D.P. VIPRA COLLEGE
BILASPUR
ACCREDITED "A" GRADE BY NAAC

# 7.1.6

Quality audits on environment and energy are regularly undertaken by the Institution and any awards received for such green campus initiatives


**D.P. Vipra College**

Old High Court Road, Bilaspur

Chhattisgarh, India 495001

OFFICE OF THE PRINCIPAL
**D. P. VIPRA COLLEGE, BILASPUR (C.G.)**
**Accredited "A" by NAAC, ISO-9001:2015 Certified**
Phone No.- 07752-424497, Web. – *www.dpvipracollege.in*, Email- *dpvipracollege@gmail.com*

# Summary-Sheet

| | |
|---|---|
| Criteria | 7 – Institutional Values and Best Practices |
| Key Indicator | 7.1 Institutional Values and Social Responsibilities |
| Metric | 7.1.6: Quality audits on environment and energy are regularly undertaken by the institution.<br>1.Green audit<br>2. Energy audit<br>3.Environment audit<br>4.Clean and green campus recognitions/awards<br>5. Beyond the campus environmental promotional activities |

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

1.Green audit.

2. Energy audit

3.Environment audit

4.Clean and green campus recognitions/awards

5. Beyond the campus environmental promotional activities

**Selected Option for the above measures**

**A**

Any 4 or all of the above

**Note:**

Since all supporting documents for this metric exceeds the upload limit of 5Mb, hence we have hosted the scanned documents as per SOP on institutional website on the following links.

| **Description** | **Relevant link** |
|---|---|
| 1) List of Quality audits on environment and energy are regularly undertaken by the institution is attached. **(Appendix-I)** | https://dpvipracollege.ac.in/aqar-2023-24/ |
| 2) Relevant supporting documents are attached. **(Appendix-II)** | |

IQAC Co-ordinator
D.P. Vipra College
BILASPUR (C.G.)

IQAC Coordinator

PRINCIPAL
D.P. Vipra College
Bilaspur (C.G.)

Principal

D.P. VIPRA COLLEGE
BILASPUR
ACCREDITED "A" GRADE BY NAAC

# 2023-24

## D.P. Vipra College

Old High Court Road, Bilaspur

Chhattisgarh, India 495001

D.P. VIPRA COLLEGE
BILASPUR
ACCREDITED "A" GRADE BY NAAC

# Appendix I


D.P. Vipra College

Old High Court Road, Bilaspur

Chattisgarh, India 495001

OFFICE OF THE PRINCIPAL

# D.P. VIPRA COLLEGE, BILASPUR (C.G.)

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12:02:2019

## GREEN CAMPUS POLICY

D.P Vipra College and its association with mother nature has been long and all the members housing the campus are pretty aware of the fact to work for its sustenanceThe college has taken an initiative to create a campus which is student friendly, pollution free and subsequently a green campus.The Green Campus, Energy and Environment Policies are intended to develop exciting new co-curricular and extracurricular practices that encourage students to take the lead in creating positive change.

**SCOPE OF POLICY:**Green Campus initiatives works on many facets and the focus areas of the policy are:

1. Clean Campus initiatives

2. LandscapingInitiatives

3.Clean Air Initiatives-

- Smoking Free Campus
- Restricted entry of automobiles

4.Infrastructure-

- Solar Power Plant
- Installation of Energy Efficiency Equipment
- Water Conservation through Rainwater Harvesting System

5.Waste Management processes-

- Solid Waste Management

- Liquid Waste Management
- E-Waste Management

6. Awareness Initiatives

7. Environment-centric Student Societies and Department Activities

8. Green and Environment Audit

9. Energy Audit

10. Plastic-Free Campus

**OBJECTIVE OF THE POLICY:**

1 To protect and conserve ecology and natural resources within the campus.

2. To integrate environmental awareness program into plans, policies for outreach activities and social initiatives.

3. To continuously improve the efficient use of allrecourses of energy and water.

4. To promote recycling system and proper waste management.

5. To promote e-governance.

Principal
D.P. Vipra College
Bilaspur (C.G.)

प्राचार्य
डी.पी.विप्र महाविद्यालय
बिलासपुर (छ.ग.)

D.P. VIPRA COLLEGE
BILASPUR
ACCREDITED "A" GRADE BY NAAC

# Green Audit & Environmental Audit Report


## D.P. Vipra College

Old High Court Road, Bilaspur

Chhattisgarh, India 495001

Greenserve Energy
Managment Solutions
Endless in Optimization

2020

# GREEN & ENVIRONMENT AUDIT REPORT

## D. P. Vipra College, Bilaspur (C.G.)


*May 2020*

*Prepared By:*

***Greenserve Energy Management Solutions***

*Vijay Nagar,*

*Durg (C.G.) - 491001*

## Acknowledgement

*We are thankful to theChairman Shri Anurag Shukla and the Principal Dr. Anju Shukla of the D. P. Vipra College, Bilaspur for entrusting processes of Green & Environment auditing with us. We thank all the participants of the auditing team especially students, faculty and non-teaching staff who took pain along with us to gather data through survey. We also thank the office staff who helped us during the document verification.*

## Audit Team Members

| | | |
|---|---|---|
| 1 | Rahul Agrawal | Certified Energy Auditor |
| 2 | Ponraja N | Certified Energy Auditor |
| 3 | Jayendra Mohabe | Senior Energy Engineer |
| 4 | Bhumesh Jagnit | Energy Engineer |

## Table of Contents

## 1. Executive Summary

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institute which will lead for sustainable development.

D. P. Vipra College, Near Old High Court Road Bilaspur, Chhattisgarh is deeply concerned and unconditionally believes that there is an urgent need to address these fundamental problems and reverse the trends. Being a premier institution of higher learning, the college has initiated 'The Green Campus' program that actively promote the various projects for the environment protection and sustainability.

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution. The methodology includes: preparation and filling up of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons, data analysis, measurements and recommendations. It works on the several facts of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management, Paperless Work, Alternative Energy and Mapping of Biodiversity. With this in mind, the specific objectives of the audit are to evaluate the adequacy of the management control framework of environment sustainability as well as the degree to which the departments are in compliance with the applicable regulations, policies and standards. It can make a tremendous impact on student's health and learning college operational costs and the environment. The criteria, methods and recommendations used in the audit are based on the identified risks

## 2. Introduction

Green Audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity. The 'Green Audit' aims to analyze 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 by 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 and it declares the institutions as Grade A, B or C according to the scores assigned during the accreditation.

### 2.1 About the College

The Year 1969 marks the beginning of college education in this area. With inspiration of Shri Rameshwar Prasad Sharma, Chairman, Laxamaneshwar Shikshan Samiti, Kharod and by great efforts of Prof. Ram Narayan Shukla a night college in Bilaspur could be established. This college was affiliated to Ravi Shankar Vishwavidyalaya, Raipur in 1969-1970 and the College Education Department of M.P. Government also accorded its recognition. The college was inaugurated on September 11, 1969 by then Vice Chancellor of Ravi Shankar University, Shri Banshi Lal Pandey, I.A.S. Later as the result of strong demand by students, day teaching began in July-August 1970. Ravi Shankar University, Raipur accorded permission to change the name of night College and the college was called degree college, Bilaspur. A few years later i.e. in July 1982 the College was named as D.P. Vipra College after the name of the eminent literary figure Pt. Dwarika Prasad Tiwari 'Vipra', ex-president of the college Management committee. D.P. Vipra College has become a centre of attraction for the enlightened students who have, great zeal and thirst for knowledge. Teaching in all subjects is being done by able, experienced, skill and learned professors.

The College has earned a name in academic, curricular, co-curricular and extra-curricular activities. Besides having a big, well established central library Departments of Science have their Departmental Libraries. We have two units of NSS and one unit of Red Cross which confirms commitment of the college towards social services. Likewise college has NCC unit of two platoons having strength of 107. NCC plays a vital role in shaping the personality of the students by teaching time discipline, societal service & self-help. Sports Dept. of the college is very active and always occupies enough space in media on student's achievement. Dr. S.K. Tiwari, Head, Dept of English has been publishing & editing two research journals of repute since 2006.

The College is known for its high academic standards, and the student's bag university ranks on a continuous basis. The college offers 05 UG and 03 PG programmes. The college offers Ph.D programmes in 07 disciplines. Till now 24 students have been pursuing their doctoral studies currently. Out of 74 permanent faculty, 28 are Ph.D. holders. The college has received funds and grants from funding agencies like UGC. The college also partners with MHRD in programmes like Ek Bharat Shrestha Bharat. The College was sanctioned Rs. 2 crore for infrastructure development under RUSA in Chhattisgarh.

The infrastructural facilities include 30 ICT enabled class rooms, 01 seminar halls, 01 video conferencing hall, 18 well equipped laboratories 03, computer labs, digital library, etc. The college library has 45989 books and 30 journals as of now. The Principal along with the staff with their vast experience and broad vision, support the dynamisms and ambitious plan of Shri Anurag Shukla, Chairman of governing body, to take the institute to great heights.

## VISION AND MISSION

### Institutional Vision

Our Institution's motive is "Shraddhavan Labhte Gyanam" and our institute is trying hard to achieve it. The motto of D.P. Vipra College forms the core philosophy of the institution. At the heart of the institution, lies its commitment to education and learning, its ingrained ideology towards individual growth, community building and national development through the spread of knowledge as a lighting beacon on the path evolving to certitude enlightenment.

The vision is the vis major of an institution, the driving force behind its actions and the axis on which its energies are focused. Envisioned by its founder, to be an institution with a purpose of fostering meaningful education.

### Mission

The mission statement of the College, signifying the existence and its road map to the achievement of its vision, read as:

"To achieve and sustain excellence in teaching and research, and enriching local and national communities through our research, the skills of alumni, and the publishing of academic and educational materials"

A detailed description of the mission statement reads as:

- To excel in innovative and quality teaching pedagogy and to provide a holistic learning experience to students.
- To identify, tap, nurture and hone talent of individuals of a diverse base enabling them to realize and maximize their potential, excel in their academic and non-academic pursuits and developing them to be leaders of tomorrow.
- To achieve and promote excellence in publications.
- To develop human resources, infuse quality of leadership and create a competitive pool of scholars.

