivar** is executed.

➤ **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. MoU of cellulose waste handling with **Maitri Parivar** is executed.

Please refer Annexure XIII for details.

Conclusion:

- Satisfactory practices of waste handling are followed by college.



13. 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. As the College is located in city premises the of campus is smaller in size, so the college does not have much scope for tree plantation. In the current session, the Institution planted several trees in the vicinity.

There are 35 fully grown trees as wells as shrubs in the campus.

The college has planted trees 35 outside the campus near boundary wall adjacent railway line.



V.S.P.M. Academy of Higher Education

**CENTRAL INSTITUTE OF BUSINESS MANAGEMENT
RESEARCH & DEVELOPMENT**

Pawanbhumi, Somalwada, Wardha Road, Nagpur - 440 025 (MS)
Website : www.cibmr.edu.in / E-mail : cibmr@gmail.com



Recogd. By AICTE, DTE Code : MB4110
Affiliated to Nagpur University

Phone : 2289913, 2292367
Fax : 0712 - 2289913

Ref. No. : MBA/02/2022


12/01/2022

This is to state that we are having following trees in our campus :

1. Palm trees-11 numbers
2. Karanj trees-2 numbers
3. Lemon tree-1 number
4. Mango tree-1 number
5. Chafa trees-2 numbers
6. Ashoka trees- 18 numbers

We have also planted trees outside campus, near boundry wall of adjacent railway line

1. Ashoka trees- 8 numbers
2. Neem trees- 10 numbers
3. Palm trees- 10 numbers
4. Karanj trees- 7 nmbers


(Dr.amishi Arora)
Principal

Principal
Central Institute of Business Management
Research & Development, Nagpur.

List of trees in the campus



Annexure



Annexure – I: List of Interviewed College Staff / Students

V.S.P.M. Academy of Higher Education

**CENTRAL INSTITUTE OF BUSINESS MANAGEMENT
RESEARCH & DEVELOPMENT**

Pawanbhumi, Somalwada, Wardha Road, Nagpur - 440 025 (MS)
Website : www.cibmrd.edu.in / E-mail : cibmrd@gmail.com



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Affiliated to Nagpur University

Phone : 2289913, 2292367
Fax : 0712 - 2289913

Ref. No. : MBA /

List of interviewed Teaching / Non teaching staff-2020-21

Sr.No	Name	Designation	Signature
1	Dr. Amishi Arora	Principal	
2	Dr. Ajay Talwekar	A. Professor	
3	Dr. Sagar Khursdngne	A. Professor	
4	Dr. Ravindra Gharpure	A. Professor	
5	Dr. Anup K. Suchak	A. Professor	
6	Mr. Rajendra H. Chore	Liibrarin	
7	Mr. Sanjay N. Raut	Accountant	
8	Mr. Niraj S. Kalbande	Clerk	
9	Mr. Ashwin Meshram	Computer Lab. Assistant	
10	Mr. Tejendra Girde	Senior Clerk	
11	Mr.Pravin Wankhade	Comp. Operator	

Principal

Central Institute of Business Management
Research & Development, Nagpur.



Annexure – II: Reference Documents / Surveys

Sr. No	Reference Documents / Surveys pertaining to
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 January 2021 to December 2021
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

V.S.P.M. Academy of Higher Education

**CENTRAL INSTITUTE OF BUSINESS MANAGEMENT
RESEARCH & DEVELOPMENT**

Pawanbhumi, Somalwada, Wardha Road, Nagpur - 440 025 (MS)
Website : www.cibmrd.edu.in / E-mail : cibmrd@gmail.com



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Fax : 0712 - 2289913

Ref. No. : MBA/01/2022

12/01/2022

Green Campus Committee for CIBMRD:

	Name of interviewee	Designation
1.	Dr.Amishi Arora	Principal
2.	Dr.Ajay Talwekar	Asst. Professor
3.	Prof. Ram Shegaye	Maintenance in charge
4.	Dr.Yogita Sure	Asst. Professor
5.	Mr.Sanjay Raut	Cashier
6.	Mr.Tejudra Girde	Sr. clerk
7.	Mrs.Sarika Gunjal	Peon
8.		Student
9.		Student
10.		Student

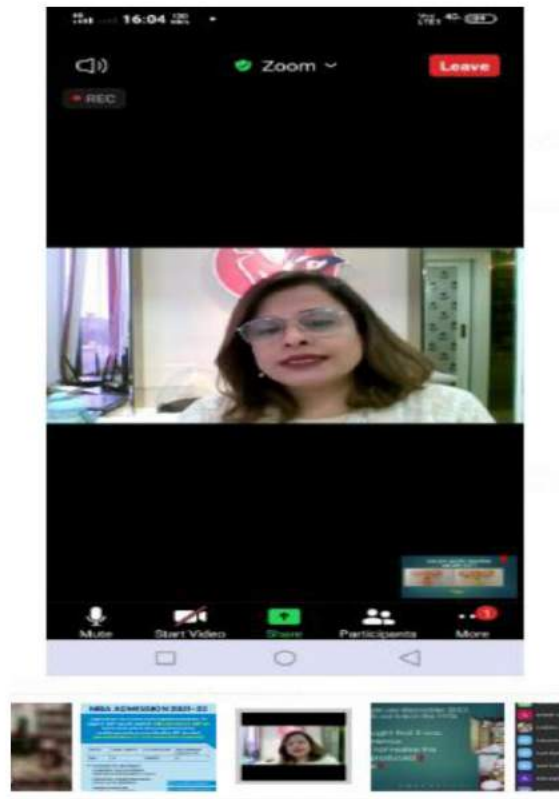

(Dr.amishi Arora)

Principal

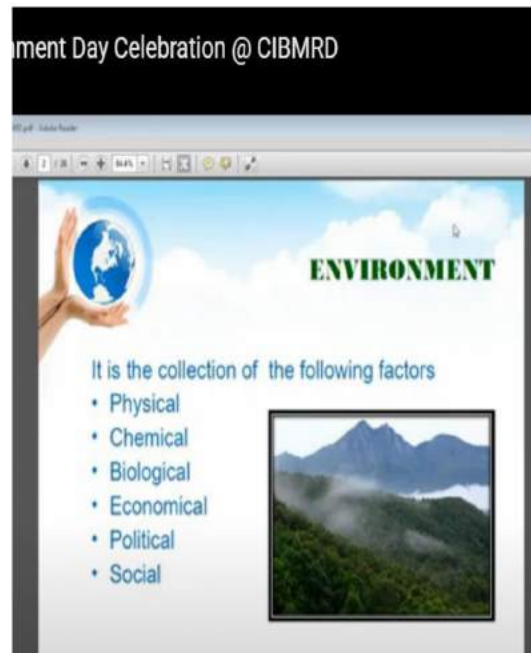
Principal
Central Institute of Business Management
Research & Development, Nagpur.



Annexure – IV: List of Awareness Program Undertaken by College



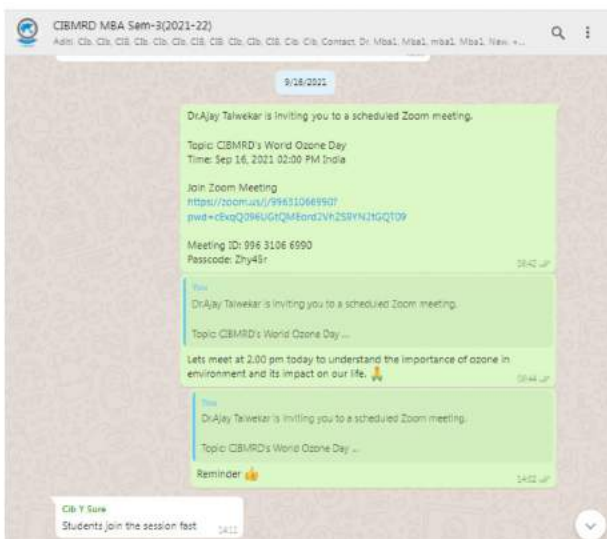
Online workshop on the occasion of Menstrual Hygiene Day on 25th May 2021



Online workshop on the occasion of World Environment Day on 05th June 2021



Online workshop on the occasion of Yoga Day on 21st June 2021



Online workshop on the occasion of World Ozone Day on 01st September 2021



Online workshop on Waste Management on 02nd October 2021



Annexure –V: Lighting Survey (2020 – 21)

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: 110-120⁹

- 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 257 working days

Light Sources	Daily Wh Consumption
Tube light	9568
LED	5990
CFL	3553

Light Sources	% Contribution
Tube light	50%
LED	31%
CFL	19%

Light Sources	Number
Tube light	63
LED	84
CFL	147

Light Sources	% Contribution
Tube light	21%
LED	29%
CFL	50%

⁹<https://www.google.co.in/amp/s/www.bijlibachao.com/lights/comparing-led-lights-with-fluorescent-lights.html%3fisamp=1>



