



• Energy Audit • Thermography • Harmonic Analysis • Water Audit • Electrical Safety Audit • ECBC Consultant
• Energy Simulation • Industrial Training and Workshop • IoT Energy Monitoring System • Heat Pump • Solar Projects and Consultant

Ref No: EEPL/2023-24/C-017

Date: - 22-06-2023

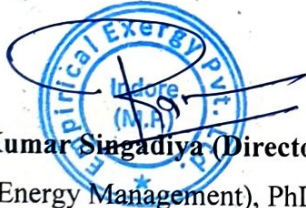
ENERGY AUDIT CERTIFICATE

This is certified that Empirical Exergy Private Limited (EEPL) Indore M.P. has conducted Energy audit at Shri Rajiv Gandhi Govt. College, Banda Dist. Sagar (M.P.) for the academic Year 2022-23.

The activities and measures carried out by Shri Rajiv Gandhi Govt. College, Banda Dist. Sagar (M.P.) have been verified and were found to be acceptable. The positive approach of management towards saving energy is highly valued commendable.

This certificate is being issued on the basis of the Energy Audit conducted by EEPL.

For- Empirical Exergy Private Limited



Rajesh Kumar Singadiya (Director)

M.Tech (Energy Management), PhD (Research Scholar)

Accredited Energy Auditor [AEA-0284]

Certified Energy Auditor [CEA-7271]

(BEE, Ministry of Power, Govt. of India)

Empanelled Energy Auditor with MPUVN, Bhopal M.P.

Lead Auditor ISO50001:2011 [EnMS] from FICCI, Delhi

Certified Water Auditor (NPC, Govt of India)

Chartered Engineer [M-1699118], The Institution of Engineers (India)

Member of ISHRAE [58150]

An ISO 9001: 2015 Certified Company



NAAC 9/C/23-24



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



ENERGY AUDIT REPORT



SHRI RAJIV GANDHI GOVT COLLEGE,

**Banda Ward No.11, Rest House Road,
Distt. Sagar Pin 470335, M.P.**

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, OM Apartment, 214 Indrapuri Colony,
Bhawarkuan, Indore – 452 001 (M. P.), India
0731-4948831, 7869327256

Email ID: ceempirical18@gmail.com

www.eeplgroups.com

(2022-23)

	Energy Audit Report Shri Rajiv Gandhi Govt. College, Banda Banda, Dist. Sagar (M.P.) Academic Year 2022-23	
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CONTENT

Sr. No.	Item	Page No.
I	Acknowledgement	3
II	Certification of Accreditation	4
III	The Audit Team	5
IV	Executive Summary	6
V	Energy Monitoring Committee	7
Chapter-1	Introduction	11
1.1	About College	11
1.2	About Energy Audit	15
1.3	Objective of Energy Auditing	15
1.4	Methodology	16
1.5	Present Energy Scenario	16
Chapter- 2	Power Supply System	17
2.1	Power Supply System	17
2.2	DG Set	18
Chapter- 3	Electricity Bill Analysis	19
3.1	Electricity Bill Analysis 2022-23	19
Chapter-4	Connected Load	20
4.1	Connected Load Details	20
4.2	Connected Load Sharing Electrical Equipment	22
4.3	Some Photographs of Electrical Equipment	23
4.4	Lux Measurement	24
Chapter- 5	Energy Conservation and Measurement	25
	Annexure-I	26

	Energy Audit Report Shri Rajiv Gandhi Govt. College, Banda Banda, Dist. Sagar (M.P.) Academic Year 2022-23	
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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thanks the management of **Shri Rajiv Gandhi Govt. College, Banda, Dist. Sagar M.P.** for allowing us to conduct an energy audit for the college.

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


Rajesh Kumar Singadiya
(Director)

M.Tech (Energy Management), Ph.D. (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
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Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



Certificate of Accreditation

 **BUREAU OF ENERGY EFFICIENCY**

Examination Registration No.: **EA-7271**

Accreditation Registration No.: **AEA-284**



Certificate of Accreditation

This is to certify that Mr./Ms. **Shri. Rajesh Kumar Singadiya** having its trade/registered office at has been given accreditation as accredited energy auditor. The certificate shall be effective from **9th** day of **May, 2018**.

The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **284** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **5th** day of **October, 2018**


Secretary,
Bureau of Energy Efficiency
New Delhi



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



The Energy Audit Team

The study team constituted of the following senior technical executives from Empirical Exergy Private Limited.

- ✦ **Mr. Rakesh Pathak**, [Director & Electrical Expert]
- ✦ **Mr. Rajesh Kumar Singadiya** [Director & Energy Expert]
- ✦ **Mr. Sachin Kumawat** [Sr. Project Engineer]
- ✦ **Mr. Charchit Pathak** [Asst. Project Engineer]
- ✦ **Mr. Aakash Kumawat** [Junior Engineer]
- ✦ **Mr. Mohan Choudhary** [Sr. Technician]



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



EXECUTIVE SUMMARY

The executive summary of the energy audit report furnished in this section briefly gives the identified energy conservation measures and other recommendations during the project that can be implemented in a phased manner to conserve energy and increase productivity inside the college campus.

