Energy Audit, Environmental Audit & Green Audit of Mansa College of Education, Bhilai

Conducted & Compiled By

Sanjay Kumar Mishra- Certified Energy Auditor

62 & 81, Daya Nagar, Risali, Bhilai Nagar, Distt.-Durg, Chhattisgarh PIN- 490 006

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3. ACKNOWLEDGEMENTS

We express our sincere thanks to Mr. Sanjeev Saxena, Director, Mansa College of Education for his kind support and giving us the assignment to contribute in their effort towards green initiatives & efficient energy management in the college premises.

We are highly indebted to Dr. Smita Saxena Principal, Mansa College of Education, Bhilai for their guidance, intellectual advice, and her kind support in completing the project. We also thank for the cooperation extended during our Audit work.

Our boundless gratitude to Mr. S Mannmad Rao, NAAC Coordinator and other teaching and non-teaching staff associated with this Energy Audit and Green Audit study of Mansa College of Education, Bhilai for extending cooperation during collection of data and field study work.

We trust that the findings of this study will help the college in improving their Green initiative towards creating awareness for healthy and sustainable environment.

Sanjay Kumar Mishra

Certified Energy Auditor, EA- 8696

4. DISCLAIMER

Warranties and Liability

While every effort is made to ensure that the content of this report is accurate, the details provided "as is" makes no representations or warranties in relation to the accuracy or completeness of the information found on it. While the content of this report is provided in good faith, we do warrant that the information will be kept up to date, be true and not misleading, or that this report will always (or ever) be available for use.

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In no event We will be liable for any incidental, indirect, consequential or special damages of any kind, or any damages whatsoever, including, without limitation, those resulting from loss of profit, loss of contracts, goodwill, data, information, income, anticipated savings or business relationships, whether or not advised of the possibility of such damage, arising out of or in connection with the use of this report..

Exceptions

Nothing in this disclaimer notice excludes or limits any warranty implied by law for death, fraud, personal injury through negligence, or anything else which it would not be lawful for to exclude.

We trust the data provided by the Mansa College of Education, Bhilai , personnel is true to their best of knowledge.

5. AUDIT CERTIFICATE

RAJ ENERGY SERVICES
dedicated in energy Conservation
62 & 81, Daya Nagar, Risali, Bhilai Nagar, 490006 (C.G.)
Mob.: 9826179597 Email : resbhilai@gmail.com

ENERGY AUDIT, ENVIRONMENTAL AUDIT & GREEN AUDIT CERTIFICATE

This is to certify that M/s. Raj Energy Services has verified Energy Audit, Environmental Audit & Green Audit of Mansa College of Education, Bhilai and submitted report under their Policy for Green Campus of the Institute.

Name and Address of the Educational Institute	Mansa College of Education Kohka Road, Kurud, Bhilai, Dist. : - Durg Chhattisgarh, PIN – 490 024
Contact Details	7772034444, 9893750431 E – Mail : mansacollege@gmail.com Website : - http://www.mansacollege.com
Name of Principal	Dr Smita Saxena
Details of facilities Audited	Administrative office, All departments, Laboratories, Classrooms, Auditorium, Library, Solar Power Plant, Electrical Systems, and complete Installations.
Date of Audit Conducted	12th, 13th & 14th December 2022
Name of Certified Energy Auditor	Sanjay Kumar Mishra
Registration Number	EA- 8696

For, Raj Energy Services

Date: December 20, 2022

(Sanjay Kumar Mishra)

Certified Energy Auditor from Bureau of Energy Efficiency, Ministry of Power, Government of India, New Delhi
EA- 8696

6. AUDITOR'S CERTIFICATE

BUREAU OF ENERGY EFFICIENCY

Examination Registration No. : EA-8696 Serial Number 5435

Certificate Registration No. : 5435

Certificate For Certified Energy Manager

This is to certify that Mr./Mrs./Ms. Sanjay Kumar Mishra Son/Daughter of Mr./Mrs. R. B. Mishra who has passed the National Examination for certification of energy manager held in the month of May 2008 is qualified as certified energy manager subject to the provisions of Bureau of Energy Efficiency (Certification Procedures for Energy Managers) Regulations, 2010.

This certificate shall be valid for five years with effect from the date of award of this certificate and shall be renewable subject to attending the prescribed refresher training course once in every five years.

His /Her name has been entered in the Register of certified energy manager at Serial Number 5435 being maintained by the Bureau of Energy Efficiency under the aforesaid regulations.

Mr./Mrs./Ms. Sanjay Kumar Mishra is deemed to have qualified for appointment or designation as energy manager under clause (*l*) of Section 14 of the Energy Conservation Act, 2001 (Act No.52 of 2001).

Given under the seal of the Bureau of Energy Efficiency, this 7th day of February, 2013

Digitally Signed: RAKESH KUMAR RAI
Sun Mar 01 10:31:41 IST 2020
Secretary, BEE New Delhi

Secretary
Bureau of Energy Efficiency
New Delhi

Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
22.01.2019			

7.INTRODUCTION

Mansa College of Education is recognized by the Government of Chhattisgarh and Affiliated to Hemchand Yadav University Durg C.G. Founded & Managed by "Vasuki Memorial Sanchalan Samiti" located at Kohka Road, Kurud, Bhilai Distt. Durg (C.G.)

Vasuki Memorial Sanchalan Samiti was founded in the year 1990, with the primary motive to nurture and facilitate students to discover the realms and pleasures of learning by building a positive, progressive, and quality educational environment to achieve employment and self-employment.

The Society was thus established with the mission of " बेहतर एवं रोजगारोंमुखी शिक्षा" and is registered under Madhya Pradesh Society

Registration Act of 1973. Society exists and is operated "exclusively for rural and urban educational purposes and not for profit".

Vision

To create innovative and vibrant young leaders and entrepreneurs in education, technology and engineering field, for building the nation as a knowledge super power and empowering the rural community towards evolving a knowledge society with equity and amity.

Mission

Mansa College aims at providing superior quality trained manpower having social commitment along with career advancement to meet the challenges and opportunities thrown up by the fast-evolving society in the 21st century.

Faith

Student success and Academic Excellence. Continuous Improvement and Accountability. Mutual Respect, civil city and Integrity. Diversity and Inclusiveness. Innovation and Adoptability. Campus and community Collaboration

The Education Training Lab has sufficient amounts of latest technological instruments like, overhead projector (O.H.P.) film projector, color television, V.C.R. (Video Cassette Recorder), L.C.D., tape-recorder and audio-video

cassettes, Educational CDs, laptop & Computers and all the neccessory items. Several seminars and webinars are organised in this Lab.