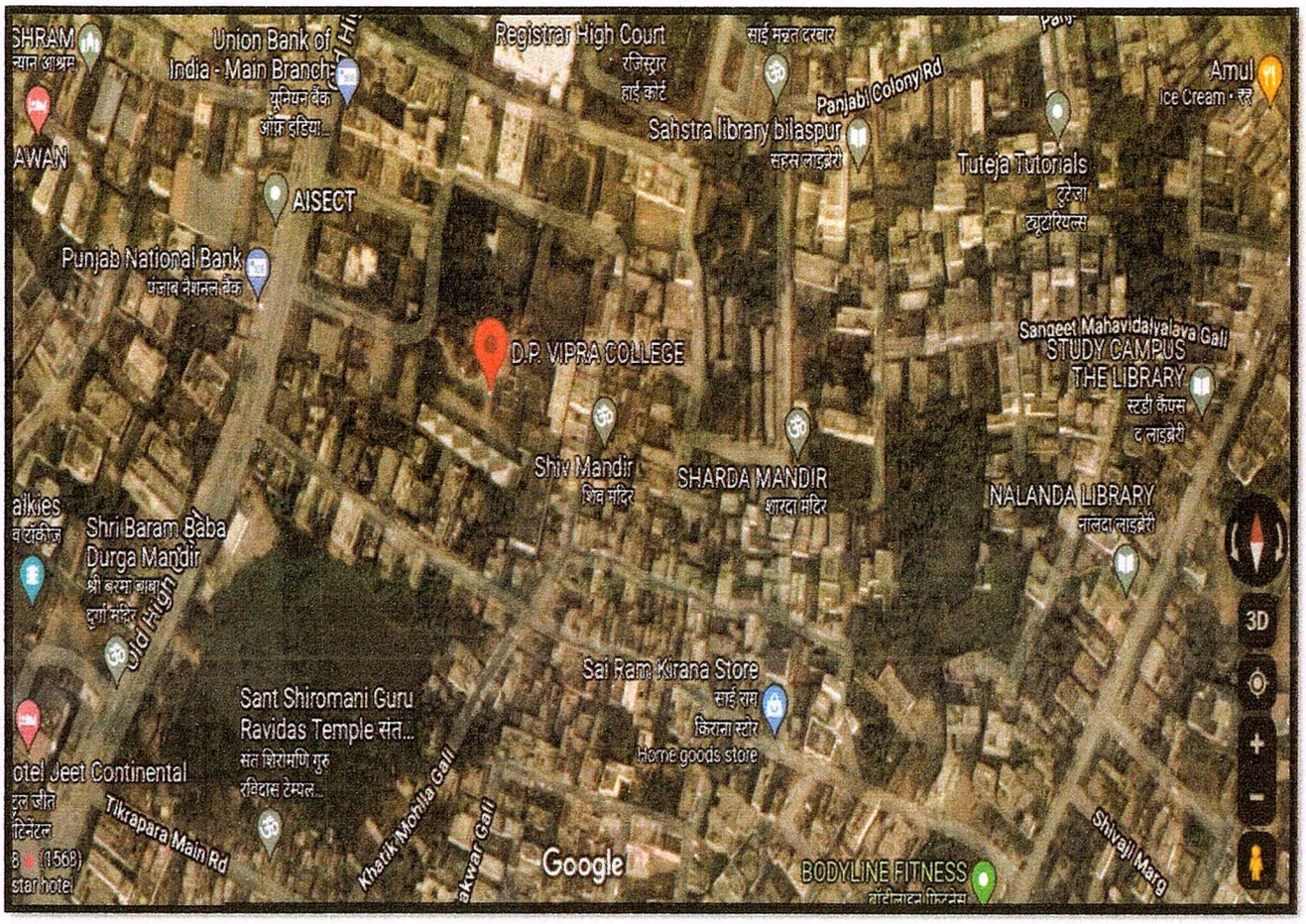
- To foster outreach, community building and empowerment initiatives at national level.
- To maintain and promote quality, transparency, compliance and sustainability in governance and service delivery.
- To collaborate and work with leading national and international institutions and organizations.
- To ensure outstanding environment-friendly infrastructure and facilities to its users.
- To encourage active participation in sports for complete physical and mental health of students.

**Objectives of the College**

- With the vision and mission clearly defined, the College has the following formally stated objectives as the basis for creating policy towards its vision and mission:
- To improve the quality and relevance of academic programmes by introducing innovation and customization of pedagogy to enhance student learning and to develop quality learning contents.
- To hone the potential of students towards their academic and individual growth, develop leadership and entrepreneurial capabilities in them; to stimulate them to pioneer innovation and reach out beyond curriculum; to in still values and morals and develop students to be designers of change and transformation in the country.
- To elevate the quality, quantity, accessibility, impact and effectiveness of research.
- To promote engagement in state and national level extra-curricular, outreach, community building and empowerment initiatives.
- To become the first choice of employees by treating positions as human first, developing an organizational culture to raise effectiveness and efficiency in functioning.
- To create, maintain and innovate infrastructure and service dynamics matching the institutional requirement.
- To introduce requirement-based technology, making information easily accessible to the community, sincerity and commitment in following established statutes and maintaining adaptability to the dynamic state of governance.
- Tapping the alumni and community network, adopting environment caring practices for conservation and utilization.

## Location:

D. P. Vipra College, Bilaspur and the GPS Coordinates of the college is **22.074961, 82.164601.**




## Total Campus Area & College Building Spread Area

| | |
|---|---|
| ***Campus area*** | ***2.520 Acre*** |

## 3.0 Pre-Audit Stage

A pre-audit meeting provided an opportunity to reinforce the scope and objectives of the audit and discussions were held on the practicalities associated with the audit. This meeting is an important prerequisite for the green audit because it is the first opportunity to meet the auditee and deal with any concerns. The meeting was an opportunity to gather information that the audit team can study before arriving on the site. The audit protocol and audit plan were handed over at this meeting and discussed in advance of the audit itself. In College pre-audit meeting was conducted successfully and necessary documents were collected directly from the college before the initiation of the audit processes. Actual planning of audit processes was discussed in the pre-audit meeting. Audit team was also selected in this meeting with the help of staff and the college management. The audit protocol and audit plan were handed over at this meeting and discussed in advance of the audit itself. The audit team worked together, under the leadership of the lead auditor, to ensure completion within the brief and scope of the audit.

### Management's Commitment

The Management of the college has shown the commitment towards the green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on the environment, campus farming, planting more trees on the campus etc., after the green auditing. The management of the college was willing to formulate policies based on green auditing report.

### Scope and Goals of Green & Environment Auditing

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues. Green & Environment Audit is the most efficient and ecological way to manage environmental problems. It is a kind of professional care which is the responsibility of each individual who are the part of Economical, financial, social, environmental factor. It is necessary to conduct green audit in college campus because students become aware of the green audit, its advantages to save the planet and they become good citizen of our country. Thus, Green audit becomes necessary at the college level. A very simple indigenized system has been devised to monitor the environmental performance of D. P. Vipra College, Bilaspur. It comes with a series of questions to be answered on a regular basis. This innovative scheme is user friendly and totally voluntary. The aim of this is to help the institution to set environmental examples for the community, and to educate the young learners.

## Benefits of the Green & Environment Auditing

- More efficient resource management
- To provide basis for improved sustainability
- To create a green campus
- To enable waste management through reduction of waste generation, solid- waste and water recycling
- To create plastic free campus and evolve health consciousness among the stakeholders
- Recognize the cost saving methods through waste minimizing and managing Point out the prevailing and forthcoming complications
- Authenticate conformity with the implemented laws
- Empower the organizations to frame a better environmental performance
- Enhance the alertness for environmental guidelines and duties
- Impart environmental education through systematic environmental management approach and Improving environmental standards
- Benchmarking for environmental protection initiatives
- Financial savings through a reduction in resource use
- Development of ownership, personal and social responsibility for the College and its environment
- Enhancement of college profile
- Developing an environmental ethic and value systems in youngsters.
- Green auditing should become a valuable tool in the management and monitoring of environmental and sustainable development programs of the college.

## Target Areas of Green and Environment Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy and water; minimize waste generation or pollution and also economic efficiency.

All these indicators are assessed in process of "Green and Environment Auditing of educational institute". Eco-campus focuses on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, promotes personal action, reduce the institute's energy and water consumption, reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint.

**Auditing for Water Management**

Water is a natural resource; all living matters depend on water. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. We need to use water wisely to ensure that drinkable water is available for all, now and in the future. A small drip from a leaky tap can waste more than 180 litters of water to a day; that is a lot of water to waste enough to flush the toilet eight times! 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. 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. It is therefore essential that any environmentally responsible institution examine its water use practices.

**Auditing for Energy Management**

Energy cannot be seen, but we know it is there because we can see its effects in the forms of heat, light and power. 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. An old incandescent bulb uses approximately 60W to 100W while an energy efficient light emitting diode (LED) uses only less than 10 W. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

### Auditing for Waste Management

Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities which can cause health problems. Plastic bags and discarded ropes and strings can be very dangerous to birds and other animals.

This indicator addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Solid waste can be divided into two categories: general waste and hazardous waste. General wastes include what is usually thrown away in homes and schools such as garbage, paper, tins and glass bottles. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals and petrol. Unscientific landfills may contain harmful contaminants that leach into soil and water supplies, and produce greenhouse gases contributing to global climate change. Furthermore, solid waste often includes wasted material resources that could otherwise be channelled into better service through recycling, repair, and reuse. Thus, the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems. It is therefore essential that any environmentally responsible institution examine its waste processing practices.

### Auditing for Green Campus Management

Unfortunately, biodiversity is facing serious threats from habitat loss, pollution, over consumption and invasive species. Species are disappearing at an alarming rate and each loss affects nature's delicate balance and our quality of life. Without this variability in the living world, ecological systems and functions would break down, with detrimental consequences for all forms of life, including human beings. Newly planted and existing trees decrease the amount of carbon dioxide in the atmosphere. Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen that a single tree produces is enough to provide one day's supply of oxygen for people. So, while you are busy studying and working on earning those good grades, all the trees on campus are also working hard to make the air cleaner for us. Trees on our campus impact our mental health as well; studies have shown that trees greatly reduce stress, which a huge deal is considering many students are under some amount of stress.

### Auditing for Carbon Footprint

Commutation of stakeholders has an impact on the environment through the emission of greenhouse gases into the atmosphere consequent to burning of fossil fuels (such as petrol). The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. 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 your 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. One aspect is to consider the distance and method travelled between home and college every day. It undertakes the measure of bulk of carbon dioxide equivalents exhaled by the organization through which the carbon accounting is done. It is necessary to know how much the organization is contributing towards sustainable development. It is therefore essential that any environmentally responsible institution examines its carbon footprint.