Lighting Survey 2020 – 21

Room Name/no.	Tube light	Watts	Daily average hrs	W.hr	LED	Watts	Daily average hrs	W.hr	CFL	Watts	Daily average hrs	W.hr	Fan	Watts	Daily average hrs	W.hr
Admin Office	1	40	6	240	2	20	6	240	-	-	-	-	3	80	6	1440
Admin Office	2	40	6	480	-	-	-	-	-	-	-	-	1	80	6	480
Bathroom	1	40	2	80	-	-	-	-	-	-	-	-	-	-	-	-
Staff Room	-	-	-	-	3	20	6	360	-	-	-	-	3	80	6	1440
Ladies Toilet	-	-	-	-	3	15	2	90	-	-	-	-	-	-	-	-
Ladies Toilet	-	-	-	-	1	20	2	40	-	-	-	-	-	-	-	-
4B Classroom	2	40	4	320	6	20	4	480	-	-	-	-	6	80	4	1920
4C Classroom	3	40	4	480	1	20	4	80	-	-	-	-	2	80	4	640
Class Room	5	40	4	800	-	-	-	-	-	-	-	-	2	80	4	640
Sick Room	1	40	2	80	1	10	2	20	-	-	-	-	-	-	-	-
Gents Toilet	2	40	2	160	-	-	-	-	-	-	-	-	-	-	-	-
Boys Common Room	6	40	4	960	2	20	4	160	-	-	-	-	-	-	-	-
Corridor	3	40	1	120	3	20	1	60	-	-	-	-	-	-	-	-
Campus Ground	1	40	1	40	8	20	1	160	-	-	-	-	-	-	-	-
Campus Ground	-	-	-	-	3	10	1	30	-	-	-	-	-	-	-	-
Guard Room	1	36	6	216	-	-	-	-	-	-	-	-	-	-	-	-
Canteen	-	-	-	-	2	20	6	240	-	-	-	-	2	80	6	960
Canteen	2	40	6	480	-	-	-	-	-	-	-	-	1	80	6	480
Examination Control Office	4	40	6	960	-	-	-	-	-	-	-	-	2	80	6	960
Principal Office	-	-	-	-	-	-	-	-	4	8	6	192	1	80	6	480
Faculty Room	-	-	-	-	3	20	6	360	1	15	6	90	4	80	6	1920
Boys Toilet	-	-	-	-	1	20	6	120	-	-	-	-	-	-	-	-
Class Room 1	4	40	4	640	-	-	-	-	-	-	-	-	4	80	4	1280
Computer Center	3	40	6	720	1	20	6	120	-	-	-	-	-	-	-	-
Computer Center	-	-	-	-	4	20	6	480	-	-	-	-	6	80	6	2880
Board Room	-	-	-	-	5	20	2	200	-	-	-	-	2	80	2	320



Record Room	-	-	-	-	1	20	2	40	-	-	-	-	-	-	-	-
Room No. 13-5	5	40	4	800					-	-	-	-	-	-	-	-
Store Room	-	-	-	-	1	20	2	40	-	-	-	-	-	-	-	-
Room No. 5	1	40	2	80	-	-	-	-	-	-	-	-	-	-	-	-
Corridor	4	40	1	160	-	-	-	-	1	15	1	15				
Placement Cell	1	36	6	216	2	20	6	240	-	-	-	-	2	80	6	960
E.D. Cell	2	40	6	480					-	-	-	-	2	80	6	960
Class Room 4	1	40	4	160	2	20	4	160	-	-	-	-	-	-	-	-
Girls Toilet	1	36	2	72	1	15	2	30	-	-	-	-	-	-	-	-
Gents Toilet	1	36	2	72	-	-	-	-	-	-	-	-	-	-	-	-
Class Room 2	4	40	4	640	1	20	4	80	-	-	-	-	-	-	-	-
Library	-	-	-	-	21	20	4	1680	-	-	-	-	14	80	4	4480
Corridor	1	40	1	40	-	-	-	-	26	12	1	312	4	80	1	320
YCMOU Office	-	-	-	-	3	20	6	360					2	80	6	960
Classroom 8	-	-	-	-	-	-	-	-	8	8	4	256	1	80	4	320
Room No. 8	-	-	-	-	-	-	-	-	8	8	4	256	1	80	4	320
Girls Common Room	-	-	-	-	-	-	-	-	10	8	4	320	2	80	4	640
Girls Common Room	-	-	-	-	-	-	-	-	2	12	4	96	-	-	-	-
IQAC Office	-	-	-	-	-	-	-	-	4	8	4	128	-	-	-	-
Gents Toilet	1	36	2	72	1	20	2	40	-	-	-	-	-	-	-	-
Ladies Toilet	-	-	-	-	2	20	2	80	-	-	-	-	-	-	-	-
Computer Lab	-	-	-	-	-	-	-	-	11	8	4	352	4	80	4	1280
Seminar Hall	-	-	-	-	-	-	-	-	56	12	2	1344	15	80	2	2400
Corridor	-	-	-	-	-	-	-	-	16	12	1	192	3	80	1	240
Total	63			9568	84			5990	147			3553				28720



On & off culture practiced in college



Use of LED lights in college



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

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Pawanbhumi, Somalwada, Wardha Road, Nagpur - 440 025 (MS)
Website : www.cibmrd.edu.in / E-mail : cibmrd@gmail.com



Recogd. By AICTE, DTE Code : MB4110
Affiliated to Nagpur University

Phone : 2289913, 2292367
Fax : 0712 - 2289913

Ref. No. : MBA /

Certificate

The administrative Rights of computer setting are with the administrative department of the college.

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

1. All the computer screen savers are disabled.
2. The computer screen are turned to sleep mode if they are ideal.
3. The computer setting cannot change as the administrative rights are with the department.
4. With regards to the users policy of photocopy 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.


(Dr. Amishi Arora)

Principal

Principal
Central Institute of Business Management
Research & Development, Nagpur.



Annexure –VII: Water Quality Reports

Note: College needs to conduct Third Party Water Testing.

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

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Website : www.cibmrd.edu.in / E-mail : cibmrd@gmail.com



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Affiliated to Nagpur University

Phone : 2289913, 2292367
Fax : 0712 - 2289913

Ref. No. : MBA/03/2022

12/01/2022

List of electric/electronic equipment :

1. Computers 80 numbers
2. Laptop 2 numbers
3. Projectors 6 numbers
4. Printers 13 numbers
5. Canon copier machines 2 numbers
6. Water coolers 4 numbers
7. Water purifiers 4 numbers


(Dr. Arushi Arora)

Principal

Principal
Central Institute of Business Management
Research & Development, Nagpur.



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Fax : 0712 - 2289913

Ref. No. : MBA/04/2022

12/01/2022

List of electric / electronic equipment purchased during Jan to Dec 2021:

1. Computer system I-3 with LED 20 inch monitor- 10 numbers
2. Computer system I-3 only (HP Desktop)- 15 numbers
3. Hitachi Projectors 32xxga- 4 numbers
4. Canon copier- 2 numbers
5. Water cooler with purifier- 2 numbers


(Dr. Anishi Arora)
Principal

Principal
Central Institute of Business Management
Research & Development, Nagpur.



Annexure –IX: Solar Panel Installations



Solar Panel's



AC Distribution Board



Inverter



Annexure –X: Water Distribution Data

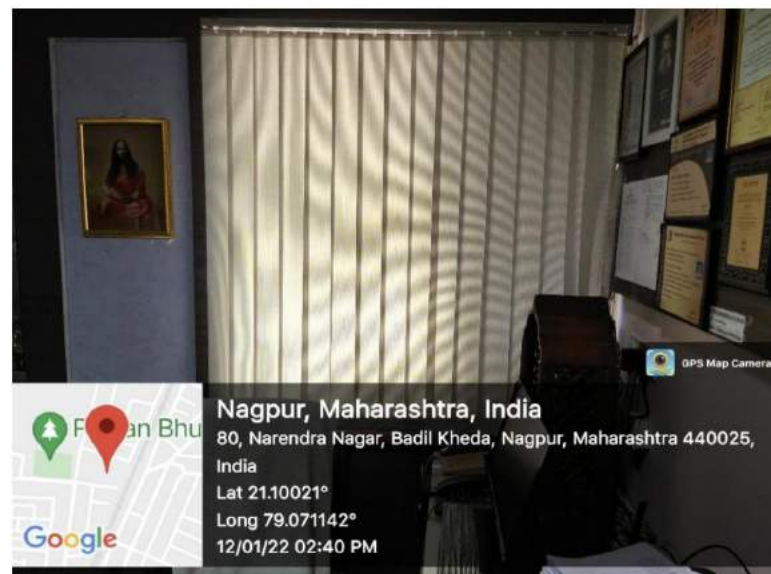
Note: The water is drawn from 01 no. of borewell. The water drawn is not measured. Recommendation to monitor the water drawn is raised under chapter 6 of this report.