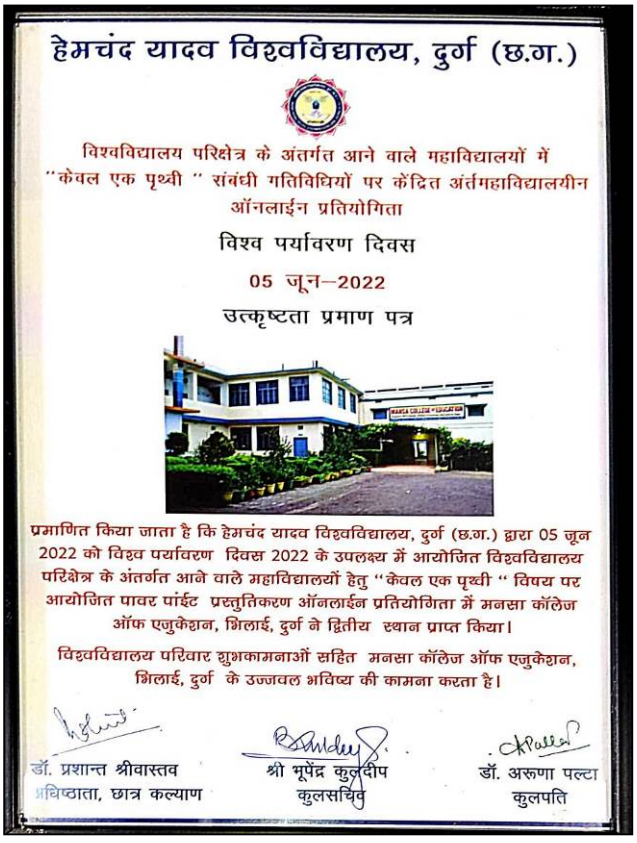
The psychological lab is equipped with eleven 17 types of different psycho test. It provides highly interactive resources for the teaching of psychological science. Some of them are like verbal, non verbal intelligence test, personality test, aptitude and attitude test case- study performs, achievement tests, etc. It provides highly interactive resources for the teaching of psychological science.

For the personal development of students, a language lab is present in the college wherein the students are taught correct pronunciation of English language. The language laboratory is an audio or audio-visual installation used as an aid in modern language teaching. A Computer software for improving communication skills in English in also available. A Digital Language lab is useful to enrich a student's language learning experiences.

College has extended computer lab with 250+ computers of latest configuration with LAN connected application and system software installed. Round the clock internet facility is available for the Better practical facilities to the students.

Wi- Fi facility in the Institution Campus is a milestone in the history of this institution as it puts the college on the road to paperless administration, functioning and enabling students to access the internet through the wireless router, anytime and anywhere in the campus. Wi-Fi system allows students to log onto the internet with their own laptops.

The college has a proper ground for the students to play outdoor games like Volley Ball, Kabaddi, Kho-Kho, Tennis, and Badminton and also has the facility of indoor games like Carom & Chess.



हेमचंद यादव विश्वविद्यालय, दुर्ग (छ.ग.)

विश्वविद्यालय परिक्षेत्र के अंतर्गत आने वाले महाविद्यालयों में "केवल एक पृथ्वी " संबंधी गतिविधियों पर केंद्रित अंतर्महाविद्यालयीन ऑनलाईन प्रतियोगिता

विश्व पर्यावरण दिवस

05 जून–2022

उत्कृष्टता प्रमाण पत्र

प्रमाणित किया जाता है कि हेमचंद यादव विश्वविद्यालय, दुर्ग (छ.ग.) द्वारा 05 जून 2022 को विश्व पर्यावरण दिवस 2022 के उपलक्ष्य में आयोजित विश्वविद्यालय परिक्षेत्र के अंतर्गत आने वाले महाविद्यालयों हेतु "केवल एक पृथ्वी " विषय पर आयोजित पावर पांईट प्रस्तुतिकरण ऑनलाईन प्रतियोगिता में मनसा कॉलेज ऑफ एजुकेशन, भिलाई, दुर्ग ने द्वितीय स्थान प्राप्त किया।

विश्वविद्यालय परिवार शुभकामनाओं सहित मनसा कॉलेज ऑफ एजुकेशन, भिलाई, दुर्ग के उज्जवल भविष्य की कामना करता है।

डॉ. प्रशान्त श्रीवास्तव
अधिष्ठाता, छात्र कल्याण

श्री भूपेंद्र कुलदीप
कुलसचिव

डॉ. अरूणा पल्टा
कुलपति

हेमचंद यादव विश्वविद्यालय, दुर्ग
(छ.ग.)

विश्वविद्यालय परिक्षेत्र के अंतर्गत आने वाले महाविद्यालयों में अपनाई जाने वाली "बेस्ट प्रेक्टिसेस" संबंधी ऑनलाईन प्रतियोगिता

जुलाई – 2020

Certificate of Merit

प्रमाणित किया जाता है कि हेमचंद यादव विश्वविद्यालय, दुर्ग (छ.ग.) द्वारा जुलाई 2020 में आयोजित विश्वविद्यालय परिक्षेत्र के अंतर्गत आने वाले महाविद्यालयों में अपनाई जाने वाली "बेस्ट प्रेक्टिसेस" संबंधी ऑनलाईन प्रतियोगिता में मनसा कॉलेज भिलाई ने चतुर्थ स्थान प्राप्त किया।

विश्वविद्यालय परिवार शुभकामनाओं सहित मनसा कॉलेज भिलाई के उज्जवल भविष्य की कामना करता है।

डॉ. प्रशान्त श्रीवास्तव
अधिष्ठाता, छात्र कल्याण

डॉ. सी.एल. देवांगन
कुलसचिव

डॉ. अरूणा पल्टा
कुलपति

The Purpose of Higher Education is to create Knowledge, Disseminate Knowledge and Transfer knowledge and skill to the society for its Empowerment. Education is Process of Empowerment Which is to promoted through the development of knowledge, Skills & Values. A Higher Education systems stands

for the onward march of the human race. Learning is acquiring necessary knowledge and skill for better performance.

Mansa college also provides distance education facilities from D.El.Ed and B.Ed. Courses (Open & Distance Learning Programme) recognized by Pandit Sundarlal Sharma (Open) University (PSSOU) Chhattisgarh, Bilaspur. Due to the pandemic and covid 19 outbreak throughout the globe, almost all the countries have forced social distancing shutting down schools and colleges for months and years. Schools, colleges, universities, and educational institutions have started conducting online virtual classes following the latest government guidelines and have shifted from conventional to online education

Every year, “SANKALP PARV" is celebrated on World Environment Day and plantation of 100 trees is carried out in which institution partnership with the partnership of SANKALP PARYAVARAN SANRAKSHAN SMITI.

The Mansa College of Education had won second prize on the subject of “Only one earth”, which is the theme of United Nation Environment Program for the year of 2022-23 organized by Hemchand University, Durg

Fire extinguishers are extremely important in colleges as they are the most commonly used for fire protection. Generally, these often-overlooked devices can be a key component in keeping college safe during a fire emergency situation. Fire extinguishers are most important in colleges as they are **the first line of defence .**

Shivnath Sewa Mandal, Chhattisgarh

Certificate

of Excellence

hereby certifies that

MANSA COLLEGE BHILAI

Actively Participated in

Shivnath Jal Sammelan

(Water, River & Environmental Conservation Program)

Date : 09.02.2020

Co-ordinator
Sanjay Kumar Mishra
(Shivnath Sewa Mandal)

Guest
Dr. Rajendra singh
(Waterman of India)

Regd. No.: 31/KOTA, 95-96

Pt. Deendayal Upadhayay Smriti Sansthan

Head Quarter :- 2-Dha-2, Dadawadi Extension KOTA, Rajasthan

M. No.: +91-9521283566 / +91-9820158633, Email:- ampduss@gmail.com, www.pduss.org

Place: Mumbai **1th January 2020**

Mou dates
National level

To,

Prof. Smita Saxena
Mansa College of Education
Kohka Road, Kurud, Bhilai (Chhattisgarh)
India - 490024

Sub: Appointment of Consultant for Joint Training Programme in Bhilai Chhattisgarh for Awareness Programme on Single Use Plastic.