**Methodology of Green and Environment Auditing**

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution. The criteria, methods and recommendations used in the audit were based on the identified risks. The methodology includes: preparation and filling up of questionnaire, physical inspection of the campus, observation and review of the document, interviewing responsible persons and data analysis, measurements and recommendations. The methodology adopted for this audit was a three-step process comprising of:

1. Data Collection – In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements.

Following steps were taken for data collection:

- The team went to each department, centres, Library, canteen etc.
- Data about the general information was collected by observation and interview.
- The power consumption of appliances was recorded by taking an average value in some cases.

2. Data Analysis - Detailed analysis of data collected include: calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the Chhattisgarh State Electricity Board (CSEB). Data related to water usages were also analysed using appropriate methodology.

3. Recommendation – On the basis of results of data analysis and observations, some steps for reducing power and water Consumption were recommended. Proper treatments for waste were also suggested. Use of fossil fuels have to be reduced for the sake of community health. The above target areas particular to the college was evaluated through questionnaire circulated among the students for data collection. Five categories of questionnaires were distributed.

## 4.0 Post-Audit Stage

### 4.1 Energy Usage:

**DETAILS OF ENERGY CONSUMPTION:**

**SATYAM BUILDING**

| Sl.No. | Location / Room No. | KWh/Day |
|---|---|---|
| 1 | Chairman Room | 9.46 |
| 2 | Principal office | 9.33 |
| 3 | Account Department | 18.77 |
| 4 | Room No-4 | 7.69 |
| 5 | PRO | 3.63 |
| 6 | Smart Class-03 | 15.52 |
| 7 | Room No-6 | 7.17 |
| 8 | Smart Class-04 | 7.61 |
| 9 | ICT Room & Conference Hall | 8.62 |
| 10 | Emergency | 3.91 |
| 11 | TEA | 1.32 |
| 12 | C 1 | 3.99 |
| 13 | C 2 | 1.51 |
| 14 | Room No-101 | 2.97 |
| 15 | Room No-102 | 2.97 |
| 16 | Room No-103 | 2.97 |
| 17 | Room No-104 | 2.97 |
| 18 | Room No-105 | 2.97 |
| 19 | Room No-106 | 2.97 |
| 20 | Room No-107 | 2.97 |
| 21 | Mathematics Department | 5.36 |
| 22 | Room No-202 | 2.97 |
| 23 | Room No-203 | 2.97 |
| 24 | Electronics Department | 2.97 |
| 25 | Managemental Departmental Room | 1.23 |
| 26 | Zoology Lab | 10.64 |
| 27 | Botany Lab | 13.68 |
| **Total** | | **159.11** |

## SHIVAM BUILDING

| Sl.No. | Location / Room No. | KWh/Day |
|---|---|---|
| 1 | S C 1 | 6.84 |
| 2 | S C 2 | 6.84 |
| 3 | C 2 | 0.50 |
| 4 | History Department | 4.84 |
| 5 | Salary Department | 2.94 |
| 6 | Chemistry Department | 19.64 |
| 7 | Room No-109 | 5.94 |
| 8 | Physics Department | 20.68 |
| 9 | Computer Department | 193.15 |
| 10 | Microbiology Department | 14.07 |
| 11 | Geography Department | 9.51 |
| 12 | Biochemistry Department | 30.50 |
| 13 | Biotechnology Department | 6.76 |
| **Total** | | **322.2** |

| Library | | |
|---|---|---|
| **Sl.No.** | **Location / Room No.** | **KWh/Day** |
| 1 | Library | 57.28 |
| **Total** | | **57.28** |

## SUNDARAM BUILDING

| Sl.No. | Location / Room No. | KWh/Day |
|---|---|---|
| 1 | Hindi Department | 3.21 |
| 2 | English Department | 5.70 |
| 3 | NCC Department | 4.65 |
| 4 | Political Science Department | 3.21 |
| 5 | Sociology Department | 5.63 |
| 6 | Economics Department | 4.65 |
| 7 | Sports Department | 6.76 |
| 8 | Commerce Department | 4.65 |
| 9 | Room No-110 | 5.94 |
| 10 | Room No-112 | 2.97 |
| 11 | Room No-113 | 2.97 |
| 12 | Room No-206 | 5.68 |
| 13 | Room No-207 | 5.92 |
| **Total** | | **61.94** |

## PUSHPARAJ BUILDING

| Sl.No. | Location / Room No. | KWh/Day |
|---|---|---|
| 1 | Room No-1 | 1.48 |
| 2 | Room No-2 | 1.48 |
| 3 | Room No-3 | 1.25 |
| 4 | Room No-4 | 1.25 |
| 5 | Room No-5 | 1.25 |
| 6 | Room No-6 | 1.25 |
| 7 | Room No-7 | 1.25 |
| 8 | Room No-8 | 1.25 |
| 9 | NSS Department | 7.34 |
| 10 | Gym | 2.49 |
| **Total** | | **20.27** |

## AUDITORIUM BUILDING

| Sl.No. | Location / Room No. | KWh/Day |
|---|---|---|
| 1 | Conference Room | 15.6 |
| **Total** | | **15.6** |

## 4.1 Water Usage:

### Water Storage Tank Capacity in Litre

| Sl No. | Location | No.of Tank | Tank Capacity (Ltr) | Storage Capacity (Ltr) | Total Storage (Ltr) |
|---|---|---|---|---|---|
| 1 | College Building | 1 | 15000 | 15000 | 20000 |
| | | 3 | 1000 | 3000 | |
| | | 4 | 500 | 2000 | |
| | **Total Water Storage** | | | | **20000** |

### Water Supply to College in Litre/ Day

| Sl No. | Source Of Water | kW Rating | Location | Under Control | Rated Flow (LPM) | Pump Running Minute /Day | Supply Ltr/Day | % age of Supply Water |
|---|---|---|---|---|---|---|---|---|
| 1 | Submersible Pump (2 HP) | 1.5 | College Building | College premises | 500 | 66.664 | 10000 | 50 |
| 2 | Submersible Pump (2 HP) | 1.5 | | | 500 | 66.666 | 10000 | 50 |
| **Total Water Supply** | | | | | | | **20000** | |

## College Building water Consumption Litre / Day

| Sl No | Location | Qty. (Nos.) | No.of Tab | Water Cons. Litre./Day | Water Cons. (%) | Water Outlet to | Remark |
|---|---|---|---|---|---|---|---|
| 1 | Administration Committee office | 1 | 3 | 150 | 1.31 | Ground | |
| 2 | Principal office | 1 | 3 | 150 | 1.31 | Ground | |
| 3 | Back Old | 1 | 4 | 200 | 1.75 | Ground | |
| 4 | Back New | 2 | 3 | 750 | 6.55 | Ground | |
| 5 | Smart Class | 1 | 3 | 150 | 1.31 | Ground | |
| 6 | Chemistry Department | 1 | 50 | 2500 | 21.83 | No | |
| 7 | Bathroom Back of Chemistry Departm | 1 | 10 | 250 | 2.18 | NO | |
| 8 | Micro-Biology Department | 1 | 23 | 1150 | 10.04 | NO | |
| 9 | Geography Department | 1 | 5 | 250 | 2.18 | Water Harvesting | |
| 10 | Biotechnology | 1 | 4 | 200 | 1.75 | Water Harvesting | |
| 11 | Third Floor Bathroom | 1 | 10 | 500 | 4.37 | Water Harvesting | |
| 12 | Computer Department | 1 | 4 | 200 | 1.75 | No | |
| 13 | Zoology Department | 1 | 2 | 100 | 0.87 | No | |
| 14 | Botonny Department | 1 | 6 | 300 | 2.62 | No | |
| 15 | Library | 1 | 21 | 1050 | 9.17 | No | |
| 16 | Social Science Department | 1 | 5 | 250 | 2.18 | No | |
| 17 | Bathroom (Pushpa raj Building) | 1 | 5 | 250 | 2.18 | Ground | |
| 18 | Ground Area | 1 | 9 | 450 | 3.93 | Ground | |
| 19 | Auditorium Bathroom | 1 | 4 | 200 | 1.75 | Ground | |
| 20 | Cycle Stand Bathroom | 1 | 10 | 500 | 4.37 | Ground | |
| 21 | Warden Room | 1 | 1 | 50 | 0.44 | Ground | |
| 22 | NCC Department | 1 | 5 | 250 | 2.18 | Ground | |
| 23 | Sports Department | 1 | 5 | 250 | 2.18 | Ground | |
| 24 | Physics Department | 1 | 9 | 450 | 3.93 | Ground | |
| 25 | Borewell Pump | 1 | 2 | 100 | 8.70 | Ground | |
| 26 | Tulu Pump | 1 | 1 | 50 | 4.35 | Ground | |
| 27 | Water Freezer | 1 | 4 | 200 | 17.39 | Ground | 30 % Water Use |
| 28 | Biochemistry department | 1 | 1 | 50 | 4.35 | Ground | |
| 29 | 1st Floor Bathroom | 1 | 3 | 150 | 13.04 | Ground | |
| 30 | Inside Auditorium Bathroom | 1 | 7 | 350 | 30.43 | Ground | |
| | **Total water Consumption** | | | **11450** | **100.00** | | |

## Existing water management methods installed in the campus

| Sl No. | Source of ground recharger | Total | Location | Quantity (No.) |
|---|---|---|---|---|
| 1 | Rain water harvesting | 1 | College Building | 1 |

## 4.3 Waste measure and its disposal

**MONTHLY PAPER DETAILS:**

| Sl No. | Details of Paper | | New Paper | | Waste Paper | |
|---|---|---|---|---|---|---|
| | Paper | Unit | New Paper | News paper | Waste Paper | News & Other Paper |
| 1 | Paper Packet (A4 Size) | No. | 25 | 210 | 5 | |
| 2 | Weight Per Packet (Kg) | Kg / Packet | 2.20 | 0.10 | 2.20 | 10 |
| | **Total Weight** | Kg | **55** | **21** | 11 | 10 |
| | | | | | **21** | |

## Existing waste management methods practiced

- Cleaning the campus on daily basis.
- Segregation of waste into degradable and non-degradable by the cleaning staff.
- Waste bin's in placed in corridors, office and staff rooms.
- E-waste and plastic waste disposal at municipal collection center.
- Campaigns for reduce, reuse and recycle.
- Special arrangement for exist of waste water from chemical lab.