Annexure –XI: Solar Passive Structure / Drip Irrigation

Note: No Drip Irrigation System Installed in College



Adequate light in classrooms without using electrical lighting



Use of blinds for windows to reduce heat



Solar Passive Structure



Use of False Ceiling



AC Condensers exposed to direct sunlight



Annexure –XII: Water Management



Pipeline of Water Harvesting System



Bore Well



Cocks to be replaced by push buttons



Taps to be replaced by Push Buttons



RO Units in college



Annexure –XIII: Waste Management



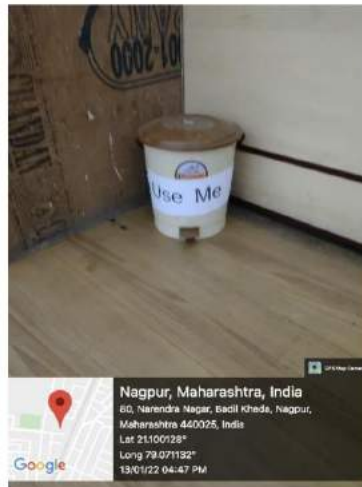
Ban on single use plastic in college campus



E-waste Collection Bin



Dustbins in class



Dustbins in corridor



Dustbins in office



Compost Pit



Dustbins in Campus



Cement blocks in college for Water Harvesting



MEMORANDUM OF UNDERSTANDING / AGREEMENT

This Memorandum of Undertaking (MOU) is made on this day, the 18-06-2018 between **Maitree Pariwar Sanstha** having its office at Prabha Nivas, Jail Road, Rahate Colony, Nagpur 440022 the expression of which shall include authorized representative Mr. , SANJAY BHENDE *Chairman, Maitree Parivar Sanstha, Nagpur.* of the first part hereinafter called as **Maitree Pariwar**.

And

VSPMAHE's Central Institute of Business Management Research and Development having its Office at Plot no.D, Pawanbhumi Layout, Somalwada, Wardha Road, Nagpur 440025 represented by its Principal Dr Amishi Arora of the second part hereinafter called as **CIBMRD**

The activities for which this MoU is signed are to be known as "**Social Service and CSR activities**" under the umbrella of Maitree Parivar Sanstha" whereas CIBMRD is desirous of executing social service and CSR activities under the umbrella of Maitree Parivar Sanstha . Detailed scope of these activities will be as under

A.Environment : An effort will be taken by the students of CIBMRD to create awareness about the environment in the citizens of the Pawanbhumi Layout and its vicinity . Awareness creation and demonstration about waste management will be done. Tree plantation in open areas will be organized.

B.Best out of Waste: The students of the CIBMRD with experts of the Maitree Parivar will collect the plastic and electronic waste and old stacks of the books and news papers from the students and staff as well from the citizens of the Pawan Bhumi Layout Nagpur and process for recycling as well as donation to the needy.

C. Cultural Programs: Cultural programs will be organized for the students of the CIBMRD and other colleges to keep up with happiness and relaxation. Platform will be provided to display their talents and artistic abilities. Also best of them will be honored and awarded.



1. Responsibilities of CIBMRD shall;

- a) To execute the activity as per the detailed proposal approved by Maitree PARIVAR
- b) To display board / s at such location /s at the service activity site as may be prescribed by Maitree Pariwar
- c) To furnish reports on the project to Maitree Pariwar or any other agency designated by Maitree Pariwar in such format and periodicity as may be prescribed by Maitree Pariwar.
- d) To provide assistance for inspection of the service site by officers of Maitree Pariwar or any other persons authorized by Maitree Pariwar as and when required by Maitree Pariwar.
- e) To constitute and provide student task force committee for aiding the members of Maitree Pariwar in dispensing off the CSR related activities.

2. Responsibilities of Maitree Pariwar shall:

- a) To Carry out inspections of the service site/ activity after due notice to CIBMRD and carry out such inspections during regular working hours of CIBMRD
- b) Not divulge any information relating to the project executed by CIBMRD or any other details relating to CIBMRD to any third party without the prior approval of CIBMRD
- c) To furnish a certificate to CIBMRD in accordance with the scheme within a period not exceeding one week from the completion of the activity to the satisfaction of Maitree Pariwar.

3. Force Majeure: In the event of non-fulfillment of the terms and conditions of this MOU due to any reason of force majeure namely fires, wars, riots, strikes, natural calamities, etc., neither Maitree Parivar nor CIBMRD shall be held responsible for any loss or consequential loss.



4. **Liabilities** : Maitree Parivar shall not be liable for:

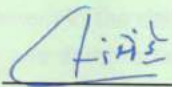
- a. Any payments of claims by employees of CIBMRD
- b. Discharging any financial commitments made by CIBMRD
- c. Any suit on account of demands for infringement of any laws by CIBMRD

5. **Amendment to the MOU:** The obligation of Maitree Pariwar and CIBMRD have been outlined in this MOU. However, during the operation of the MOU, circumstances may arise which call for alteration or modifications of this MOU. These modifications/alterations will be mutually discussed and agreed upon in writing.

6. **Period of Validity:** This MOU shall be valid for 5 years from the date of agreement and may be renewed subsequently by mutual consent of both the parties.

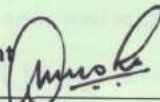
7. **Arbitration:** Any dispute arising with regard to any aspect of this MOU shall be settled through mutual consultations and agreements by the parties to the MOU.

For Maitree Pariwar Sanstha

 अरवि, मंडल
नागपुर



For Central Institute of Business Management
Research & Development


Dr. AMISHI ARORA



Principal
Central Institute of Business Management
Research & Development, Nagpur.

MOU of E-waste and Cellulose Waste Management



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Ref. No. : MBA/

No.CIBMRD/Notice/ /2021.

NOTICE

**Single Use Plastic is
Banned in college
Campus.**

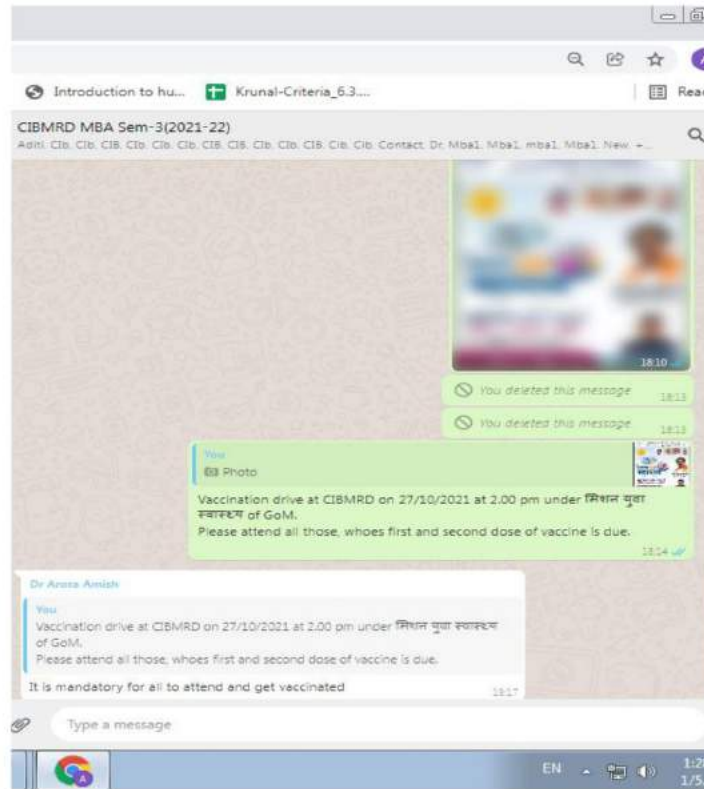

(Dr. Amishi Arora)
Principal

Principal
Central Institute of Business Management
Research & Development, Nagpur.

Ban on Single Use Plastic Notice



Annexure –XIV: Awareness / Posters



Covid vaccination drive at CIBMRD for students, staff and citizens in association with government hospital team on 27th October 2021.





Landscaping of trees and plants in the college campus



Biometric attendance for staff members



Fire Extinguishers in college



V.S.P.M. Academy of Higher Education

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Ref. No. : MBA/

No.CIBMRD/Notice/ /2021.

NOTICE

First Saturday of every
month will be no
vehicle day. All are
requested to comply


(Dr. Amishi Arora)
Principal

Principal
Central Institute of Business Management
Research & Development, Nagpur.