Dear Ma'am,

Appointment: With reference to your proposal, we are pleased to inform you that we have considered to appoint you as, one of our panel of consultants for providing suitable and sustainable training and awareness programme for us in the region of Bhilai Chhattisgarh
We hereby engage Mansa College of Education, on a non-exclusive basis in the areas of

1) Bhilai
2) Risali
3) Bhilai-Charoda
4) Durg

And such other location as may be desired by our organisation. Mansa College of Education agrees to provide trained mentors and training programmes for the inhouse college institutions, community centres through community engagement as per the requirements at these locations. Notwithstanding anything contained herein nothing shall restrict the right of our organisation to appoint any other consultant on similar or on any other conditions as our organisation may deem fit.

Period: The period of your empanelment will be made effective from the 1st day of January 2020 to for a period of 2 (two) years and upon the acceptance of the terms on this letter by you. The period of appointment of empanelment will expire automatically on 31st December 2022.

Limitation of Liability: Notwithstanding anything to the contrary in this appointment, there will be financial or commercial transactions involved between Mansa College of Education and our organisation for the above services and the same will be attached through Annexure-I of the arrangements on a per session per programme basis.

Termination: This appointment can be terminated either by our organisation or Mansa College of Education without assigning any reason by giving at least thirty (30) days' notice. No compensation or damages shall be payable by either in the event of such terminations.
In case of any dispute, it will be determined by referring the same to arbitration and be governed by the provision of the Arbitration and Conciliation Act, 1996.
You are requested to acknowledge the receipt of this letter as a token of your acceptance of the aforementioned conditions, please return us the copy of this letter for our records.

For,

Pt. DeenDayal Upadhyay Smriti Sansthan.

For,

Mansa College of Education

A/8, Prerana 2nd Floor, SV Road Santacruz (W), Mumbai 400 054
B 66, First Floor, Sarvodaya Enclave, New Delhi 110 017

8. ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT

Technically, Detailed Green audit covers all the aspects of energy audit, green audit & environmental audit. Green Audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity. The 'Green Audit' aims to analyse environmental practices within and outside the College campus, which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit.

Green audit is assigned to the criteria 7 of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India which declares the institutions as Grade A, B or C according to the scores assigned during the accreditation.

Objectives of the Study

The main objective of the green audit is to promote the Environment Management and Conservation in the College Campus. The purpose of the audit is to identify, quantify, describe, and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards.

The main objectives of carrying out Green Audit are:

- To introduce and aware students to real concerns of environment and its Sustainability.
- To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use of the campus.
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requiring high cost.
- To bring out a status report on environmental compliance.

Methodology

We had discussed in detail with the audit coordinator, staff members and Principal. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional, district, national and global level. The discussion revolved around three key questions: Do the members of the group consider themselves eco-conscious? Do they consider the Institution to be eco-friendly? What do they think are the issues that need to be given top priority? In order to perform green audit, the methodology included different tools such as preparation of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations.

The study covered the following areas to summarise the present status of environment management in the campus:

- Water management
- Energy management
- Waste management
- E-waste management
- Green campus management

8.1 Water Management

This indicator addresses water consumption, water sources, irrigation, storm water, appliances and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

Mansa College of Education Bhilai gets water from two sources - which is from its two bore wells. One submersible water pump operates to fulfil the daily needs of college. The College has total 7 over head water tanks in which one water tank having capacity of 20,000 litres is kept over main building.

Waste water goes directly in water pits. As three is no hazardous chemicals are used in lab. Thus, no chemical hazardous water mixed with ground water.

There are four water coolers in college for clean water drinking purpose and eight numbers of air coolers are used in summer season.Water saving tips display and turn off tap after using the water tap is displayed.

Sr. No.	Water Tank Capacity in litre	Quantity	Total Capacity in Litre
1	20,000	1	20,000
2	1500	2	3,000
3	1000	4	4,000
Total water storage capacity in litre			27,000

Table 1: Water storage capacity of college

Water Pump Details

Two submersible pumps of 2 HP are operating. In which one pump is rarely used. However, two pumps of 0.5 HP is used as booster pump.

1	One number of 2 HP for main building
2	One number of 2 HP for polytechnic building
3	Two numbers of 0.5 HP for 3rd floor

Soak Pits Details

Total numbers of soak pits are three.

Dimension	Cubic feet	Litres
Depth 6' x diameter 3 '	42.43	1201
Total capacity of soak pit		3603

Table 2: Soak Pits Details

It is suggested to put signboard for identification of soak pit & rain water harvesting system.

8.1.1 Water Consumption at Mansa College of Education, Bhilai

Water is a natural resource; all living organisms depend on water. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. Groundwater depletion and water contamination are taking place at an alarming rate. Hence it is essential to examine the quality and usage of water in the college. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water.

The amount of water consumption at college depends on different activities like drinking, washing, gardening etc.

Activity	Average litres of water used per activity (litres)	No. of times activity done each day	Total water used by a person each day (litres)	No. of people in the College using water	water consumption per day in Litres
Wash hands and face	1.5 litres	*1*	*1.5*	*200*	*300*
Toilet flush	6 to 21 litres	1	7	500	3500
Drinking (cup)	0.25	2	0.5	500	250
Washing dishes (hand)	2	1		50	200
Leaking/dripping tap					200
Office garden (m2/ day)	15 litre per sq. meter	1	15 litre per sq. meter	58	870
Pantry (Av. for 5 people)		5	10	50	250
Using the garden hose for an hour from 7 tap	1000	10	10	10	10000
Water for cleaning solar panel					7000
Others					430
Total water consumption					23000

Table 3: Total Water Consumption Per Day

The college has a rain water harvesting system

8.1.2 Rain Water Harvesting System

Rainwater harvesting is a technology used to collect, convey and store rain water for later use from relatively clean surfaces such as a roof, land surface or rock catchment. RWH is the technique of collecting water from roof, Filtering and storing for further uses. Rainwater Harvesting is a simple technique of catching

and holding rainwater where its falls. Either, we can store it in tanks for further use or we can use it to recharge groundwater depending upon the situation. RWH system provides sources of soft, high quality water reduces dependence on well and other sources and in many contexts are cost effective.

Rain Water Harvesting System

The runoff from the terrace of the college building is channelized into recharge well located in the campus . All the rooftop rainwater outlets discharge into storm water drains and then to the recharge Layer of bricks filled inside the recharge well ensures proper filtration of harvested water. Mansa College of Education, Bhilai has a very good potential of collection rain water.