## 4.4 Greenery in Campus

Campus tree cover – 0.5 Acre (Approx)

## Existing trees details in the campus

| S.No. | Local Name | Botanical Name | Number of Plants |
|---|---|---|---|
| 1 | Ashoka | *Sarca indica* | 30 |
| 2 | Neem | *Azardirachta indica* | 7 |
| 3 | Gulmohar | *Cegilpinia pulcherrima* | 1 |
| 4 | Karanja | *Pongamia pinnata* | 5 |
| 5 | Nilgiri | *Eucalyptus* | 2 |
| 6 | Dracaena | *Dracaena* | 5 |
| 7 | Kela | *Musa indica* | 4 |
| 8 | Ratanjot | *Jatropha curcas* | 3 |
| 9 | Agave | *Agave americana* | 20 |
| 10 | Palm | *Areca pam* | 25 |
| 11 | Tuha | *Euphorbia milii* | 3 |
| 12 | Patharchatta | *Kalanchose pinnata* | 5 |
| 13 | Kaner | *Nerium olender* | 5 |
| 14 | Ixora | *Ixora* | 5 |
| 15 | Jasmine | *Jasminun mogra* | 10 |
| 16 | Croton | *Soribus rotundifolius* | 12 |
| 17 | Gudhal | *Hibiscus rosa-sinesis* | 20 |
| 18 | Tendu | *Diosyros melanoxylon* | 3 |
| 19 | Gulab | *Rosa sinensis* | 20 |
| 20 | Cycas | *Cycas revolute* | 10 |
| 21 | Sadasuhagan | *Vinca rosia* | 2 |
| 22 | Lotus | *Nulumbo nucifera* | 2 |
| 23 | Clove Pink | *Dianthus caryophylous* | 4 |
| 24 | Botal Brush | *Collistemon lanceolatus* | 2 |
| 25 | Hadge | *Golden hadge* | 200 |
| 26 | Salvia | *Salvia splendens* | 7 |
| 27 | Tulsi | *Ocimum sanctum* | 10 |
| 28 | Champa | *Magnolia champaca* | 5 |
| 29 | Aurucaria | *Aurucaria columnaris* | 3 |
| 30 | Vidhya Patti | *Thuja occidentalis* | 5 |
| 31 | Genda | *Maxican marigold* | 20 |
| 32 | Sonpatti | *Bauhinia racemesa* | 5 |
| 33 | Chuhimuhi | *Mimosa pudica* | 1 |
| 34 | Ming Aralia | *Polyscias fruticosa* | 2 |
| 35 | Red Peacock | *Aglaonema commutatum* | 4 |
| 36 | Kadam | *Neolamarchia cadamba* | 2 |
| | | **Total** | **469** |

## 5.0 Conclusion and Recommendations

Green and Environment Audit is the most efficient way to identify the strength and weakness of environmental sustainable practices and to find a way to solve problem. Green Audit is one kind of professional approach towards a responsible way in utilizing economic, financial, social and environmental resources. Green audits can "add value" to the management approaches being taken by the college and is a way of identifying, evaluating and managing environmental risks (known and unknown). There is scope for further improvement, particularly in relation to waste, energy and water management. The college in recent years consider the environmental impacts of most of its actions and makes a concerted effort to act in an environmentally responsible manner. Even though the college does perform fairly well, the recommendations in this report highlight many ways in which the college can work to improve its actions and become a more sustainable institution.

### Major Audit Observations

i) Use of notice boards and signs are inadequate to reduce over exploitation of natural resources.

ii) Solar Plant Installed with Capacity of 30 KW

iii) Programs on green initiatives have to be increased. Campus is declared plastic free, stringent actions should be taken to maintain this.

iv) Existing Rain water harvesting systems, solar power generation, environmental education programs have to be strengthened.

v) Display boards against the misuse of water use are lacking.

vi) Display boards for awareness in relation to energy conservation is found inadequate.

vii) There are fans of older generation and non-energy efficient which can be phase out by replacing with new energy efficient fans.

viii) Solid waste management systems established are insufficient.

ix) Waste bins in the class rooms, veranda, canteen and campus are inadequate.

x) Regular planting of trees in the campus Can be increased.

xi) Display boards to all plants & trees identified, Should be increased.

xii) There is only very few fruit trees in the college to attract birds.

xiii) College has not yet taken any initiative for carbon accounting.

**Recommendations:**

## Water

i. Remove damaged taps and install sensitive taps is possible.

ii. Awareness programs on water conservation to be conducted.

iii. Install display boards to control over exploitation of water.

## Environment

i. Arrange training programmes on environmental management system and nature conservation. .

## Energy

i. Establish a purchase policy that is energy saving and eco-friendly.

ii. Replace incandescent and CFL lamps with LED lights.

iii. Conduct seminars, workshops and exhibitions on environmental education.

iv. Establish water, energy and waste management systems.

v. Increase the number of display boards on environmental awareness such as – save water, save electricity, no wastage of food/water, no smoking, switch off light and fan after use, plastic free campus etc.

vi. Replace old fans with energy efficient fans.

vii)Replace Window AC with Split AC

## Waste

i. Conduct exhibition of recyclable waste products.

ii. Conduct more seminars and group discussions on environmental education.

iii. Remove damaged taps and install sensitive taps is possible.

iv. Practice of waste segregation to be initiated.

v. Avoid plastic/thermocol plates and cups in the college level or department level functions.

vi. Establish an E-waste collection center in campus.

## Green Campus

i. All trees in the campus should be named scientifically.

ii. Create more space for planting.

iii. Grow potted plants at both verandah and class rooms.

iv. Create automatic drip irrigation system during summer holidays.

v. Not just celebrating environment day but making it a daily habit.

vi. Beautify the college building with more indoor plants.

vii. Conducting competitions among departments for making students more interested in making the campus green.

## Carbon footprint

i. Establish a system of car pooling among the staff to reduce the number of four wheelers coming to the college.
ii. Encourage students and staff to use cycles.

### Commitments after Green and Environment Auditing

In the light of green and environment audit the College should, adopt some additions in the vision and mission statements promoting compliance with environmental laws and regulations for sustainable existence of the college.

## CERTIFICATION

This Part shall indicate certification by Certified Energy Auditor stating that: -

I. The data collection has been carried out diligently and truthfully.
II. All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorized and no tampering of such device has occurred.
III. All reasonable professional skill, care and diligence had been taken in preparing the Green & Environment Audit Report and the contents thereof are a true representation of the facts.
IV. Adequate training provided to personnel involved in daily operation after implementation of recommendation.

Signature:


Name of the Certified Energy Auditor: Mr. Rahul Agrawal
Certification Detail: EA-20984

D.P. VIPRA COLLEGE
BILASPUR
ACCREDITED "A" GRADE BY NAAC

# Energy Audit Report


## D.P. Vipra College

Old High Court Road, Bilaspur

Chhattisgarh, India 495001

2020

# ENERGY AUDIT REPORT OF D.P. VIPRA COLLEGE, BILASPUR (C.G.)


Greenserve Energy
Managment Solutions
Endless to Optimization

**Greenserve Energy Management Solutions**
Vijay nagar, Near shrinathkuni, Dura-491001

## Acknowledgement

*We are thankful to the Chairman Shri Anurag Shukla and the Principal Dr. Anju Shukla of the D. P. Vipra College, Bilaspur for entrusting processes of Energy auditing with us. We thank all the participants of the auditing team especially students, faculty and non-teaching staff who took pain along with us to gather data through survey. We also thank the office staff who helped us during the document verification.*

## Audit Team Members

| | | |
|---|---|---|
| 1 | Ponraja N | Certified Energy Auditor |
| 2 | Rahul Agrawal | Certified Energy Auditor |
| 3 | Jayendra Mohabe | Senior Energy Engineer |
| 4 | Bhumesh Jagnit | Energy Engineer |

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# List of Abbreviations

| Word | Meaning |
|---|---|
| ECM | Energy Conservation Measure |
| EE | Energy Efficiency |
| Kva | Kilo Volt Ampere |
| KVAh | Kilo Volt Ampere hour |
| kVAr | Kilo Volt Ampere reactive |
| kW | Kilo Watt |
| kWh | Kilo Watt hour |
| PF | Power Factor |
| RH | Relative Humidity |
| THD | Total Harmonic Distortion |
| TR | Tons of Refrigerant |
| INR | Indian Rupees |
| kV | Kilo Volt |
| V | Volt |
| A | Ampere |
| EB | Electricity Board |
| m/s | Meter per seconds |
| m2 | Meter Square |
| CFL | Compact Fluorescent Lamp |
| FTL | Fluorescent Tube Light |
| LED | Light Emitting Diodes |
| FY | Financial Year |
| HP | Horse Power |

# Section 1: Executive Summary

# 1. Executive Summary

Energy Saving Potential at a glance:

| Sno | Energy saving measures | Investment (Lakh Rs.) | Energy Saving Electricity (kWh/Year) | Annual Energy Cost savings (Lakh Rs.) | Payback Period (Months) |
|---|---|---|---|---|---|
| 1 | Replacement of Existing Light to LED Lights in College Building | 0.977 | 11924 | 0.835 | 14 |
| 2 | Replacement of Existing Ceiling Fan to Energy Efficient Fan in College Building | 7.575 | 20362 | 1.425 | 64 |
| | **Total** | **8.552** | **32288** | **2.26** | **45** |

# Section 2: Introduction

# 2. Introduction

## 2.1 About D. P. Vipra *College*

The Year 1969 marks the beginning of college education in this area. With inspiration of Shri Rameshwar Prasad Sharma, Chairman, Laxamaneshwar Shikshan Samiti, Kharod and by great efforts of Prof. Ram Narayan Shukla a night college in Bilaspur could be established. This college was affiliated to Ravi Shankar Vishwavidyalaya, Raipur in 1969-1970 and the College Education Department of M.P. Government also accorded its recognition. The college was inaugurated on September 11, 1969 by then Vice Chancellor of Ravi Shankar University, Shri Banshi Lal Pandey, I.A.S. Later as the result of strong demand by students, day teaching began in July-August 1970. Ravi Shankar University, Raipur accorded permission to change the name of night College and the college was called degree college, Bilaspur. A few years later i.e. in July 1982 the College was named as D.P. Vipra College after the name of the eminent literary figure Pt. Dwarika Prasad Tiwari 'Vipra', ex-president of the college Management committee. D.P. Vipra College has become a centre of attraction for the enlightened students who have, great zeal and thirst for knowledge. Teaching in all subjects is being done by able, experienced, skill and learned professors.