No Vehicle Day Notice



Annexure –XV: Onsite Measurements (Sample Pictures)



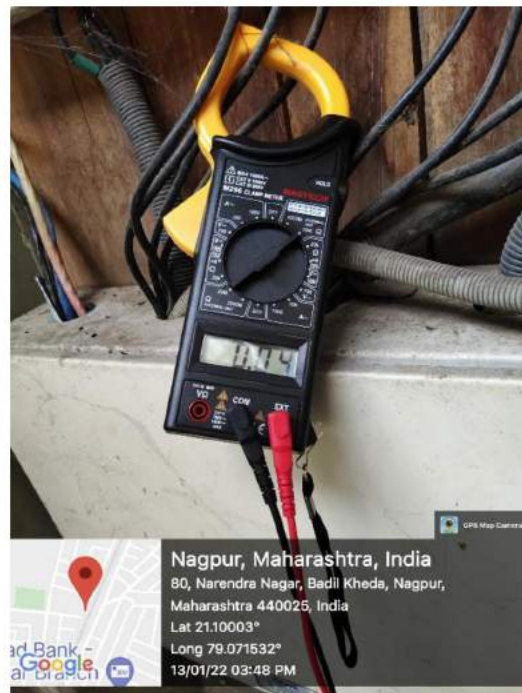
Onsite measurements taken by Green Audit Team



Lux Meter reading in classroom



Lux meter reading in Computer Lab



Energy Audit Readings

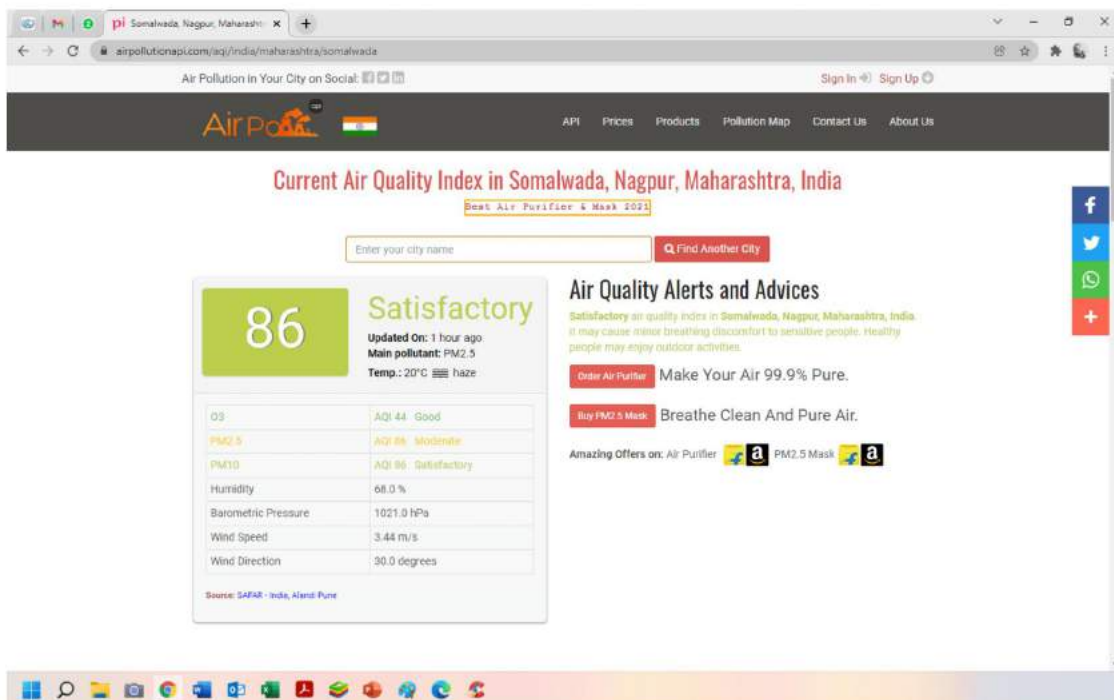


Annexure –XVI: Sound and Air Quality Readings

WHO/ CPCB Guidelines for Noise¹⁰

Specific Environment	Time Base (hours)	Standard limits as per WHO guidelines	
		LAeq [dB]	LAm _{ax} , 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 publically available, reliable and reproducible source. Air Quality was found satisfactory however it is variable and changes with season and anthropogenic activities.

¹⁰ <https://cpcb.nic.in/who-guidelines-for-noise-quality/>, http://cpcbenvis.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



Campus



Library



Class Room



Office

Readings of sound at various locations in college



Action Taken Report

V.S.P.M. Academy of Higher Education

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Ref. No. : MBA /

Action Taken Report

Last Audits Recommendation	Action Taken
The Assessment Team observed that CRT monitor is utilized in the computer lab. Since additional LCD monitors are available, the CRT monitor should be replaced with existing LCD monitors and CRT monitor should be utilized as back-up measure in case of failure of LCD monitors.	Done
College must ensure that condenser of AC's are not exposed to direct sunlight.	Since there were no students in the college because of Covid- protocol, these resources were not used. We have processed this requirement for sanction from management; we will do it as early as possible.
College should appoint independent third party for drinking water testing at least once in a semester.	Since there were no students in the college because of Covid- protocol, these resources were not used. We have processed this requirement for sanction from management; we will do it as early as possible.
Vending Machine and Incinerator Machine for sanitary pads needs to be installed in girl's common room.	The institute authorities would not like to encourage the use of sanitary napkins and hence we are totally against the installation of vending machine and incinerator. Instead, we repeated conduct awareness programs of gynecologists who strongly advice the use of reusable cloth napkins as silicon cups.
Drip irrigation system needs to be installed in college campus for gardening	Since there were no students in the college because of Covid- protocol, these resources were not used. We have processed this requirement for sanction from management; we will do it as early as possible.
College needs to install the metering arrangement to measure the water drawn from bore well.	Since there were no students in the college because of Covid- protocol, these resources were not used. We have processed this requirement for sanction from management; we will do it as early as possible.
The college Management needs to consider the low-flow faucets, automatic faucets, and/or faucet aerators as the replacement for the existing conventional taps	Since there were no students in the college because of Covid- protocol, these resources were not used. We have processed this requirement for sanction from management; we will do it as early as possible.


(Dr. Amishi Arora)
Principal

Principal

Central Institute of Business Management
Research & Development, Nagpur.



Annexure –XVII: Energy Audit Report

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

Instrument Used for the Study: -

1. 3 Phase power Data Logger – Fluke 1735 model

The 3-phase power analyzer and data logger were 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.



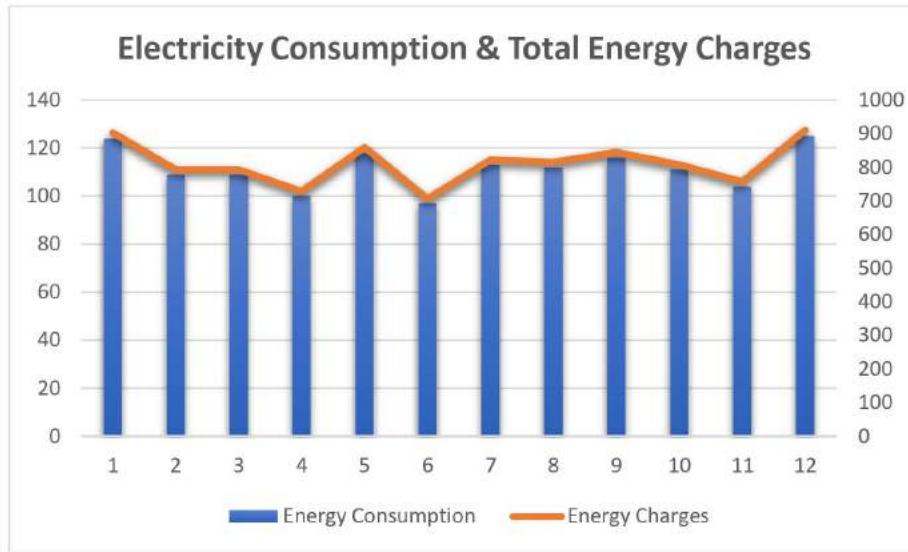
Chapter 2 – Electrical Bill Analysis

Electricity bill pattern under consideration is from January 2021 to December 2021

Consumer No	419990018139
Tariff	88 /LT-VII B I
Category	LT-X Public Services 20-50kW
Connected Load	31 kW
Contract Demand	20.00
50% of Contract Demand	10.00

Sr. No.	Month	Energy Consumption	Rate/kWh	Energy Charges	Total Charges
1	Jan-21	124	7.28	902.72	5171
2	Feb-21	109	7.28	793.52	4922
3	Mar-21	109	7.28	793.52	9409
4	Apr-21	100	7.28	728	4929
5	May-21	118	7.28	859.04	5047
6	Jun-21	97	7.28	706.16	658
7	Jul-21	113	7.28	822.64	4946
8	Aug-21	112	7.28	815.36	4893
9	Sep-21	116	7.28	844.48	5187
10	Oct-21	111	7.28	808.08	5105
11	Nov-21	104	7.28	757.12	5018
12	Dec-21	125	7.28	910	5005
Average		110	7.28	803	5024
Yearly		1338		9741	60290

Table: Monthly Electricity Consumption Details (January 2021- December 2021)



Graphical Representation of Electricity Consumption and Total Energy Charges

Observations from Bill Analysis for year January 2021- December 2021:

1. Average monthly MSEDCL energy consumption is **110** Units (kWh) and avg. monthly bill is **Rs. 5024**
2. Average of 12 months' unit cost is Rs.7.28/kWh. (Excluding Tax).