Dimension	Cubic feet	Litres
6' x 10 'x 10'	600	16990

The pipe line of rain water harvesting system has been broken recently due to storm. The pipe should be replaced by new one. The complete area of roof should be used for rain water collection and sent to pits. It is also advised to the RWH system should be serviced in twice in a year and pit should be cleaned once in two years

8.1.3 Auditing for Water Management

Auditing for Water Management			
1	Uses of water in college.	:	Drinking, Gardening, Washing, Mess
2	sources of water in college.	:	Tube well
3	No. of wells in college.	:	Tube well- 2 Nos.
4	No. of motors used for pumping water from well	:	2 pumps
5	Total horse power of motor.	:	2 HP
6	Storage of water.	:	7 Tank (1 tank of 20,000 litre, 2 tanks of of 1500 litre and 4 tanks of 1000 litre capacity.)
7	Quantity of water stored in overhead water tank? (in litres)	:	27,000 litres
8	Quantity of water pumped every day (in litres)	:	One times in a day.
9	If there is water wastage, specify why?	:	Overflow of water from tanks.
10	How can the wastage be prevented / stopped?	:	Water level controller can be installed.
11	Locate the point of entry of water and point of exit of waste water in your College?	:	Entry of water point is in the pump house room near the administrative office and exit point is in the soak pit near to administration building.
12	Where does waste water come from?	:	Toilet
13	Where does the waste water go?	:	In waste water pit
14	What are the uses of waste water in your college?	:	Recharging of ground water level and gardening
15	What happens to the water used in your labs? Whether it is mixing with ground water?	:	No

16	Is there any treatment for the lab water?	:	No hazardous chemicals are used
17	Are your labs are practicing green chemistry methods?	:	No
18	Record water use from the college water meter for six months?	:	Not applicable
19	No. of water coolers. Amount of water used per day? (in litres)	:	4 water cooler, each 40 liter capacity
20	Amount of water used per day for garden use?	:	10,000 litre
21	No. of water taps in laboratories. Amount of water used per day in each lab?	:	Not applicable
22	Total use of water in each hostel?	:	Not applicable
23	At the end of the period, compile a table to show how many litres of water have been used in the college for each purpose?	:	Attached
24	Is there any water used for agricultural purposes?	:	Yes
25	Does your college harvest rain water?	:	Yes
26	If yes, how many rain water harvesting units are there?(Approx. amount)	:	Two
27	Dimension of each rain water harvesting units		10' x 10' x 6'
28	How many of the taps are leaky? Amount of water lost per day	:	one (Repaired when come to notice)
29	Are there signs reminding people to turn off the water?	:	No
30	How often is the garden watered?	:	In winter season every alternate day, In summer season daily.

31	Amount of water used to watering the ground?	:	5000 litre
32	Amount of water used for bus cleaning? (litres per day)	:	Not applicable
33	Amount of water for other uses? (items not mentioned above)	:	No
34	Area of the college land without tree/building canopy?	:	3 Acre
35	Is there any water management plan for the college?	:	The college has planned for rain water harvesting in remaining portion of college building.
36	Please share Some IDEA for how your college could save more water?	:	College should put the instruction for water conservation on their notice board. They should install over flow controller on water tanks.

8.2 Energy Management

This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. Mansa College of Education, Bhilai uses electrical energy in the campus ;-

1) Electricity from Distribution Company
2) Electricity from Solar Power Plant
3) Electricity from Diesel Generator set

a) Electricity from Distribution Company

Chhattisgarh State Power Distribution Company Limited is supplying power to Mansa college of Education through service number 1000523410. The college has contract demand of 50 HP.

8.2.1 Electricity Bill Analysis & Connected Load

Months	Maximum Demand in KW	PF	Unit Consumption	Solar Export Units in KWH	Power Purchase Amount	Total Bill
Jan-22	14	0.9	3182	3691	12992	1002
Feb-22	14	0.9	1635	3764	13249	6768
Mar-22	14	0.9	2225	4435	15611	9401
Apr-22	14	0.9	1354	3350	11792	6366
May-22	14.2	0.9	2374	2922	10285	16832
Jun-22	14	0.9	3221	2102	7399	27146
Jul-22	14	0.99	2532	1264	4449	23270
Aug-22	24.9	0.99	2060	1870	6582	17655
Sep-22	24.1	0.98	2941	2849	10028	22115
Oct-22	32.9	0.99	1311	5029	17702	1045
Nov-22	33	0.99	1476	4852	17079	3379
Dec-22	14.5	0.9	1444	4169	14675	6383
Total			25,755	40,297	1,41,843	1,41,362

Table 4: Electricity Bill Analysis for last one year

8.2.2 Connected Load

Sr. No.	Segment	Particulars	Wattage	Quantity	Total Wattage
1	Lighting	LED Tube light	20	394	7880
2		LED Bulb	12	40	480
3		Conventional Tube light	40	32	1280
4	Heating, Ventilation & Air Conditioning	Fan	70	444	31080
5		Air Cooler	250	6	1500
6		Air Cooler	400	2	800
7		Exhaust Fan	350	2	700
8		Air Conditioner 2 T	2200	2	4400
9		Air Conditioner 1.5 T	1700	33	56100
10	Office	Computer (office)	70	40	2800
11		Printer	500	5	2500
12		Photo Copy Machine	1200	2	2400
13	Water Supply	Water Pump	1500	2	3000

14		Water Pump	375	2	750
15	Campus	LED Street Light	50	2	100
16	Lighting	LED Street Light	100	3	300
17		Water Cooler	900	2	1800
18		Water Cooler	650	2	1300
19	Miscellaneou	Computer (Lab)	70	510	35700
20	s	Induction Heater	2000	1	2000
21		Refrigerator	750	2	1500
22		Others			2000
Total connected load					160,370

Table 5: Connected load

8.2.3 Segment wise Connected Load

Segment	Connected Load in watt
Lighting	9640
Heating, Ventilation & Air Conditioning	94580
Office	7700
Water Supply	3750
Campus Lighting	400
Miscellaneous	44300

Table 6: Segment wise Connected Load of Mansa College of Education, Bhilai

Graphical representation of Connected Load

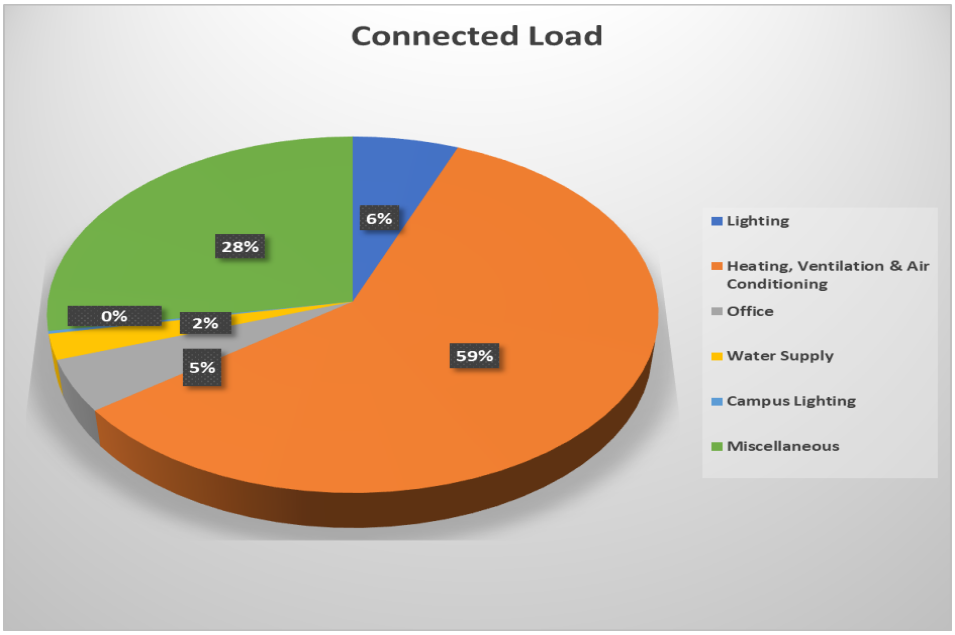


Figure 1: Graphical representation of Connected Load

The total connected load of Mansa College of Education is about 161 KW. The maximum share of connected load is in HVAC segment, which is about 59%.

As per NAAC requirement, we have calculated installed load of LED light fittings and Conventional light fittings.