The College has earned a name in academic, curricular, co-curricular and extra-curricular activities. Besides having a big, well established central library Departments of Science have their Departmental Libraries. We have two units of NSS and one unit of Red Cross which confirms commitment of the college towards social services. Likewise college has NCC unit of two platoons having strength of 107. NCC plays a vital role in shaping the personality of the students by teaching time discipline, societal service & self-help. Sports Dept. of the college is very active and always occupies enough space in media on student's achievement. Dr. S.K. Tiwari, Head, Dept of English has been publishing & editing two research journals of repute since 2006.

The College is known for its high academic standards, and the student's bag university ranks on a continuous basis. The college offers 05 UG and 03 PG programmes. The college offers Ph.D programmes in 07 disciplines. Till now 24 students have been pursuing their doctoral studies currently. Out of 74 permanent faculty, 27 are Ph.D. holders. The college has received funds and grants from funding agencies like UGC. The college also partners with MHRD in programmes like Ek Bharat Shrestha Bharat. The College was sanctioned Rs. 2 crore for infrastructure development under RUSA in Chhattisgarh.

The infrastructural facilities include 30 ICT enabled class rooms, 01 seminar halls, 01 video conferencing hall, 18 well equipped laboratories, 03 computer labs, digital library, etc. The college library has 45989 books and 30 journals as of now. The Principal along with the staff with their vast experience and broad vision, support the dynamisms and ambitious plan of Shri Anurag Shukla, Chairman of governing body, to take the institute to great heights.

## VISION AND MISSION

### Institutional Vision

Our Institution's motive is "Shraddhavan Labhte Gyanam" and our institute is trying hard to achieve it. The motto of D.P. Vipra College forms the core philosophy of the institution. At the heart of the institution, lies its commitment to education and learning, its ingrained ideology towards individual growth, community building and national development through the spread of knowledge as a lighting beacon on the path evolving to certitude enlightenment.

The vision is the vis major of an institution, the driving force behind its actions and the axis on which its energies are focussed. Envisioned by its founder, to be an institution with a purpose of fostering meaningful education.

### Mission

The mission statement of the College, signifying the existence and its road map to the achievement of its vision, read as:

"To achieve and sustain excellence in teaching and research, and enriching local and national communities through our research, the skills of alumni, and the publishing of academic and educational materials"

A detailed description of the mission statement reads as:

- To excel in innovative and quality teaching pedagogy and to provide a holistic learning experience to students.
- To identify, tap, nurture and hone talent of individuals of a diverse base enabling them to realize and maximize their potential, excel in their academic and non-academic pursuits and developing them to be leaders of tomorrow.
- To achieve and promote excellence in publications.
- To develop human resources, infuse quality of leadership and create a competitive pool of scholars.
- To foster outreach, community building and empowerment initiatives at national level.
- To maintain and promote quality, transparency, compliance and sustainability in governance and service delivery.
- To collaborate and work with leading national and international institutions and organizations.
- To ensure outstanding environment-friendly infrastructure and facilities to its users.
- To encourage active participation in sports for complete physical and mental health of students.

The installed capacity of each load is given as follows:

| Connected Load Breakup | |
|---|---|
| Lighting Load | 16.6 |
| Fans, Coolers | 31.7 |
| AC Load | 33 |
| Computers, Printer & Photo Copier Load | 23.1 |
| Freeze, LED TV& Projector Load | 6.3 |
| **Total** | **111** |

Table 1: Connected Load Break up

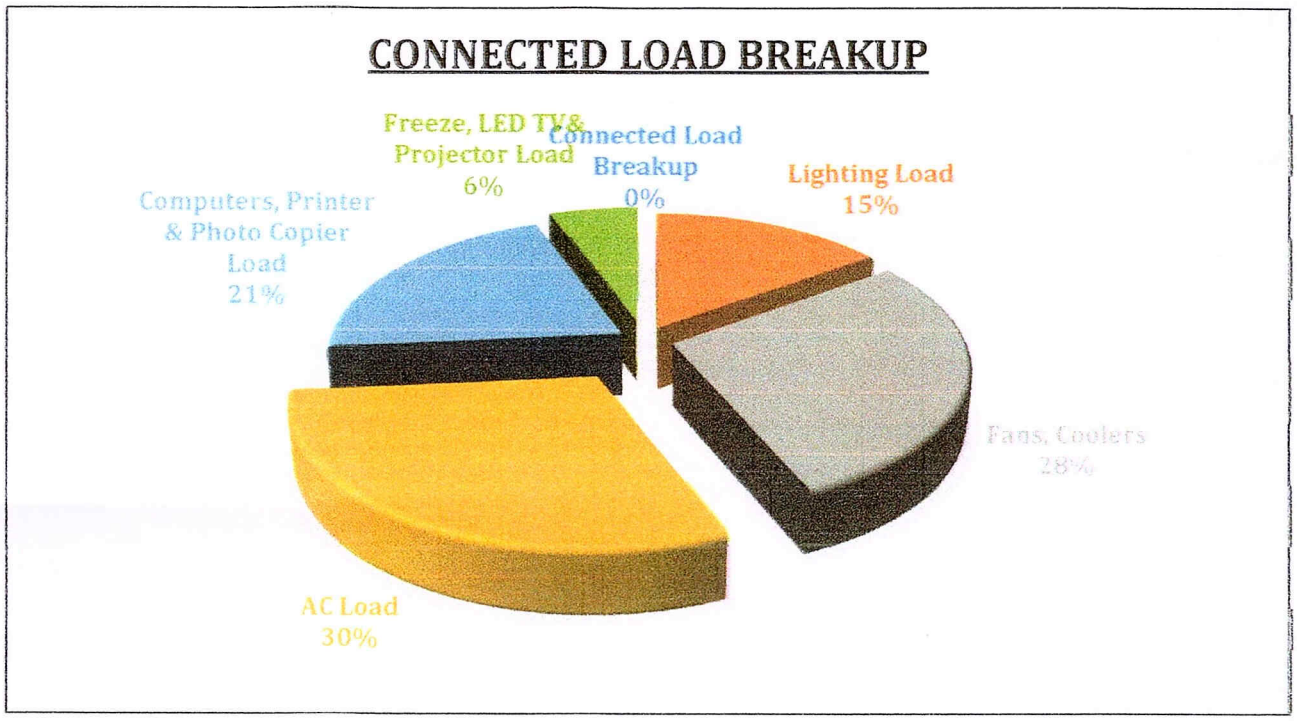



*Figure 1: Connected Load Breakup*

## 2.2 Methodology

The methodology adopted for energy audit study is given below:

- Kick off meeting
- Analysis of past performance data
- Measurements of required electrical parameters
- Conduct of efficiency and performance improvement trials (if required)
- Discussion of the findings and recommendations with Electrical Team.
- Detailed techno-economic analysis
- Report submission

## 2.3 Instruments used for study

The following Instruments were used during energy audit study:

| S. No | Name of the Instrument | Make of the instrument | Details |
|---|---|---|---|
| 1. | Portable power quality analyser | Hioki | Range: 5A-5000Amps Accuracy: Uncertainty in measurement is ±0.77% Voltage & ±0.7% (current), ±0.31% (watts) |
| 2. | Thermal Imaging camera | Fluke TS10 | Temperature Range: -10 to 350 °C (14 to 662 °F) |
| 4. | RH meter | TESTO | Temperature range: 0°C to 50°C. with 100% RH |
| 5. | Lux meter | Ten mars (NEDA 1604) | Range:0-2000, 0-20000 & 0-50000 Lux (3 Ranges) |
| 6. | Digital Pressure Meter | Metravi | Range : 0 to 2.131 PSI |
| 7. | Anemometer | Lutron (AM 4201) | Range of Velocity: 0-30 m/s |
| 8. | Ultrasonic flow meter | ADOPT Fluid Dynamics, pune | Range: 0-2500 $m^3$/hr Resolution: 0.01$m^3$/hr |

*Table 2: Instruments used for the study*

## Climatic condition

The average high temperature and low temperature profile of Bilaspur is given as follows:

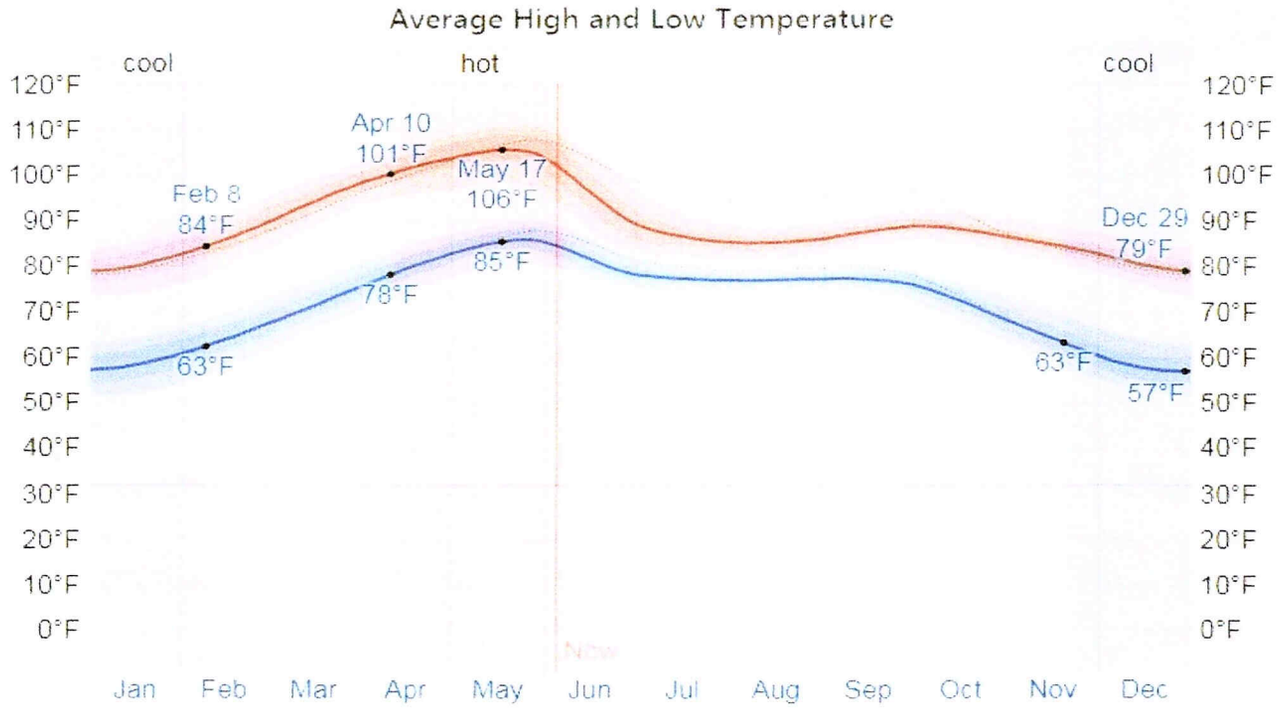



*Figure 2: Climatic condition of Bilaspur*

The hot season lasts for 1.9 months, from April 10 to June 8, with an average daily high temperature above 101°F (38°C). The hottest day of the year is May 17, with an average high of 106°F (41°C) and low of 85°F (29°C).