Chapter 3: Electrical Logging for Main Feeder

Start(India Standard Time)	Vrms_A_N_avg	Vrms_B_N_avg	Vrms_CN_avg	Vrms_A_B_avg	Vrms_B_C_avg	Vrms_CA_avg	Irms_A_avg	Irms_B_avg	Irms_C_avg	Vdistor_sion_VA_avg	Vdistor_sion_VB_avg	Vdistor_sion_VC_avg	Vdistor_sion_IA_avg	Vdistor_sion_IB_avg	Vdistor_sion_IC_avg
11:48:50	238	233	239	407	410	412	15.9	24.3	17.9	1.5	1.5	1.8	8.4	4	14.4
11:49:00	238	233	239	407	410	412	15.9	24.4	17.9	1.6	1.5	1.8	8.4	4	14.4
11:49:10	238	233	239	407	410	412	15.9	24.3	17.8	1.5	1.5	1.8	8.5	4.2	14.3
11:49:20	238	233	239	407	410	413	15.9	24.4	17.8	1.5	1.5	1.8	8.5	4.1	14.3
11:49:30	238	233	239	407	410	413	15.9	24.4	17.6	1.5	1.5	1.7	8.4	4	14.6
11:49:40	238	233	239	407	410	413	15.9	24.4	18.1	1.6	1.6	1.8	8.4	4	14
11:49:50	238	233	239	407	409	413	15.9	24.4	18.3	1.5	1.5	1.7	8.4	3.9	14
11:50:00	238	233	238	407	409	412	15.9	24.3	18.4	1.6	1.5	1.8	8.4	3.9	13.8
11:50:10	238	233	239	407	410	412	15.9	24.3	18.4	1.6	1.6	1.8	8.5	4	13.7
11:50:20	238	233	239	407	410	412	15.9	24.1	18.4	1.6	1.6	1.8	8.5	4	13.7
11:50:30	238	233	238	407	410	412	15.9	23.8	18.4	1.5	1.5	1.7	8.5	4.1	13.7
11:50:40	238	233	238	407	410	412	15.9	23.8	18.4	1.6	1.5	1.8	8.5	4.2	13.7
11:50:50	238	233	238	407	410	412	15.9	23.8	18.4	1.5	1.5	1.8	8.6	4.3	13.7
11:51:00	238	233	239	407	410	412	15.9	23.8	18.4	1.5	1.5	1.8	8.6	4.2	13.7
11:51:10	238	233	239	407	410	412	15.9	23.8	18.4	1.5	1.5	1.8	8.6	4.2	13.7
11:51:20	238	233	239	407	410	412	16.4	23.8	18.4	1.6	1.5	1.8	8.4	4.2	13.7
11:51:30	238	234	239	407	410	413	16.5	23.8	18.4	1.5	1.5	1.7	8.3	4.2	13.8
11:51:40	238	234	239	407	410	413	16.4	23.8	18.4	1.5	1.5	1.7	8.2	4.2	13.8
11:51:50	238	234	239	407	411	413	16.4	23.8	18.5	1.6	1.5	1.8	8.2	4.2	13.7
11:52:00	238	234	239	408	410	413	16.3	23.8	18.5	1.5	1.5	1.7	8.2	4.1	13.7
11:52:10	238	233	239	407	410	413	16.3	23.8	18.4	1.5	1.5	1.7	8.1	4	13.7



11:52:20	238	233	239	407	410	413	16.3	23.8	18.5	1.5	1.5	1.7	8.1	4	13.7
11:52:30	238	233	239	407	410	412	16.4	23.8	18.4	1.5	1.5	1.7	8.1	4.1	13.8
11:52:40	238	233	239	407	410	412	16.4	23.9	18.4	1.5	1.5	1.7	8.1	4.1	13.7
11:52:50	238	233	239	407	410	412	16.4	24.2	18.4	1.4	1.4	1.7	8.1	4	13.8
11:53:00	238	233	239	407	410	412	16.3	24.2	18.4	1.5	1.4	1.7	8.1	4	13.8
11:53:10	238	233	239	407	410	413	16.3	24.2	18.4	1.5	1.5	1.7	8.1	4	13.7
11:53:20	238	233	239	407	410	413	16.3	24.1	18.4	1.5	1.5	1.7	8.1	4	13.8
11:53:30	238	233	239	407	410	413	16.4	24.2	18.4	1.5	1.5	1.7	8.1	4	13.8
11:53:40	238	233	239	408	410	412	16.3	24.2	18.4	1.5	1.5	1.8	8.1	4	13.8
11:53:50	238	233	239	408	410	413	16.3	24.1	18.4	1.5	1.5	1.7	8.1	4	13.8
11:54:00	238	233	239	407	410	413	16.3	24.1	18.4	1.5	1.4	1.7	8	3.9	13.8
11:54:10	238	233	239	407	410	413	16.3	24.1	18.4	1.5	1.4	1.7	8.1	4	13.8
11:54:20	238	233	239	407	410	413	16.3	24.1	18.4	1.5	1.5	1.8	8.2	4.1	13.8
11:54:30	238	233	239	407	410	412	16.3	24.1	18.4	1.5	1.5	1.7	8.2	4.1	13.8
11:54:40	238	233	239	407	410	412	16.4	24.2	18.4	1.6	1.5	1.8	8.3	4	13.8
11:54:50	238	233	239	407	410	413	16.4	24.2	18.4	1.6	1.5	1.8	8.3	4	13.7
11:55:00	238	233	239	407	410	412	16.4	24.1	18.3	1.6	1.5	1.8	8.2	3.9	13.5
11:55:10	238	233	239	407	410	413	16.4	24.1	18.3	1.5	1.4	1.7	8.2	3.9	13.4
11:55:20	238	233	239	407	410	413	16.4	24.1	18.3	1.5	1.4	1.7	8.1	3.8	13.5
11:55:30	238	233	239	407	410	412	16.4	24.1	18.3	1.5	1.4	1.7	8.1	3.9	13.5
11:55:40	238	233	239	407	410	412	16.4	24.2	18.3	1.6	1.5	1.7	8.2	3.9	13.6
11:55:50	238	234	239	407	410	412	16.4	24.2	18.8	1.5	1.5	1.7	8.2	3.9	13.7
11:56:00	238	234	239	407	410	412	16.4	24.2	18.5	1.5	1.4	1.7	8.3	3.9	14
11:56:10	238	234	239	407	410	412	16.4	24.2	18.5	1.6	1.5	1.7	8.2	3.9	14.1
11:56:20	238	234	239	407	410	412	16.4	24.2	18.5	1.5	1.5	1.7	8.3	4	14.2
11:56:30	238	234	239	408	410	412	16.4	24.2	18.5	1.5	1.4	1.7	8.3	4	14.3
11:56:40	238	234	239	408	411	412	16.4	24.2	18.6	1.5	1.4	1.7	8.4	4.1	14.5
11:56:50	238	234	239	408	411	412	16.4	24.2	18.8	1.5	1.4	1.8	8.3	4	15.4