ENERGY MANAGEMENT INITIATIVE TAKEN BY THE COLLEGE

✚ LIGHTING SYSTEM

The college has been illuminated with a 100 % Energy Efficient LED Lighting System. During the audit, there are some projects under construction. College management has decided future lighting system will be installed with energy-efficient LED lighting. **It is appreciable.**

ENERGY AUDIT RECOMMENDATION

✚ SOLAR SYSTEM

There is good potential for the installation of a 10 KWp solar rooftop grid-connected system as per the annual energy consumption of the college and the net metering policy of the grid-connected solar system of the Madhya Pradesh government. The expected potential for solar unit generation of the above system @ of 4 units per kWp is 14,600 units per year.

✚ IOT BASED ENERGY MONITORING SYSTEM

Installation of a "Cloud-based (IoT based) energy monitoring system" on the electrical feeder, as well as energy monitoring on individual buildings will be a good initiative for energy monitoring as well as a demo project for students and management.



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



Energy Monitoring Committee



Office of the Principal – Shri Rajiv Gandhi Govt. College Banda
(B Grade by NAAC)

E-mail : hegcbansag@mp.gov.in

☎ : 07583-292011

Website : <http://mphiighereducation.nic.in/bandacollege>

No. / 645 / NAAC/21

CASHLESS CAMPUS

Dated - 21/12/2021

//Order//

Developing an effective energy and environment policy for a college is crucial step towards promoting sustainability, afforestation, reducing carbon emissions and minimizing energy costs. Guidelines formulated by IQAC of Govt. College Banda are intended to manage and reduce energy consumption in the campus. It will help us to promote environmental and efficiency based awareness into our everyday activities, thus helping us to realize our responsibilities and commitment to conservation of natural resources and to limit its usage. In view of energy and environment policy a committee is formed to review and update the guidelines as and when required. The committee will comprise following members.

- | | |
|-----------------------|-------------------------|
| 1. Principal | -Chairman |
| 2. Dr. Vivek Dwivedi | -Incharge |
| 3. Dr. Sweetee Mishra | -I/c HOD Botany |
| 4. Dr. R.K. Nagarch | -I/c HOD Physics |
| 5. Dr. Kuldeep Yadav | -Administrative Officer |

Responsibilities and roles of an energy and environment committee :

- **Policy Development:** The committee shall be involved in the

Page 1 of 3



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



formulation of energy and environmental policies and regulations. It will analyze the issues related to energy sources, renewable energy, energy efficiency, climate change, pollution control, and conservation.

- **Reviewing the policy:** The committee shall review proposed energy and environmental policy guidelines and provides recommendations for further planning as per need and requirement. It will also assess the potential impacts, feasibility, and effectiveness of laid policy guidelines.
- **Oversight and Monitoring:** The committee shall oversee the implementation and enforcement of energy and environmental policies and regulations. It will monitor the activities in the college to ensure compliance and evaluate their environmental impact.
- **Stakeholder Engagement:** The committee shall engage with stakeholder for meetings and consultations to gather input of their environmental concerns in the college and to incorporate diverse perspectives into decision-making processes (policy making).
- **Environmental Impact Assessment:** The committee may be responsible for evaluating the potential environmental impacts of energy projects, such as renewable energy installations. It will assess the risks, benefits, and mitigation measures associated with such projects running or installed in the college premises.
- **Promotion of Sustainable Practices:** The committee shall play vital role in promoting sustainable practices and encouraging the adoption of clean and renewable energy sources through seminar, conferences or symposiums etc.. It will support initiatives for energy efficiency, renewable energy incentives, waste reduction, and conservation efforts in premises and surroundings (If feasible). "Green India Clean India" campaign is already being run in the college by NSS units.
- **Collaboration and Cooperation:** Energy and environment committees often collaborate with other committees, governmental bodies, and non government bodies to address cross-cutting issues. They may participate in climate change agreements and collaborate on regional environmental initiatives.

Page 2 of 3



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



Overall, the energy and environment committee's primary focus is to balance the need for energy resources with the imperative of protecting the environment and promoting sustainability. By formulating policies, and monitoring their implementation, the committee works towards achieving a cleaner, more sustainable, and resilient energy future.