Connected load of LED Lights in watts	8760
Connected load of conventional lights in watts	1280

Table 7: Connected Load of LED light fittings & Conventional fittings

8.2.4 Percentage of Lighting Power requirement met through LED lights

LED Lighting Load in Watt	8,760
Total Lighting Load in Watt	10,040
Percentage of Lighting Power requirement met through LED lights	87.2 %

Table 8: NAAC Requirement: Percentage of Lighting Power requirement met through LED lights

Thus, total Percentage of Lighting Power requirement met through LED lights is about 87.2 %.

Graphical representation of Percentage of Lighting Power requirement met through LED lights

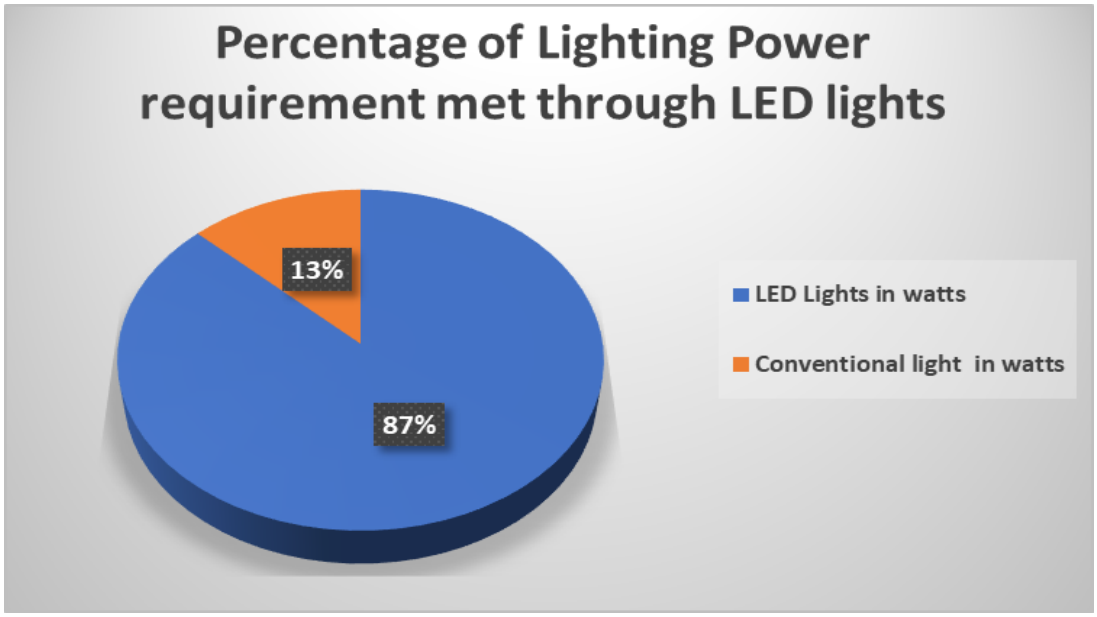


Figure 2: Graphical representation of Percentage of Lighting Power requirement met

through LED lights

8.2.5 Alternative Energy Initiative: Percentage of Power requirement met by Renewable Energy Source

The grid connected solar power plant of 50 KW is operating since July 2017. Initially, there 168 numbers of solar modules having capacity 300 Wp each were installed and solar power generation capacity was about 50 KWp and now it is planned to increase the generation capacity up to 56 KWp.

Technical Parameters of solar modules

Maximum power of solar module (Pmax)	300 Wp
Total quantity of solar modules	188 Nos.
Open circuit voltage (Voc)	44.45 V
Short Circuit current (Isc)	8.75 A
Voltage at maximum power (Vmp)	36.18 V
Current at maximum power (Imp)	8.30 A
Name of Manufacturer	IconSolar-En-Power Technologies Pvt. Ltd, Raipur

Table 9: Technical Parameters of solar modules

Contract demand of college	50 HP
Solar power plant capacity	50 KW
Percentage of Power requirement met by Renewable Energy Source	100 %

Table 10: Alternative Energy Initiative: Percentage of Power requirement met by Renewable Energy Source.

Thus, 100% percent of total power requirement of Mansa College of Education, Bhilai is met by Solar Power Plant.

Diesel Generator set

A diesel generator set of 82.5 KVA is installed in the campus, in case of power failure / on-line examination. It is rarely used. The technical specifications of generator is as under: -

Rated capacity in KVA	82.5 KVA / 66 KW
Rated voltage in volts	415
Rated RPM	1500
Full load current in Ampere	114.6

Format for recording the activities during synchronization of grid connected solar photovoltaic power plant

Minutes of Metering

In accordance with Addl. Chief Engineer, (Comml-I) O/o ED (Comml), CSPDCL, Raipur letter no. 02-02/Kc. /Adv./C. 170 /2017 Date 21/1/17 the synchronization of 50 KW Capacity of Grid Connected Solar PV Power Plant at Mansa (P) I T I ..... With CSPDCL's grid on LT Side has been witnessed by the representative of Electrical Inspectorate, ..., CSPDCL and CREDA on date 11 July-17 at about 16:33 Hrs, consumer has LT/HT connection.

The Surplus solar energy after meeting in house consumption is exported to CSPDCL grid on 11KV and is recorded by meter installed at Mansa (P) ITI, Vaishali Nagar Bhilai premises which is a bidirectional meter having facility for recording import consumption. There are 2 Nos. of solar string invertors out of which each(one) invertors are of 25 KW each and second invertors of 25 KW KW each. Total solar generation on 3Φ 433 Volt is measured by 01 Nos. meters installed on the main solar panels.

Details of meter of main solar panel:-

		LT-CT
Make	SECURE	Make: ESSMA
Sl No.	CSE51884	Sr No Bq 16071517, Fq 16
Class	0.5S	Yq 16071616
Cap	150/5A, 3x240V	CTR: 150/5A for All
Reading of Meters	35 KWH (Import)	00 KWH (Export)
MF	1	

Details of Bidirectional Energy meters:-

Time-16:43

Make	SECURE
Sl No.	CSE61883
CTR	150/5A
PTR	3X240V
CL	0.5S

LT CT Ratio	150/5A
MF	1
KWH (I)	1626
KWH (E)	0.00

11/07/17

A.E. CREDA R.O.... | A.E. CEI CG Govt. | A.E.E (MT) CSPDCL Div... | E.E. Emp.No.-89371107 Executive Engineer Dn.(West) CSPDCL, Bhilai

Nodal Officer Beneficiary Organization | Representative System Integrator

The grid connected solar power plant is supplying power to grid since 11th of July, 2017. Two numbers of solar string having 25 KW each are installed for generation of three phase power at 433 volts. A bidirectional meter is also installed to measure import and export power.

DG set of 82.5 KVA rating

8.3 Waste Management

This indicator addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of adverse environmental impacts, most of which are well known and not in need of elaboration.

Mansa College of Education Bhilai practices solid waste management which includes segregation of waste, the most important step in waste management. College encourages the process of eco friendly waste disposal method.

8.3.1 Composting Pit

College has also planned for compost pit to produce compost manure from the canteen solid waste and waste from other sources. Manure will be used for the purpose of garden as well or for planted tree.

Non Bio Waste - Plastic Bottles / Waste Paper etc.