The cool season lasts for 2.6 months, from November 19 to February 8, with an average daily high temperature below 84°F(29°C). The coldest day of the year is December 29, with an average low of 57°F(14°C) and high of 79°F(26°C).

## 2.4 Present Energy Scenario at D. P. Vipra College

### 2.4.1 Source of Electricity

Electricity is sourced from Chhattisgarh State Power Distribution Company Limited (CSPDCL). The sanction Load of the facility is 60 KVA.

### 2.5.2 Electricity Board Bill Analysis

Electricity details including bills paid, demand recorded, and consumption is tabulated below. Electricity bill data of the facility from April 2019 to March 2020 is analysed as per billing month and summarised as follows:

| Bill Month | KWH Consumption | KVAH Consumption | Contract Demand (KVA) | Maximum Demand (KVA) | Avg. P.F | Total Bill Amount (Rs.) | Charge Per Unit KWH (Rs.) | Charge Per Unit KVAH (Rs.) |
|---|---|---|---|---|---|---|---|---|
| Apr-19 | 3530 | 4755 | 60 | 30 | 0.74 | 49,820 | 14.1 | 10.5 |
| May-19 | 3360 | 4575 | 60 | 28.8 | 0.73 | 46,210 | 13.8 | 10.1 |
| Jun-19 | 3800 | 4865 | 60 | 34.2 | 0.78 | 49,010 | 12.9 | 10.1 |
| Jul-19 | 4705 | 5995 | 60 | 42.6 | 0.78 | 59,620 | 12.7 | 9.9 |
| Aug-19 | 6165 | 7815 | 60 | 48 | 0.79 | 84,870 | 13.8 | 10.9 |
| Sep-19 | 7285 | 8850 | 60 | 50.4 | 0.82 | 94,200 | 12.9 | 10.6 |
| Oct-19 | 4675 | 6255 | 60 | 44 | 0.75 | 40,040 | 8.6 | 6.4 |
| Nov-19 | 4220 | 6225 | 60 | 39.6 | 0.68 | 60,630 | 14.4 | 9.7 |
| Dec-19 | 3045 | 5210 | 60 | 30.2 | 0.58 | 51,300 | 16.8 | 9.8 |
| Jan-20 | 2975 | 5060 | 60 | 18.2 | 0.59 | 50,560 | 17.0 | 10.0 |
| Feb-20 | 3170 | 4900 | 60 | 20.8 | 0.65 | 50,240 | 15.8 | 10.3 |
| Mar-20 | 2660 | 4145 | 60 | 23.4 | 0.64 | 41,620 | 15.6 | 10.0 |
| **Total** | **49590** | **68650** | | | | **678120** | | |
| **Average** | | | **60** | **34.563636** | **0.709** | | **14.0** | **9.9** |

*Table 3 Electricity Board bill analysis*

Month wise energy consumption (kWh) and associated bills paid pattern from April 2019 to March 2020 of the facility is shown below

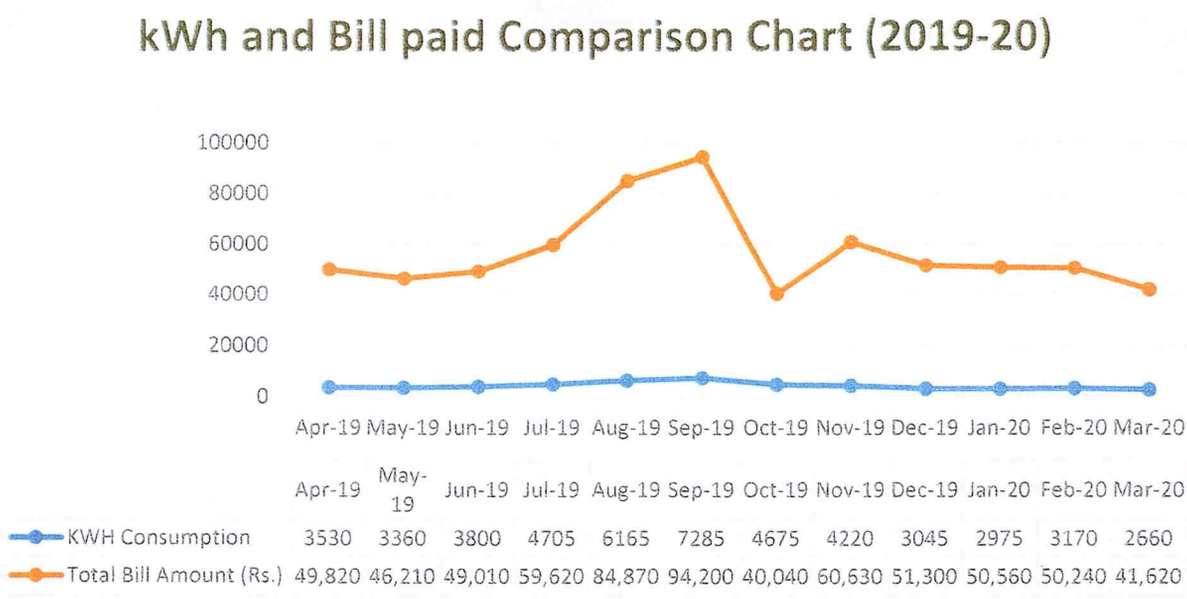



*Figure 3: Electrical energy consumption and bill paid pattern (2019-20)*

Energy consumption (kWh) was maximum during Sep 2019 and minimum during March 2020. The energy cost paid was maximum during Sep2019 and minimum during oct 2019.

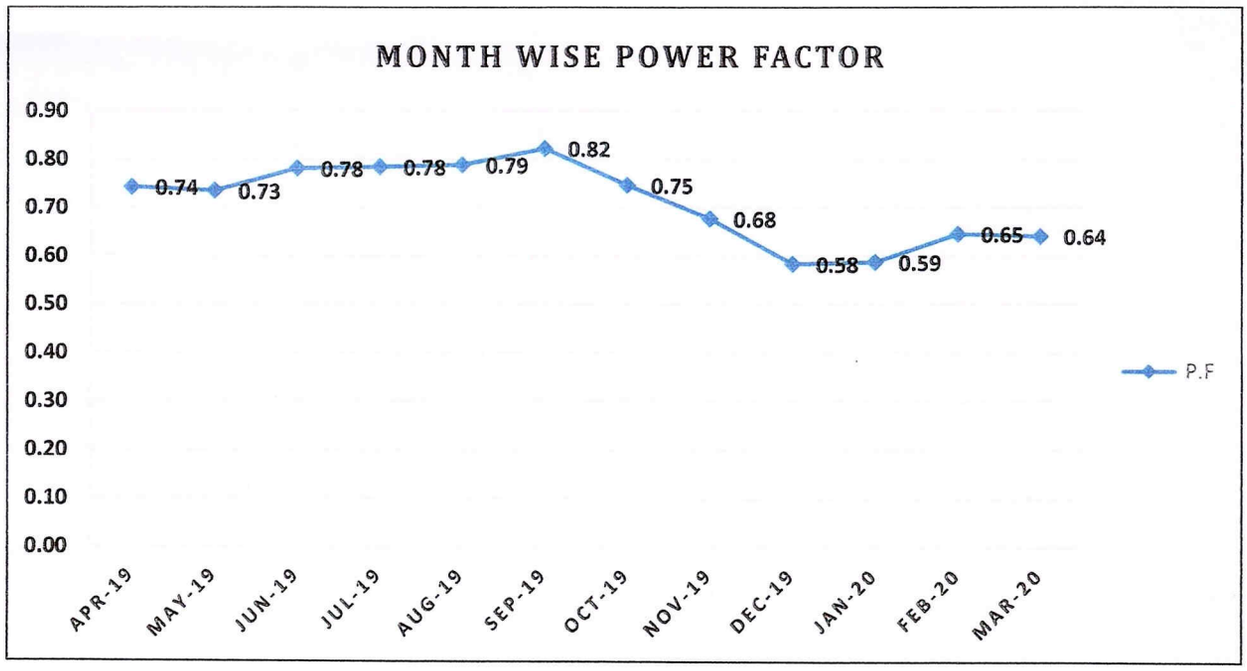



*Figure 4: Month Wise Power Factor*

# Section3: Performance Assessment

# 3. Performance Assessment

D. P. Vipra College, Bilaspur has One Energy Meter. The facility has AC's, Fans, lighting and Computers as the major energy consuming utilities.

## 3.1 Load Analysis

The power logging monitoring has been done for main incomer feeder.