11:57:00	238	234	239	408	410	412	16.4	24.2	18.8	1.5	1.4	1.8	8.4	4.1	15.4
11:57:10	238	234	239	407	410	412	16.4	24.2	18.8	1.5	1.4	1.8	8.3	4.1	15.4
11:57:20	238	234	239	407	411	413	16.4	24.1	18.8	1.5	1.4	1.8	8.3	4.1	15.4
11:57:30	238	234	239	408	411	413	16.4	24.1	18.8	1.5	1.5	1.8	8.3	4.1	15.4
11:57:40	238	234	239	408	411	413	16.3	24.2	18.8	1.5	1.5	1.8	8.2	4.1	15.4
11:57:50	238	233	239	407	410	413	16.3	25.9	18.7	1.5	1.5	1.8	8.3	4	15.4
11:58:00	238	233	239	407	411	413	16.3	24.4	18.6	1.5	1.5	1.8	8.3	4.2	15.5
11:58:10	238	234	239	407	411	413	16.3	24	18.6	1.5	1.5	1.8	8.2	4.1	15.6
11:58:20	238	234	239	408	411	413	16.3	24	18.6	1.5	1.5	1.8	8.2	4.1	15.7
11:58:30	238	234	239	408	411	413	16.3	24	18.5	1.5	1.5	1.8	8.1	4	15.6
11:58:40	238	234	239	408	411	413	16.3	25.1	18.6	1.6	1.5	1.8	8.2	4.6	15.5
11:58:50	238	232	240	407	410	413	16.3	29.8	18.6	1.5	1.5	1.8	8.3	3.3	15.5
11:59:00	238	233	240	407	411	413	16.3	26.6	18.6	1.6	1.6	1.9	8.2	3.7	15.4
11:59:10	238	234	240	408	411	414	16.3	24.8	18.7	1.6	1.6	1.9	8.1	3.8	15.5
11:59:20	238	233	240	407	411	413	16.3	25.9	18.7	1.6	1.6	1.9	8.1	3.7	15.4
11:59:30	238	234	239	408	411	413	16.3	24.3	18.7	1.6	1.6	1.9	8.1	3.9	15.3
11:59:40	238	234	240	408	411	413	16.3	25	18.7	1.6	1.6	1.9	8.2	4	15.3
11:59:50	238	234	240	408	411	414	16.3	24.7	18.3	1.6	1.6	1.9	8.1	3.9	15.5
12:00:00	238	233	240	407	410	413	16.3	25.5	18.2	1.5	1.6	1.9	8.1	3.9	15.6
12:00:10	238	233	240	408	410	414	16.3	24.7	18.2	1.6	1.6	1.9	8.2	4	15.8
12:00:20	238	235	239	408	411	413	16.3	21.7	19.7	1.5	1.6	1.9	8.1	4.6	14.9
12:00:30	238	235	238	409	411	413	16.3	20.8	20.9	1.5	1.5	1.8	8.2	4.9	14.4
12:00:40	239	235	238	409	411	413	16.4	20.8	21	1.5	1.6	1.9	8.2	4.9	14.6
12:00:50	238	235	238	409	411	413	16.4	20.7	20.6	1.5	1.5	1.9	8.1	4.8	14.6
12:01:00	238	236	239	409	412	413	16.4	20.8	20.6	1.5	1.5	1.9	8.2	4.9	15.2
12:01:10	238	235	239	409	412	414	16.4	21.4	19.3	1.5	1.5	1.8	8.2	4.7	15.6
12:01:20	238	235	240	409	412	414	16.4	22	18.4	1.6	1.5	1.8	8.2	4.6	16
12:01:30	238	235	239	409	412	413	16.4	21.9	18.5	1.5	1.5	1.8	8.2	4.7	15.8



12:01:40	238	236	239	409	412	413	16.3	21.1	18.4	1.6	1.5	1.8	8.3	4.8	15.7
12:01:50	238	236	239	409	412	414	15.6	20.8	18.4	1.5	1.5	1.8	9	4.9	15.6
12:02:00	239	236	239	410	412	414	15.6	20.8	18.3	1.5	1.5	1.8	9	4.9	15.7
12:02:10	239	236	239	410	412	414	15.6	20.8	18.4	1.6	1.5	1.8	9	4.8	15.7
12:02:20	239	236	239	410	412	414	15.6	20.9	18.4	1.6	1.6	1.8	9	4.9	15.6
12:02:30	238	236	239	410	412	414	15.6	20.9	18.4	1.6	1.6	1.8	9.1	4.9	15.5
12:02:40	238	236	239	409	412	414	15.6	20.9	18.4	1.5	1.6	1.8	9.1	4.9	15.4
12:02:50	238	236	239	409	412	414	15.6	20.9	18.3	1.5	1.6	1.8	9.1	4.9	15.4
12:03:00	239	236	239	409	412	414	15.6	20.8	18.3	1.6	1.6	1.8	9.1	4.9	15.4
12:03:10	238	235	239	409	412	414	15.6	20.8	18.4	1.5	1.6	1.8	9.1	4.9	15.4
12:03:20	238	235	239	409	412	414	15.6	20.9	18.4	1.6	1.6	1.8	9.1	4.9	15.3
12:03:30	238	235	239	409	412	414	15.6	20.8	18.4	1.6	1.6	1.8	9	4.9	15.4
12:03:40	238	235	239	408	412	414	15.8	20.9	20.1	1.6	1.6	1.8	8.8	4.9	14.2
12:03:50	239	235	239	409	412	414	15.8	21.3	19.8	1.6	1.6	1.8	8.7	4.9	14.5
12:04:00	238	237	239	409	413	414	15.8	16.9	20	1.6	1.6	1.8	8.7	6.1	14.4
12:04:10	238	237	239	410	413	414	15.8	17.8	20.3	1.6	1.6	1.8	8.7	6	14.1
12:04:20	238	237	239	410	413	414	15.8	17.7	18.5	1.6	1.6	1.8	8.8	5.8	15.2
12:04:30	238	237	239	410	413	414	15.8	17.3	17.9	1.6	1.6	1.8	8.7	5.9	15.7
12:04:40	238	237	239	410	413	415	15.9	17.1	17.6	1.6	1.6	1.8	8.7	5.9	16
12:04:50	238	237	239	409	412	414	15.9	17.1	17.6	1.6	1.6	1.8	8.7	6	15.9
12:05:00	238	236	239	409	412	414	15.8	17.1	17.6	1.6	1.6	1.8	8.7	5.9	15.8
12:05:10	238	236	239	410	412	414	15.9	17.1	17.6	1.6	1.6	1.8	8.7	6.1	15.7
12:05:20	238	237	239	410	412	414	15.8	17.1	17.6	1.6	1.6	1.9	8.8	6	15.7
12:05:30	238	237	239	410	412	414	15.8	17	17.6	1.6	1.6	1.9	8.9	6.1	15.8
12:05:40	238	237	239	410	412	415	15.8	16.9	17.5	1.6	1.6	1.9	8.8	6	15.9
12:05:50	238	238	239	410	413	415	15.8	14	17.5	1.6	1.6	1.9	8.8	6.1	15.9
12:06:00	238	239	239	411	413	414	15.8	12.1	17.4	1.6	1.6	1.9	8.7	6.2	15.9
12:06:10	238	238	238	410	413	414	15.9	13.2	18.7	1.6	1.6	1.9	8.7	6.1	15



12:06:20	238	239	238	410	413	414	15.9	12.6	19	1.6	1.6	1.9	8.7	6.2	14.8
12:06:30	238	239	238	410	413	414	15.9	12	18.9	1.6	1.6	1.9	8.8	6.3	14.9
12:06:40	237	239	238	410	413	413	15.9	12	18.9	1.7	1.6	1.9	8.9	6.3	15
12:06:50	237	238	238	409	413	413	16	12	18.3	1.7	1.6	1.9	8.9	6.3	15.8
12:07:00	236	238	238	409	413	413	16	12	17.6	1.7	1.6	1.9	8.8	6.2	16.2
12:07:10	237	238	238	409	413	413	15.9	12	17.6	1.7	1.6	1.9	8.8	6.2	16.3
12:07:20	237	238	238	409	413	413	15.9	12	17.7	1.7	1.7	1.9	8.8	6.2	16.4
12:07:30	237	238	238	409	413	413	16	12	17.6	1.7	1.7	1.9	8.8	6.2	16.3
12:07:40	237	238	238	409	412	413	15.9	12	17.6	1.7	1.7	1.9	8.7	6.3	16.2
12:07:50	237	238	238	409	412	413	15.9	12	17.6	1.7	1.6	1.9	8.7	6.3	16.3
12:08:00	237	238	238	409	412	413	15.9	11.9	17.6	1.7	1.7	1.9	8.7	6.1	16.2
12:08:10	237	238	238	409	412	413	15.9	11.5	17.6	1.7	1.7	1.9	8.7	6.3	16.2
12:08:20	236	238	238	409	413	413	15.9	11.5	17.7	1.7	1.7	1.9	8.8	6.3	16.2
12:08:30	237	238	238	409	413	413	15.9	11.5	19.3	1.7	1.7	1.9	8.8	6.3	14.9
12:08:40	237	238	238	409	413	413	15.9	11.5	17.7	1.7	1.7	1.9	8.8	6.3	16.2
12:08:50	237	237	238	409	412	413	15.9	15.3	17.7	1.7	1.6	1.9	8.8	5.6	16.2
12:09:00	237	236	239	409	412	413	15.9	17.1	17.7	1.7	1.6	1.9	8.8	5.9	16.3
12:09:10	237	236	239	409	412	413	15.8	17	17.6	1.7	1.6	1.9	8.8	6.1	16.4
12:09:20	237	237	239	409	412	413	15.9	16.8	17.7	1.7	1.6	1.9	8.8	6.2	16.3
12:09:30	238	237	239	409	412	414	15.8	16.7	17.7	1.7	1.6	1.9	8.7	6.2	16.3
12:10:40	238	237	239	410	412	414	15.8	16.1	17.6	1.6	1.5	1.9	8.6	6.5	16.6
12:10:50	238	237	239	409	412	414	15.8	16.1	17.7	1.6	1.6	1.9	8.5	6.4	16.6
12:11:00	237	237	239	409	412	414	15.8	16.1	17.6	1.6	1.6	1.9	8.6	6.4	16.6
12:11:10	237	237	239	409	412	414	15.8	16.1	17.7	1.7	1.6	1.9	8.6	6.5	16.5
12:11:20	237	237	239	409	412	414	15.8	16.1	17.6	1.6	1.6	1.9	8.6	6.4	16.6
12:11:30	237	237	239	409	412	414	15.8	16.1	17.7	1.7	1.6	1.9	8.6	6.5	16.5
12:11:40	238	237	239	409	411	414	15.8	16.1	17.6	1.7	1.6	1.9	8.6	6.4	16.5
12:11:50	237	237	239	409	411	413	15.8	16.1	17.7	1.7	1.6	1.9	8.6	6.4	16.5