Non- biodegradable waste, which cannot be decomposed by biological processes is called non- biodegradable waste. These are of two types - Recyclable: waste having economic values but destined for disposal can be recovered and reused along with their energy values. e. g. Plastic, paper, old cloth etc. Non-recyclable: waste which do not have economic value of recovery. e.g. Carbon paper, tetra

packs etc. Disposal of non-biodegradable waste is a major concern, not just plastic, a variety of waste being accumulated. There are a few ways to help non-biodegradable waste management. The impact of non- biodegradable waste on the environment and also focus on its safe disposal for sustainable environment.

Non-biodegradable waste like plastics, metal, glass etc. is collected in the buckets and handover to Municipal corporation, Bhilai.

Single use plastic is banned in the campus. Pt. Deendayal Upadhyay Smriti Sansthan, Kota, Rajasthan has appointed Mansa College of Education Bhilai for

providing suitable and sustainable training and awareness programme on single use plastic in the region of Bhilai- Durg.

To reduce paper consumption, college is using both side of paper. No waste is polluting surface/ ground water.

Mansa College of Education commits to:

1) Keep a stack of paper that has been printed on one side and use it for day to day rough paper work

2) Use more readout material in soft form. Reduce the hard readout material. Use more of e-mail for officially communicating the information needed, online reading etc.

Waste water from water cooler is used for gardening needs

8.4 E-Waste Management

Waste Electrical and Electronic Equipment (WEEE) or E-waste is one of the fastest growing waste streams in the world. In developed countries, it equals 1% of total solid waste on an average. In developing countries, it ranges from 0.01% to 1% of the total municipal solid waste generation. In countries like China and India, though annual generation per capita is less than 1 kg, it is growing at an exponential pace.

Presently, E waste (computer component) from labs is either used for demonstration purpose or handed over to vendors.

8.5 Green Campus Management

Greening the campus is all about sweeping away wasteful inefficiencies and using conventional sources of energies for its daily power needs, correct disposal handling, purchase of environment friendly supplies and effective recycling program. Institute has to work out the time bound strategies to implement green campus initiatives. These strategies need to be incorporated into the institutional planning and budgeting processes with the aim of developing a clean and green campus.

Tree Plantation in Premises

Mansa College of Education has a beautiful green campus. The college has planted various types of trees, flowers. The greenery has remained useful in developing oxygen zone in our college.

The campus is covered by nice greenery including lush green lawns, avenue trees, On the occasion of World Environment Day, The college having partnership with Sankalp Paryavaran Sanrakshan Samiti has planted about 100 trees under Ankuran : an initiative towards green campus, near Jamul police station and in Kurud village.

This practise has following objective: -

Objectives

1)To develop responsible attitude and commitment towards green environment.

2) To promote clean and green environment.

3) Optimum utilization of water.

4) Motivate students and staff through environmental education.

The total numbers of trees, plants are mentioned below: --

Particulars of Flora	**Numbers (A)**
Full grown Tree	380
Semi Grown Tree	220
Quarter grown plants	250
Lawn	232 Sq. meter

Table 11: Type and quantity of flora

8.6 Carbon Footprint

A carbon footprint is the amount of greenhouse gases–primarily carbon dioxide–released into the atmosphere by an individual, event, organization, service, or product, expressed as carbon dioxide equivalent. In addition to the water, waste, energy and biodiversity audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions.

An important aspect of doing an audit is to be able to measure our impact so that we can determine better ways to manage the impact. In addition to the water, waste, energy and biodiversity audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created.

The following activity/utility is responsible for carbon emission: -

- Transportation
- Electricity purchased from Distribution companies.

8.6.1 Carbon Emission by Transportation

Director, Principal, teaching & non-teaching staff and students comes to college either by two wheelers or four wheelers .The two major fuels used by the transport sector are petrol and diesel. These fuels are carbon intensive as they contain 80-85% of carbon by weight.

Particulars	Mode of conveyance	Average Number	A Number of vehicles used	B milage (KM/litre)	C Average distance in KM	D= C/B Fuel Consumed per Day per Vehicle in ltr	E Total working days	F=E x D Fuel Consumption Per Vehicle in a year	G Emission factor	H=G x F x A Total emission by college students/faculty
Students	On foot	20			2	0				
	Bicycle	50			10	0				
	Two Wheeler	280	200	40	8	0.2	180	36	2.67	19224
	Two Wheeler	190	120	40	12	0.3	180	54	2.67	17302
Supporting Staff	On foot	8								
	Bicycle	12								
Teaching Staff	Car	5	5	20	10	0.5	180	90	2.67	1202
	EV - Two Wheeler	3								
	Bicycle	6								
	Two Wheeler	32	30	40	16	0.4	180	72	2.67	5767
Non- teaching staff	Two Wheeler	35	20	40	12	0.3	180	54	2.67	2884
Total Co2 emission in KgCo2 eq per Year										46,379

Table 12: Carbon emission by transport

Thus, Total Co2 emission by transport is 46,379 $KgCO_2eq.$ per Year

8.6.2 Carbon Emission by Electricity

Electricity is taken by grid which uses coal for generating electricity or DG set which uses diesel for electricity generation.

Parameter	Emission Factor	Unit in KWH	Total emission in KG CO_2 equivalent Per Year
Grid Electricity	0.82	25,755	21,119

Table 13: Carbon Emission by Electricity

Thus, total emission by purchased electricity is 21,119 KGCO_2 eq. Per year.

8.6.3 Total Carbon dioxide emission at Mansa College of Education

Area	CO_2 eq. emission in KG
Electricity	21,119
Transport	46,379
Total	67,498

Table 14: Total Carbon dioxide emission at Mansa College of Education

A) The following installation /activity is responsible for reduction in carbon emission: -

- Grid Connected Solar Power Plant of 50 KWp
- Tree plantation

8.6.4 Reduction of Carbon Emission by Solar Power Plant

The solar power plant has generated 40,297 unit from renewable sources in the year 2022. If it is not generated from solar then it would be purchased from electricity distribution companies which will produced from burning of coals in thermal power plant, which causes carbon dioxide emission.

Parameter	Emission Factor	Unit in KWH	Total reduction of emission
Solar Power Plant	0.82	40,297	33,044

Table 15: Reduction of Carbon Emission by Solar Power Plant

Thus, solar power plant has reduced 33,044 KG of CO_2eq. Per year.

8.6.5 Reduction of Carbon Emission due to absorption of CO_2 by Tree Plantation

Types of Flora	Numbers (A)	Carbon absorption in Kg by one tree Per year (B)	Total Carbon Di Oxide absorbed in Kg (A x B)	Oxygen Production by one tree Per year (D)	Total Oxygen produced in Kg (A x D)
Full grown Tree	380	21	7980	117.6	44688
Semi Grown Tree	220	9	1980	58.8	8467
Quarter grown plants	250	3	750	29.4	6527
Lawn	232 Sq. meter	1 KG per sq. meter	232	0.336 KG/sq. meter	78
Total			10,710		59,682

Table 16: Carbon absorption by tree plantation

Planting is a great way to help sequester carbon emissions. Through photosynthesis ***trees absorb carbon dioxide to produce oxygen, food and food.***

8.6.6 Total Reduction in Carbon dioxide emission

Area	Reduction in CO2 eq. emission in kG
Solar	33,044
Trees	10.710
Total	43,754

Table 17: Total Reduction in Carbon dioxide emission

9. RECOMMENDATIONS

Green Campus Management

1) Formation of Green Club under Green Campus Policy

A **Green Campus** is one that integrates environmental knowledge into all relevant disciplines; improves environmental studies course offerings; provides opportunities for students to study campus and local environmental problems; conducts environmental audits of its practices; institutes environmentally responsible education combines to promote sustainable and eco-friendly practices in the campus.