### TRF Loading

| Sr.no | Parameters | Unit | 200KVA TRF | |
|---|---|---|---|---|
| | | | Design | Measurement. |
| 1 | Capacity | KVA | 200 | 12 |
| 2 | No-Load loss | kW | 0.54 | 0.54 |
| 3 | Load Loss (Primary and secondary side) | kW | 2.9 | 0.01 |
| 4 | Rated Resistance Value | Ω | 0.00004 | |
| 5 | Voltage (Sec. side) | V | 433 | 427 |
| 6 | Current (Sec. side) | Amps | 266.6 | 16 |
| 7 | Power | KW | | 9 |
| 8 | Power Factor | -- | | 0.75 |
| 9 | Impedance | % | 5 | |
| 10 | Loading @ operating pf | % | | 5.82 |
| 11 | Efficiency | % | | 94.07 |
| 12 | TRF Loading | % | | 5.82 |
| 13 | Current Tap Position | | | 2 |

### Main Incomer reading

| Sr No. | Panel Name | Measured | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Voltage (V) | | | | | Current(A) | | | | | Power Factor | Power | |
| | | RY | YB | BR | Average | % imbalance | RY | YB | BR | Average | % Imbalance | | kW | KVA |
| 1 | TRF Main Incomer | 428 | 427 | 426 | 427.0 | 0.23 | 16.3 | 24.3 | 6.6 | 15.7 | 54.4 | 0.750 | 8.7 | 11.6 |

Voltage profile

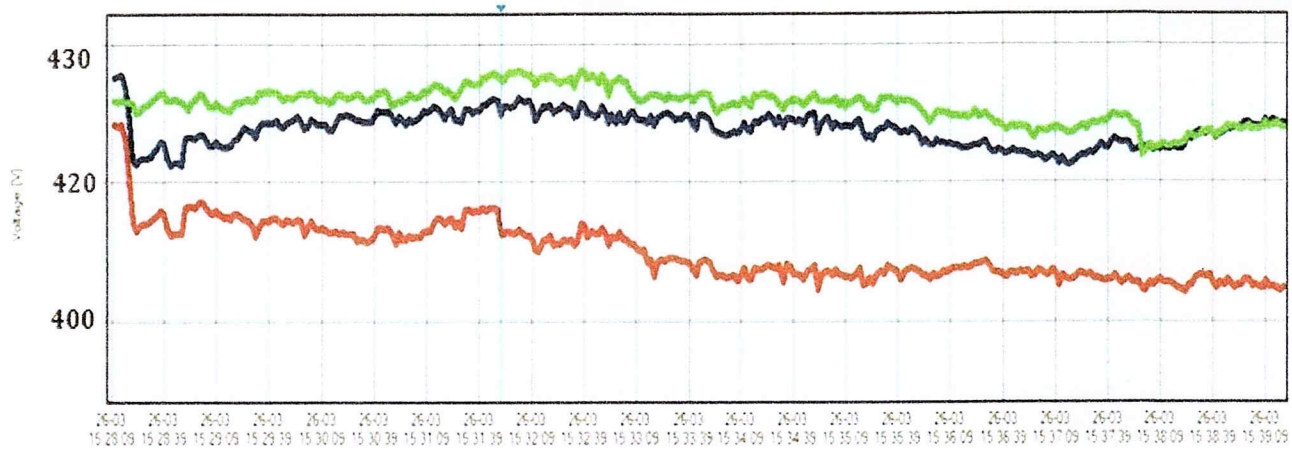
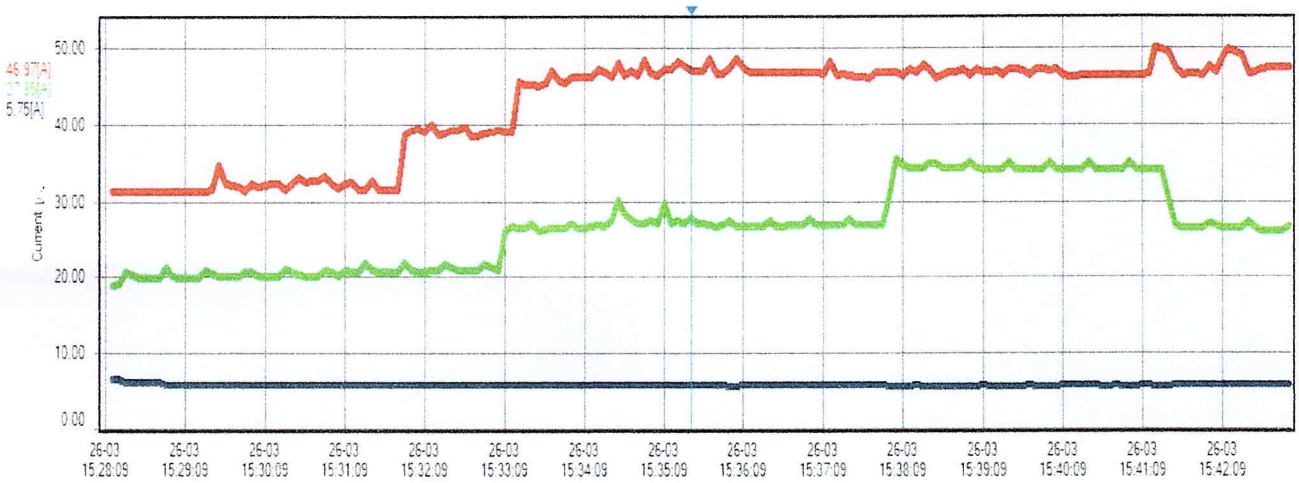



*Figure 4:* ***Voltage profile-***




Current profile

*Figure 5: Current profile*

## 3.2 Illumination Survey

| Sl. No. | Location / Room No. | Lux |
|---|---|---|
| | **SATYAM BUILDING** | |
| | **Ground Floor** | |
| 1 | Chairman Room | 388 |
| 2 | Principle Room | 497 |
| 3 | Account Department | 221 |
| 4 | Established Room | 301 |
| 5 | Salary Room | 303 |
| 6 | Prof. Kiran Dubey Room | 363 |
| 7 | Smart Class-3 | 171 |
| 8 | Storage Room | 80 |
| 9 | University Branch | 123 |
| 10 | Smart Class-4 | 241 |
| 11 | ICT Room & Conference Hall | 136 |
| 12 | Public Admistrate Room | 333 |
| 13 | Ground Floor Gali | 41 |
| | **1st Floor** | |
| 1 | Room No.101 | 170 |
| 2 | Room No.102 | 174 |
| 3 | Room No.103 | 168 |
| 4 | Room No.104 | 172 |
| 5 | Room No.105 | 146 |
| 6 | Room No.106 | 149 |
| 7 | Room No.107 | 145 |
| | **2nd Floor** | |
| 1 | Botonny Lab-01 | 139 |
| 2 | Zoology Lab | 160 |
| 3 | Electronics department | 170 |
| 4 | Managemental Departmental Room | 187 |
| 5 | Class Room-202 | 251 |
| 6 | Class Room-203 | 166 |
| 7 | Mathematics Department | 148 |
| | **SHIVAM BUILDING** | |
| | **2nd Floor** | |
| 1 | Computer Department office | 241 |
| 2 | Library-1 | 140 |
| 3 | Computer Lab-01 | 179 |
| 4 | Computer Lab-02 | 160 |
| 5 | Computer Lab-03 | 108 |
| 6 | Staff Room | 152 |
| 7 | Physics Lab-01 | 180 |
| 8 | Physics Department Staff | 163 |
| 9 | Physics Class Room | 156 |
| 10 | Physics Lab-02 | 166.5 |
| 11 | Girls Common Room | 419.3 |
| | **1st Floor** | |
| 1 | Department of Microbiology | 208 |
| 2 | Microbiology Lab-01 | 49 |
| 3 | Geography Department | 125 |
| 4 | Microbiology Lab-02(U.G.) | 111 |
| 5 | Room no-109 | 190 |
| 6 | Department of biotechnology | 87 |
| 7 | Biotechnology Class room | 121 |
| 8 | Biotechnology Lab | 120 |
| 9 | Research Room | 111 |
| 10 | 1st floor Library | 71 |

| Sl. No. | Location / Room No. | Lux |
|---|---|---|
| | **Ground Floor** | |
| 1 | Chemistry Department | 67 |
| 2 | Chemistry Lab (U.G.) | 120 |
| 3 | Chemistry Lab (P.G.) | 149 |
| 4 | Chemistry Department Staff Room | 144 |
| 5 | Chemistry Lab Research Room | 134 |
| 6 | History Department | 309 |
| 7 | Smart Class-01 | 77 |
| 8 | Smart Class-02 | 87 |
| 9 | Student Organisation room | 246 |
| 10 | Clerk Room | 444 |
| 11 | Lab Department | 86 |
| | **SUNDRAM BUILDING** | |
| | **Ground Floor** | |
| 1 | Sports Department | 78 |
| 2 | English Department | 302.5 |
| 3 | Commerce Department | 92.5 |
| 4 | Sociology Department | 126.5 |
| 5 | Economics department | 121.5 |
| 6 | Political department | 191 |
| 7 | NCC Department | 130 |
| 8 | Hindi Department | 117.5 |
| | **1st Floor** | |
| 1 | Room No.110&111 | 149.5 |
| 2 | Room No.112&113 | 139 |
| 3 | Room No.206 | 243.5 |
| 4 | Room No.207 | 232.5 |
| | **PUSHPARAJ BUILDING** | |
| | **Ground Floor** | |
| 1 | NSS Department | 220 |
| 2 | Gym Department | 208 |
| 3 | Godam | 167 |
| 4 | Room No.01 | 410 |
| 5 | Room No.02 | 350 |
| 6 | Room No.03 | 380 |
| 7 | Room No.04 | 254.5 |
| 8 | Room No.05 | 178 |
| 9 | Room No.06 | 230 |
| 10 | Room No.07 | 212 |
| 11 | Room No.08 | 230 |
| | **AUDITORIUM BUILDING** | |
| 1 | Conference Room | 92.67 |

## 3.3 Connected Load

| SL No. | Types of Fitting | Capacity (watt) | Qty. (Nos.) | Total Watt (KW) |
|---|---|---|---|---|
| 1 | CFL Bulb(9W) | 9 | 117 | 1.1 |
| 2 | LED Bulb(12W) | 12 | 42 | 0.5 |
| 3 | LED Tube Light(20W) | 20 | 80 | 1.6 |
| 4 | T5 Tube Light(36W) | 36 | 358 | 12.9 |
| 5 | Smart Class (LED) | 200 | 3 | 0.6 |
| 6 | Wall Fan(60W) | 60 | 12 | 0.7 |
| 7 | Table Fan(60W) | 60 | 5 | 0.3 |
| 8 | Ceiling Fan(70W) | 70 | 303 | 21.2 |
| 9 | Exhaust Fan(150W) | 150 | 30 | 4.5 |
| 10 | Room Cooler(250W) | 250 | 20 | 5.0 |
| 11 | Air Conditioner (1.5 Tonne Split) | 1500 | 8 | 12.0 |
| 12 | Air Conditioner (2 Tonne Split) | 2000 | 3 | 6.0 |
| 13 | Air Conditioner (1.5 Tonne-Window) | 2500 | 6 | 15.0 |
| 14 | Computer(150W) | 150 | 130 | 19.5 |
| 15 | Photo copier M/c(1500W) | 1500 | 2 | 3.0 |
| 16 | Printer(50W) | 50 | 12 | 0.6 |
| 17 | Projector(300W) | 300 | 15 | 4.5 |
| 18 | LED TV (100W) | 100 | 3 | 0.3 |
| 19 | Freeze(300W) | 300 | 5 | 1.5 |
| | **Total** | | | **111** |