12:12:00	237	237	239	409	412	413	15.8	16.1	17.7	1.7	1.6	1.9	8.7	6.4	16.5
12:12:10	237	237	239	409	412	414	15.8	16.1	17.7	1.7	1.6	1.9	8.6	6.3	16.4
12:12:20	237	236	239	409	412	413	15.8	18.2	17.8	1.7	1.5	1.9	8.7	6.7	16.4
12:12:30	238	236	239	409	412	414	15.8	21.1	18	1.6	1.5	1.9	8.7	4.9	16.2
12:12:40	238	236	239	410	412	414	15.8	19.2	18	1.6	1.6	1.9	8.8	5.6	16.1
12:12:50	238	236	239	410	412	414	15.8	19	18	1.6	1.6	1.9	8.8	5.8	16.2
12:13:00	238	236	239	410	412	414	15.8	18.1	18	1.6	1.6	1.9	8.7	6.5	16.2
12:13:10	238	237	239	410	413	414	15.8	16.4	18	1.6	1.6	1.9	8.8	6.3	16.1
12:13:20	238	237	239	410	412	414	15.8	16.9	18	1.6	1.6	1.9	8.7	6.3	16.2
12:13:30	235	239	240	410	413	413	21.6	13	15.4	1.5	1.6	1.9	10.2	6.8	19.2
12:13:40	234	239	241	410	414	414	21.6	11.3	13.2	1.6	1.7	2	11	7.4	22.1
12:13:50	234	239	241	410	414	414	21.8	11.3	13.2	1.6	1.7	2	11	7	22.1
12:14:00	234	240	241	410	414	414	21.9	11	13.2	1.6	1.7	2	11	7.4	22.1
12:14:10	234	239	241	410	414	414	21.9	11.6	13.2	1.6	1.7	2	10.9	6.9	22.2
12:14:20	234	239	241	410	414	414	22	13	13.2	1.6	1.7	2	10.9	6.3	22.3
12:14:30	234	240	241	410	414	414	22.2	10.8	13.2	1.6	1.8	2	10.8	7.4	22.2
12:14:40	234	239	240	409	414	414	22.4	11.3	15	1.6	1.8	1.9	10.7	7.4	19.9
12:14:50	234	239	241	409	413	414	22.4	11.4	13.3	1.5	1.7	1.9	10.7	6.9	22.6
12:15:00	234	239	241	409	413	414	22.6	12.9	13.2	1.6	1.7	1.9	10.7	6.2	22.4
12:15:10	234	239	241	409	414	414	22.6	10.9	13.2	1.6	1.7	1.9	10.6	7.3	22.4
12:15:20	234	239	241	409	414	414	22.7	10.8	13.2	1.6	1.8	1.9	10.6	7.2	22.4
12:15:30	234	239	241	409	413	414	22.7	11.9	13.2	1.6	1.8	1.9	10.5	6.9	22.3
12:15:40	234	239	241	409	414	414	22.6	10.7	13.2	1.6	1.7	1.9	10.5	6.9	22.2
12:15:50	234	238	241	409	413	414	22.6	13.2	13.2	1.5	1.7	1.9	10.5	5.7	22.2
12:16:00	234	239	241	409	413	413	22.7	10.7	13.3	1.6	1.7	2	10.5	6.9	22.2
12:16:09	233	239	241	409	413	413	22.8	10.7	13.2	1.6	1.7	2	10.5	6.9	22.2
12:10:40	238	237	239	410	412	414	15.8	16.1	17.6	1.6	1.5	1.9	8.6	6.5	16.6
12:10:50	238	237	239	409	412	414	15.8	16.1	17.7	1.6	1.6	1.9	8.5	6.4	16.6



12:11:00	237	237	239	409	412	414	15.8	16.1	17.6	1.6	1.6	1.9	8.6	6.4	16.6
12:11:10	237	237	239	409	412	414	15.8	16.1	17.7	1.7	1.6	1.9	8.6	6.5	16.5
12:11:20	237	237	239	409	412	414	15.8	16.1	17.6	1.6	1.6	1.9	8.6	6.4	16.6
12:11:30	237	237	239	409	412	414	15.8	16.1	17.7	1.7	1.6	1.9	8.6	6.5	16.5
12:11:40	238	237	239	409	411	414	15.8	16.1	17.6	1.7	1.6	1.9	8.6	6.4	16.5
12:11:50	237	237	239	409	411	413	15.8	16.1	17.7	1.7	1.6	1.9	8.6	6.4	16.5
12:12:00	237	237	239	409	412	413	15.8	16.1	17.7	1.7	1.6	1.9	8.7	6.4	16.5
12:12:10	237	237	239	409	412	414	15.8	16.1	17.7	1.7	1.6	1.9	8.6	6.3	16.4
12:12:20	237	236	239	409	412	413	15.8	18.2	17.8	1.7	1.5	1.9	8.7	6.7	16.4
12:12:30	238	236	239	409	412	414	15.8	21.1	18	1.6	1.5	1.9	8.7	4.9	16.2
12:12:40	238	236	239	410	412	414	15.8	19.2	18	1.6	1.6	1.9	8.8	5.6	16.1
12:12:50	238	236	239	410	412	414	15.8	19	18	1.6	1.6	1.9	8.8	5.8	16.2
12:13:00	238	236	239	410	412	414	15.8	18.1	18	1.6	1.6	1.9	8.7	6.5	16.2
12:13:10	238	237	239	410	413	414	15.8	16.4	18	1.6	1.6	1.9	8.8	6.3	16.1
12:13:20	238	237	239	410	412	414	15.8	16.9	18	1.6	1.6	1.9	8.7	6.3	16.2
12:13:30	235	239	240	410	413	413	21.6	13	15.4	1.5	1.6	1.9	10.2	6.8	19.2
12:13:40	234	239	241	410	414	414	21.6	11.3	13.2	1.6	1.7	2	11	7.4	22.1
12:13:50	234	239	241	410	414	414	21.8	11.3	13.2	1.6	1.7	2	11	7	22.1
12:14:00	234	240	241	410	414	414	21.9	11	13.2	1.6	1.7	2	11	7.4	22.1
12:14:10	234	239	241	410	414	414	21.9	11.6	13.2	1.6	1.7	2	10.9	6.9	22.2
12:14:20	234	239	241	410	414	414	22	13	13.2	1.6	1.7	2	10.9	6.3	22.3
12:14:30	234	240	241	410	414	414	22.2	10.8	13.2	1.6	1.8	2	10.8	7.4	22.2
12:14:40	234	239	240	409	414	414	22.4	11.3	15	1.6	1.8	1.9	10.7	7.4	19.9
12:14:50	234	239	241	409	413	414	22.4	11.4	13.3	1.5	1.7	1.9	10.7	6.9	22.6
12:14:50	234	239	241	409	413	414	22.4	11.4	13.3	1.5	1.7	1.9	10.7	6.9	22.6
12:15:00	234	239	241	409	413	414	22.6	12.9	13.2	1.6	1.7	1.9	10.7	6.2	22.4
12:15:10	234	239	241	409	414	414	22.6	10.9	13.2	1.6	1.7	1.9	10.6	7.3	22.4
12:15:20	234	239	241	409	414	414	22.7	10.8	13.2	1.6	1.8	1.9	10.6	7.2	22.4