Though Mansa College of Education is doing the activities of Green Campus policy, but it is required to frame out a Green Campus Policy and carry out the activities as per Green Calendar every year under Green Club. Few recommendations are added to curb the menace of waste management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus & thus sustainable environment and community development.

Green Club will be formed under the policy of Green Campus. Green Club will prepare Green Calendar of each session and celebrate all important days related to environment protection and sustainability.

Energy Management

2) Formation of ENCON Club

The solar power plant is installed to promote the use of renewable energy in the college and also a very appreciable percentage of energy efficient equipment in lighting and air conditioning are used. It is suggested to paste slogans/ small banners like “Save Energy, Save Tomorrow”, “Switch off lights and Fans, when not in use” for awareness of energy conservation.

We also recommend to formation of the Energy Club in Mansa College of Education, Bhilai for spreading awareness on the importance of energy conservation in the students and staff of college. The ENCON Club will participate in all energy conservation activities and organize program with the support of Chhattisgarh State Renewable Energy Development Agency, (CREDA) Raipur and Bureau of Energy Efficiency,(BEE) New Delhi.

Energy Club will celebrate "Energy Conservation Day" on 16Th December, each year. It would not only help in imparting knowledge on energy efficiency but also in its implementation in households and institutions.

Objective of ENCON Club

The objective of the club is to create awareness among the students, staff and teachers and equip them for efficient management of all forms of energy, to promote energy efficiency and energy conservation. The club will keen to spread "Energy Conservation Messages" in the society by conducting awareness programmes to students & public.

3) **Replacement of all conventional tube light will replaced by energy efficient LED tube light :**

The share of Energy Efficient LED lights is appreciable, which is about 87%. **Some of** conventional lights are still installed. They should be replaced by LED light fittings. It will not only save in electricity consumption but also save CO_2 emission directly and indirectly.

4) **Enhancement of Energy Efficiency**:

It should make practice of cleaning of energy efficient LED tube-lights periodically, to remove dust over It. It should improve lumen efficiency of light fittings. Solar panels should also be cleaned daily.

5) General Recommendation for Energy Saving in Office Equipment:

Equipment	Wattage	Comments
CRT Monitor	100 - 120W (during operating condition)	CRT monitors consume a lot of power, much of which is wasted as heat, and represent the largest power consumption component in a typical desktop computer. Emit potentially harmful radiation. Fortunately, most CRT monitors these days are legacy equipment as new computers are generally supplied with LCD monitors. Unfortunately, most CRT monitors end up in landfill.
Desktop Computer	150W (During operating condition)	Power consumption will differ significantly depending on whether a CRT or LCD monitor is used. In home and office situations where it is necessary to run multiple desktop computers, it may be possible to make significant power savings by running a single terminal server computer with several LCD monitors and keyboards attached. Terminal server computers can also greatly simplify network management, software upgrades, etc
Photo copier	7-30W (Sl.Mode) 40-300W (Standby) 200-300W (op. cond)	Most of the energy used in a photocopier is consumed by the hot rollers, which are usually kept hot on stand-bay, consuming from 40-300W. Significant energy savings (40% to 60%) can be made by ensuring that photocopiers are switched off at night and on weekends. Some photocopiers consume up to 30 watts even when switched off, so photo copiers should be switched off at the power outlet to ensure they are really "off".
LCD Monitor	30-50W (During operating condition)	LCD monitors typically require about 30% of the power required for a CRT monitor with the same screen area. In addition, the amount of heat generated by an LCD monitor is considerably less than a CRT monitor, resulting in a lower load on ACs. Building cooling needs may be decreased by up to 20%.

Inkjet Printer	120W (During operating condition)	Inkjet printers use relatively little power in comparison to laser printers. From an energy consumption point of view, inkjets are preferable to lasers. Unfortunately, they typically cost more to un on a cost -Per -print basis and sometimes produce less than optimum results
Laser Printer	25-80W (Standby) 150-1100W (During operating condition)	Laser printers consume significant amounts of power even when in standby mode. Over the course of an 8 -10 hr working day, a laser printer could consume around 1kWh of energy. On the other hand, laser printers are cheaper to run on a cost-per page basis and generally produce better results. Both the number of laser printers used, and the number of hours the are operated for, should be minimized. As with printing of any kind, office procedures should be developed which minimize the need for printing to paper
Laptop Computer	15-40 W (during operating condition)	Laptop computer power consumption is typically 10% to 25% of that of a desktop computer. In situations such as an office or home office, where computers may operate for 8 to 10 hours a day, this difference is significant and could represent an energy saving of up to 1kWh per day.

Water Management

6) Installation of water level controller for water tanks.

It is suggested to install water level controller for overhead water tanks. Gardens should be watered by using drip/sprinkler irrigation system to minimize water use. Leakage of the taps are repair, It is recommended to install taps with reduced water flow, . Reward the personnel informing Leaky taps, Paste Labels where ever water is expected to be wasted. 1) Repair sources of water leakage, such as dripping taps and showers as quickly as possible.

2) Use an efficient and hygienic water storage mechanism is to minimize the

loss of water during storage.

7) **Installation/ repair of Rain Water Harvesting System for polytechnic building and main college building**

The Mansa College of Education has a very large roof area for roof top rainy water collection The connecting pipe between roof of polytechnic building and rain water harvesting pit has been broken due to storm, and also it does not cover complete area of roof. The remaining roof area of both the building should also be used for rain water harvesting system. This will improve the recharging of ground water level.

Waste Management

8) **Preparation of Compost Pit**

Waste minimization is very important because it makes good sense to protect the environment and boost environmental performance. Waste minimization techniques focus on preventing waste from ever being created, otherwise known as source reduction, and recycling.

It is suggested to minimize the use of fertilizers and pesticides in college by preparing a compost pit and opting the use of compost in place of fertilizers.

10. Awareness Activities at Mansa College of Education, Bhilai

Mansa College of Education, Bhilai has the practice of conducting various awareness program in college as well as surrounding area.

Seedball Preparation, Plantation by College Students in Schools

Mansa College of Education, Bhilai has promoted the use of Electric vehicles in college campus. Thus, taken a small step towards the India's target of reducing carbon emission by 2030.

MANSA
COLLEGE OF EDUCATION

Best Practices

1. *ANKURAN* (Initiative towards Green Campus)

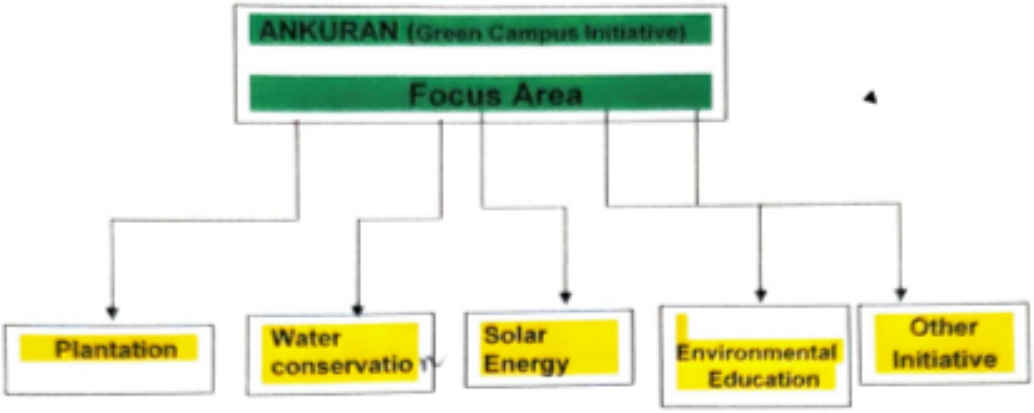
Objectives of the Practice:

- To develop responsible attitude and commitment towards green environment.
- To promote clean and green environment.
- Optimum utilization of water.
- Motivate students and staff through environmental education.