# Section 4: Energy Conservation Measures (ECM)

# 4. Energy Conservation Measures

## ECM 1: Replacement of Existing Light to LED Lights in College Building.

Existing condition

| Sr. No. | Location | Existing Fittings (36 Watt FTL & 9 Watt CFL) | | | | Proposed Fittings to be Replaced with LED | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Type of Fitting | Watt | Qty. | Total Watt | Watt | Qty. | Total Watt | Approx. Each Price in Rs. | Amount in Rs. |
| 1 | College Building | FTL | 36 | 358 | 12888 | 20 | 358 | 7160 | 250 | 89500 |
| 2 | | CFL | 9 | 117 | 1053 | 7 | 117 | 819 | 70 | 8190 |
| | **Total** | | | | **13941** | | | **7979** | | **97690** |

**Recommendation**

Replacement of remaining Existing Light to LED Lights

**Savings Analysis**

Energy saving potential

| | | | |
|---|---|---|---|
| 1 | **Existing Fitting energy consumption** | **Watt** | **13941** |
| 2 | **Proposed Fitting energy consumption** | **Watt** | **7979** |
| 3 | **After replacement energy saving** | **Watt** | **5962** |
| 4 | **Energy Saving in Percentage** | **%** | **42.77** |
| 5 | **Operating hour per day** | **hours/day** | **8** |
| 6 | **Operating days per years** | **days/Year** | **250** |
| 7 | **Energy Saving After Replacement** | **Watt Hour** | **47696** |
| | | **kWh/year** | **11924** |
| | | **Lakh kWh/year** | **0.119** |
| 8 | **Energy Cost** | **Rs./kWh** | **7.00** |
| 9 | **Saving in Terms of Amount** | **Lakh Rs. /year** | **0.835** |
| 10 | **Estimator Investment of LED Fitting** | **Lakh Rs.** | **0.977** |
| 11 | **Simple Payback Period** | **Year** | **1.17** |
| | | **Month** | **14.04** |
| | | **Say Month** | **14** |

## ECM 2: Replacement of Existing Ceiling Fan to Energy Efficient Fan in College Building.

**Existing condition**

| Sr.No. | Location | Existing Ceiling Fan Fittings (70 Watt ) | | | Proposed Fan to be Replaced with Energy Efficient ceiling Fan (1200 mm) 30 Watt | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Watt | Qty. | Total Watt | Watt | Qty. | Total Watt | Approx. Each Price in Rs. | Amount in Rs. |
| 1 | College Building | 60 | 303 | 18180 | 30 | 303 | 9090 | 2500 | 757500 |
| | **Total** | | | **18180** | | | **9090** | | **757500** |

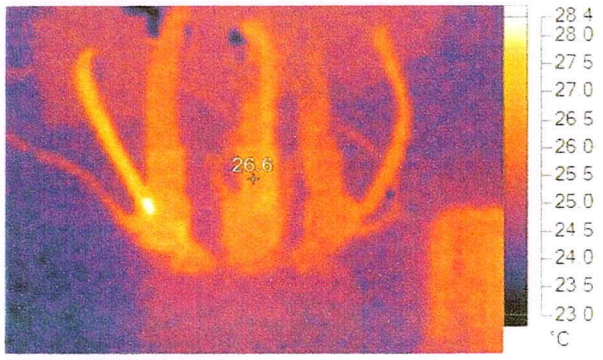
**Recommendation**

Replacement of existing Ceiling Fan to Energy Efficient fan in Old Building

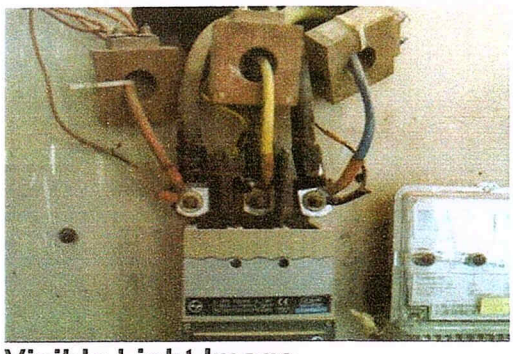
**Savings Analysis**

| | | | |
|---|---|---|---|
| 1 | **Existing Fitting energy consumption** | **Watt** | **18180** |
| 2 | **Proposed Fitting energy consumption** | **Watt** | **9090** |
| 3 | **After replacement energy saving** | **Watt** | **9090** |
| 4 | **Energy Saving in Percentage** | **%** | **50.00** |
| 5 | **Operating hour per day** | **hours/day** | **8** |
| 6 | **Operating days per years** | **days/Year** | **280** |
| 7 | **Energy Saving After Replacement** | **Watt Hour** | **72720** |
| | | **kWh/year** | **20362** |
| | | **Lakh kWh/year** | **0.204** |
| 8 | **Energy Cost** | **Rs./kWh** | **7.00** |
| 9 | **Saving in Terms of Amount** | **Lakh Rs. /year** | **1.425** |
| 10 | **Estimated Investment for Energy Efficient ceiling fan** | **Lakh Rs.** | **7.575** |
| 11 | **Simple Payback Period** | **Year** | **5.31** |
| | | **Month** | **63.78** |
| | | **Say Month** | **64** |

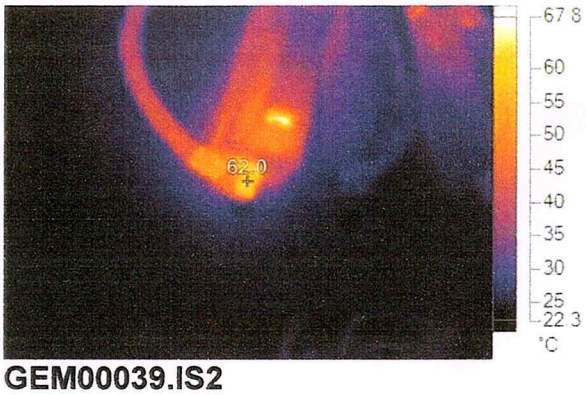
# Thermal Images



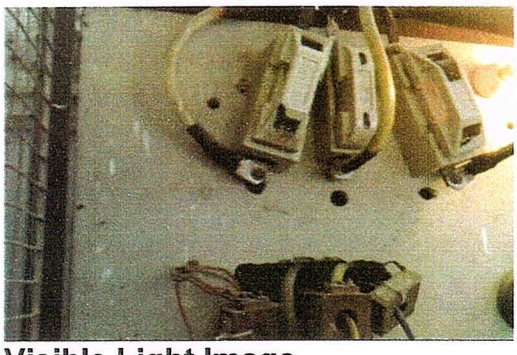

**GEM00038.IS2**



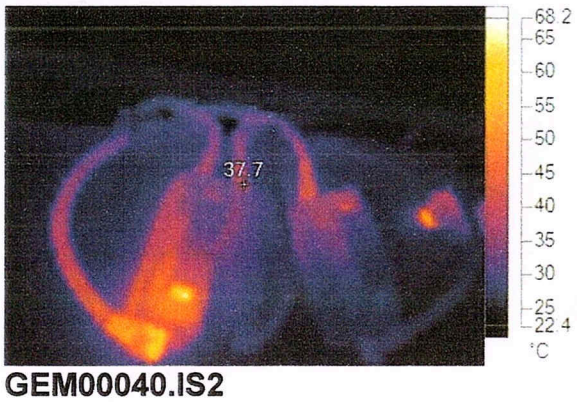
**Visible Light Image**




**GEM00039.IS2**

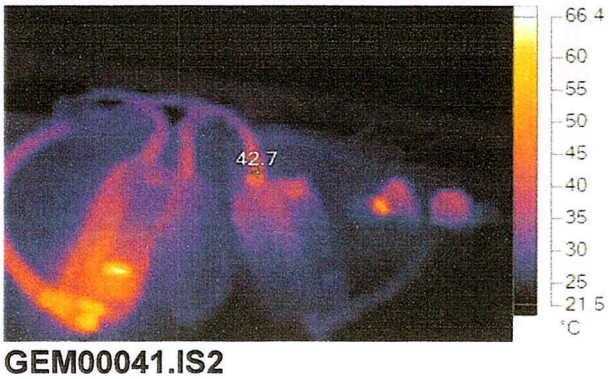


**Visible Light Image**




**GEM00040.IS2**

**Visible Light Image**




**GEM00041.IS2**

**Visible Light Image**

## CERTIFICATION

This Part shall indicate certification by Certified Energy Auditor stating that: -

I. The data collection has been carried out diligently and truthfully.
II. All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorized and no tampering of such device has occurred.
III. All reasonable professional skill, care and diligence had been taken in preparing the Energy Audit Report and the contents thereof are a true representation of the facts.
IV. Adequate training provided to personnel involved in daily operation after implementation of recommendation.
V. The Energy Audit has been carried out in accordance with the Bureau of Energy Efficiency (Manner and intervals of time for the conduct of Energy Audit) Regulation, 2010.

Signature:

Certified Energy Auditor EA-20984 BEE Rahul Agrawal

Name of the Certified Energy Auditor: Mr. Rahul Agrawal
Certification Detail: EA-20984

D.P. VIPRA COLLEGE
BILASPUR
ACCREDITED "A" GRADE BY NAAC

# Appendix II


## D.P. Vipra College

Old High Court Road, Bilaspur

Chhattisgarh, India 495001

D.P. VIPRA COLLEGE
BILASPUR
ACCREDITED "A" GRADE BY NAAC

# Certificate form the Auditing Agency


## D.P. Vipra College

Old High Court Road, Bilaspur

Chhattisgarh, India 495001

Greenserve Energy
Managment Solutions
Registration Number: D-DURG-159/2016-17
Phone Number : 9752531330, 9098148400
Email-id : greenserve.energy@gmail.com

# CERTIFICATE

This is to certify that **D. P. VIPRA COLLEGE BILASPUR** has successfully conducted Green Audit, Environment Audit & Energy Audit of the year 2020.

The above certificate is issued in accordance to the work order provided by the **D. P. VIPRA COLLEGE BILASPUR** (CHHATTISGARH).

Place: Durg

Greenserve Energy
Management Solutions
Durg (C.G.)

Authorized Signatory

Seal