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12:15:30	234	239	241	409	413	414	22.7	11.9	13.2	1.6	1.8	1.9	10.5	6.9	22.3
12:15:40	234	239	241	409	414	414	22.6	10.7	13.2	1.6	1.7	1.9	10.5	6.9	22.2
12:15:50	234	238	241	409	413	414	22.6	13.2	13.2	1.5	1.7	1.9	10.5	5.7	22.2
12:16:00	234	239	241	409	413	413	22.7	10.7	13.3	1.6	1.7	2	10.5	6.9	22.2
12:16:09	233	239	241	409	413	413	22.8	10.7	13.2	1.6	1.7	2	10.5	6.9	22.2
Minimum	233	232	238	407	409	412	15.60	10.70	13.2	1.40	1.40	1.70	8.00	3.30	15.60
Maximum	239	240	241	411	414	415	22.80	29.80	21.0	1.70	1.80	2.00	11.00	7.40	22.80
Average	237	236	239	408	412	413	16.69	19.50	17.8	1.58	1.56	1.83	8.72	5.17	16.69



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

	Voltage Variation (V) – R-N	Voltage Variation (V) – Y-N	Voltage Variation (V) –B-N	Current Variation (A) – R	Current Variation (A) – Y	Current Variation (A) – B
Minimum	233.00	232.00	238.00	15.60	10.70	13.20
Maximum	239.00	240.00	241.00	22.80	29.80	21.00
Average	237.44	235.54	239.10	16.69	19.49	17.81

The following table gives the results of power data logging for main Feeder:

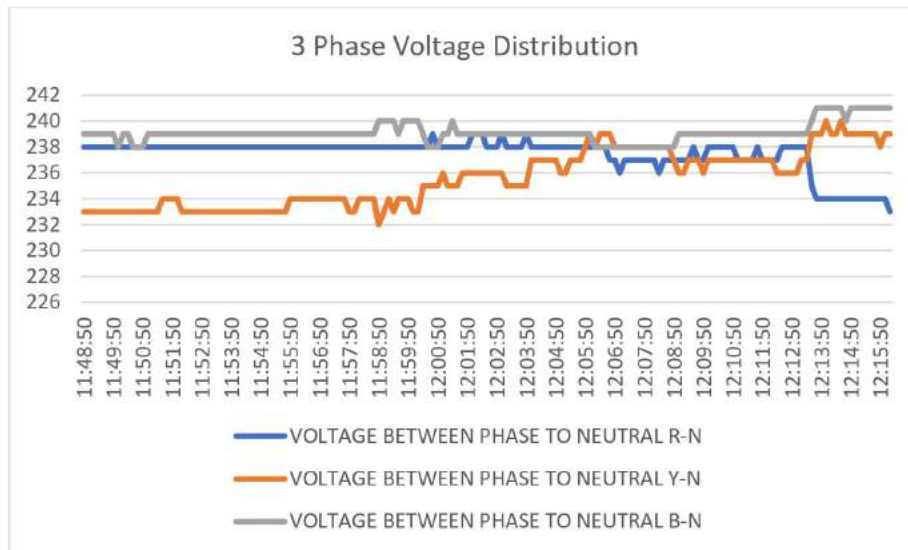
	Total Harmonics Distortion – Voltage (THD R)	Total Harmonics Distortion – Voltage (THD Y)	Total Harmonics Distortion – Voltage (THD B)	Total Harmonics Distortion – Current (THD R)	Total Harmonics Distortion – Current (THD Y)	Total Harmonics Distortion – Current (THD B)
Minimum	1.40	1.40	1.70	8.00	3.30	13.40
Maximum	1.70	1.80	2.00	11.00	7.40	22.60
Average	1.58	1.56	1.83	8.72	5.17	15.84

Observations for Main Feeder Logging

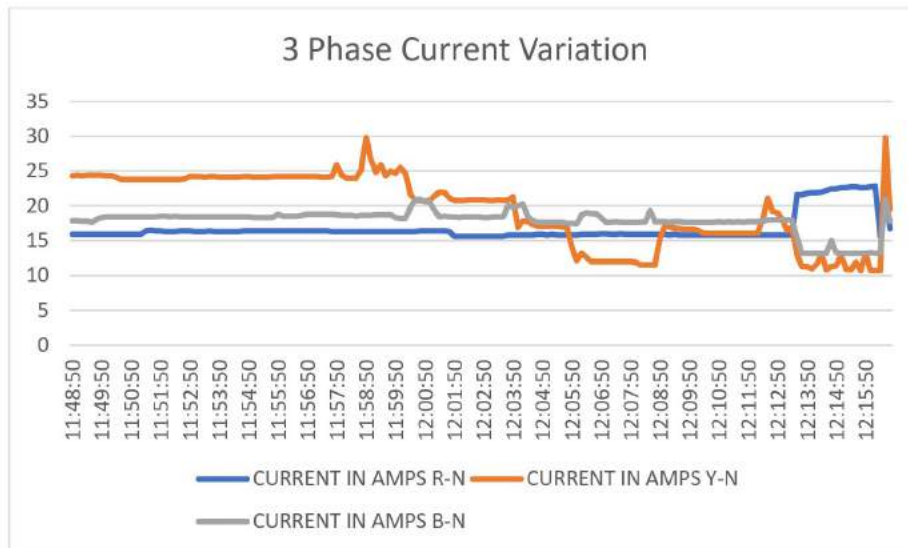
- Voltage harmonics are found to be within limits. While the average current harmonics is found to slightly at greater side i.e. above 7%. Harmonic stabilizer to be installed to suppress the harmonics level within 5%.



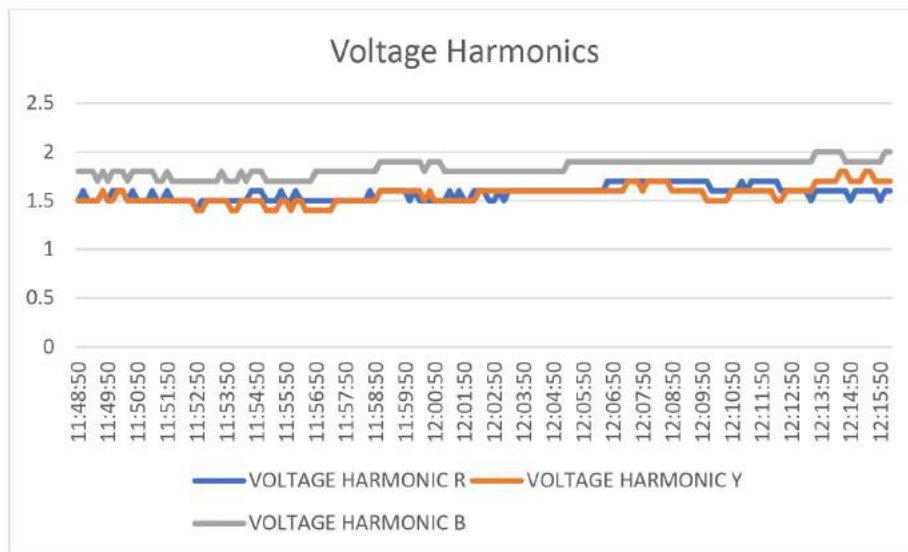
Graphical Representations of Measured Electrical Data



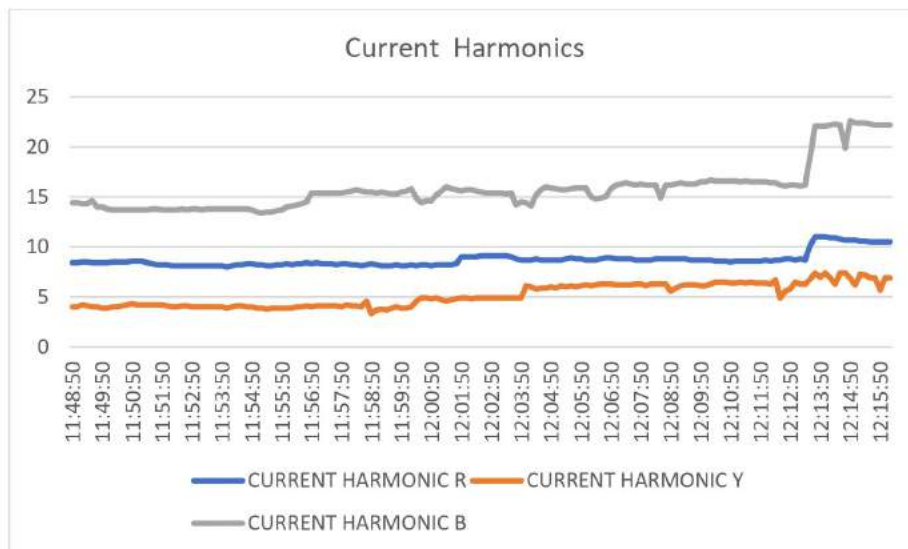
Graphical Representation of 3 Phase Voltage Variation.



Graphical Representation of 3 Phase Current Variation.



Graphical Representation of 3 Phase Voltage Harmonics Variation.



Graphical Representation of 3 Phase Current Harmonics Variation.



Annexure –VIII: 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
Savnar	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 CO₂/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).