The Context:

- Air pollution is increasing day by day. It has gone to such a high level in some parts of the country that it has become cause for many human respiratory diseases and has affected the human health significantly. This arises the need to treat the pollution issues on high priority basis.
- The industrial area in the vicinity of the campus is polluting air by carbon emission. The institute has taken an initiative to contribute in counterbalancing the emission.
- Due to process of industrialization the load on the conventional energy sources is increasing significantly so there is need to use nonconventional energy sources.

The Practice :



The institute strongly believes that environmental sustainability should be integrated in every aspect of life. To achieve this goal the institute is emphasizing on the following areas:

Plantation: We think that this world can be made a better place to live by taking such initiatives like the Green Campus. Plantation allows us to set an example on how sincere approach and constant efforts ensures solution to the environmental problems. Our college has a beautiful green campus . We have skillfully planted the plants like medicinal Trees and fruits, flowers, seasonal flowers so as to make the campus full of oxygen. The greenery has remained useful in developing oxygen zone in our college. The campus is covered by nice greenery including lush green lawns, avenue trees, plants are gifted to each students at different occasions . Plantation by faculty members and students.

On the occasion of **World Environment Day**, this year we resolved to plantation drive in our institution at " संकल्प पर्व " (mission to plant a 100 Trees) in which institution partnership with " **SANKALP PARYAVARAN SANRAKSHAN SMITI** " planted 100 trees along the road in village kurud near the college.

Water CONSERVATION: The college is having 4 soak pits and 2 water harvesting system to conserve the water. The earth water level is increased which helped to have water to our college boar. It increases natural storage of water, and helps the college in getting water for various purposes.

E-Waste management: The generated e-waste is handed over to the authorized dealer periodically.

Energy: Continuous power supply is the burning problem of the country, there is demand for electricity from agriculture, industrial and household sectors. We have implemented energy conservation programme as below :

1. Installation of solar panel of 50KW.
2. Use of LED Bulb, tube in the college building
3. Eco Friendly construction of college building. No need of light on the day time and minimal use of fans.

Environmental Education: The institute has conducted numerous environmental education programs such as solid waste management, liquid waste management, setting up of medicinal plant nursery, water management, tree planting, energy management, landscape management, pollution monitoring methods etc. The number of display boards on environmental awareness such as – save water, save electricity, no wastage of food/water, switch off light and fan after use, plastic free campus etc. has been placed in the campus.

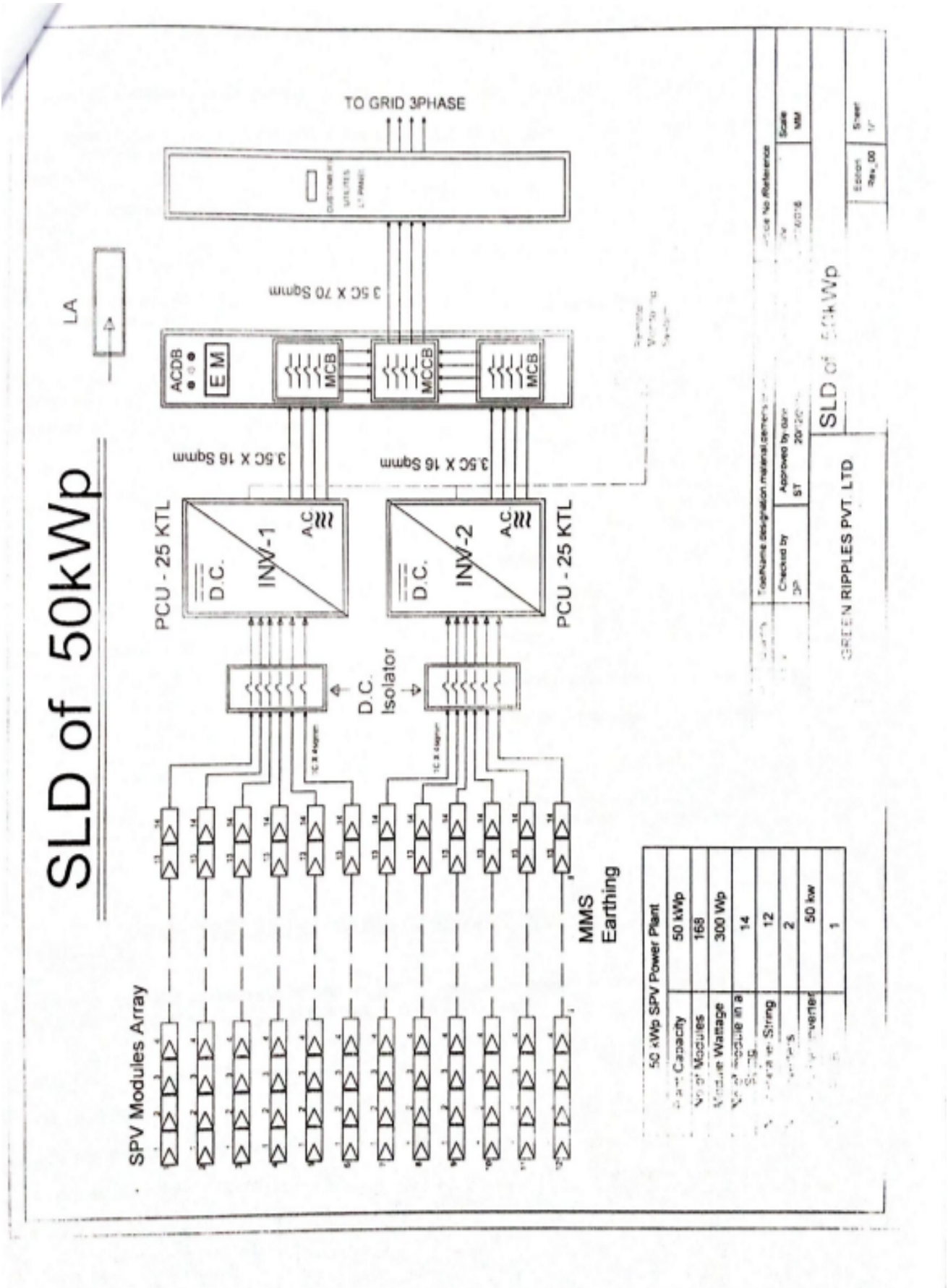
The institute has recently organized a program on awareness of pollution caused by use of vehicles by students and staff members. This activity helped to spread the awareness on carbon emission at individual as well as social level.

The institute encourages students to carry out the projects based on environmental issues as well as non-conventional energy sources.

Other Initiatives:

- Tree plantation by the students at jamul police station and nearby villages.
- **100 Trees Plantation drive** a partnership with " SANKALP PARYAVARAN SANRAKSHAN SMITI ".
- College building is beautified with indoor plants at different places.

Principal
Mansa College of Education
Kurud, Bhilai (C.G.)



Single Line Diagram of Solar Power Plant