Copy to:

1. Commissioner Higher Education Bhopal
2. The concern Professor

Principal
Shri Rajiv Gandhi Govt.
College Banda, Dist. Sagar (M.P.)
Pin- 470335 - 07363-252252

Page 3 of 3

	Energy Audit Report Shri Rajiv Gandhi Govt. College, Banda Banda, Dist. Sagar (M.P.) Academic Year 2022-23	
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ENERGY CONSERVATION MEASURES FOR ELECTRICAL SYSTEM

Case Study	Section	Identification	Observation	Recommendation	Annual energy saving (kWh)	Annual cost saving (Rs.)	Investment (Rs.)	Simple payback Period
1	Electrical System	There is good potential for solar plant	100% energy consumption from the grid	Installation of 10 kWp solar system	14,600	1,03,660/-	5,00,000/-	4.8 year



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



CHAPTER-1
INTRODUCTION

1.1 About College

Shri Rajiv Gandhi Government College Banda is an affiliated college under Maharaj Chhatrasal Bundelkhand University Chhatarpur M.P. and situated at a distance of 30 kilometers from the district headquarter Sagar. This college was established in the year 1982 and it offers undergraduate and postgraduate courses in Arts, Science, Commerce. In postgraduate courses we have M.Com. and M.A. (Political Science/Sociology). Since year 1991, the college is being run in its own govt. constructed building on a hilly area, 2 km away from the main city, earlier it was running in a rented building.

For the last few years, due to the implementation of the innovative popular schemes of the government, quality and outcome-based education, and further college's initiatives like College Chalo Abhiyan, most of the students of this region are enrolling themselves in the institute. At present about 3200 students are studying in various courses in the college. Institute is enriched with a regular Principal, 2 Professors, 8 Assistant professors, 13 Guest faculties, 1 librarian, 5 office staff and 9 temporary employees are working under Janbhagidari samiti. The college is striving for excellence within its limited resources.

In the year 2017, the institution has received "B" grade by NAAC. Since then, college is moving with fast pace towards excellence. Apart from well-equipped fully automated library, separate laboratories of science faculty have been established, sports facilities like basketball court have been developed along with extension of sports ground. Open gymnasium has been installed and botanical gardens too have been developed.

Recently college has become research centre in the faculty of Political science and Commerce. Under the World Bank project, a new building is under construction by Bhopal Development Authority (BDA) along with sports ground and a new library. Programmes of Academic Excellence like seminars, symposiums, Faculty development programmes, expert lectures, certificate courses and similar activities have become synonymous in the college.

College staff and students are smartly and efficiently using the electrical appliances and equipment's as per the energy policy of the college so that energy consumption could be minimised upto optimum level. I hope this college of Banda tehsil will establish new



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



dimensions in the direction of teaching learning process and innovations. This college is committed for holistic development and inclusive education for every student.

with best wishes



Source: Google Image of Shri Rajiv Gandhi Govt. College Banda Dist. Sagar (M.P.)



Energy Audit Report

Shri Rajiv Gandhi Govt. College, Banda

Banda, Dist. Sagar (M.P.)

Academic Year 2022-23



College Population For student's

कार्यालय प्राचार्य, श्री राजीव गांधी शासकीय महाविद्यालय, बण्डा, जिला-सागर (म०प्र०)

कला/वाणिज्य/विज्ञान संकाय के छात्र-छात्राओं की कक्षावार/वर्गवार प्रवेश जानकारी

सत्र 2021-22

सत्र 2021-22																													
क्र	कक्षा	साधारण वर्ग			पिछड़ा वर्ग			अनुसूचित जाति			अनुसूचित जाति			महायोग			EWS			संबल योजना			शेमावी योजना			नि: शुल्क जन वर्ग			टिप्पणी
1	2	3			4			5			6			7			8			9			10			11			12
		छात्र	छात्रा	योग	छात्र	छात्रा	योग	छात्र	छात्रा	योग	छात्र	छात्रा	योग	छात्र	छात्रा	योग	छात्र	छात्रा	योग	छात्र	छात्रा	योग	छात्र	छात्रा	योग	छात्र	छात्रा	योग	
1	B.A. 1st year.	53	37	90	349	268	617	87	42	129	22	21	43	511	368	879	1	-	1	37	25	62	5	2	7	-	-	-	EWS की संख्या सामान्य वर्ग में नि: शुल्क जन वर्ग, संबल योजना, शेमावी योजना की विद्यार्थी संख्या उनमें प्रत्यक्ष प्रविष्टि नहीं है।
2	B.A. IInd year.	63	49	112	222	204	426	57	39	96	12	12	24	354	304	658	2	2	4	-	-	0	-	-	0	-	-	-	
3	B.A. III rd year	50	33	83	260	172	432	67	47	114	7	7	14	384	259	643	1	-	1	-	-	0	-	-	-	-	-	-	
4	B.Com 1st year	5	3	8	31	15	46	4	5	9	1	1	2	41	24	65	-	-	0	3	3	6	-	-	0	-	-	-	
5	B.Com II nd year	7	4	11	12	16	28	6	2	8	0	1	1	25	23	48	-	-	0	-	-	0	-	-	0	-	-	-	
6	B.Com III rd year	11	13	24	22	16	38	3	0	3	0	0	0	36	29	65	-	-	0	-	-	0	-	-	-	-	-	-	
7	B.Sc. 1st year (Bio)	9	11	20	54	52	106	22	13	35	0	1	1	85	77	162	-	-	0	10	8	18	4	3	7	-	-	-	
8	B.Sc. 1st year (Maths)	3	5	8	9	6	15	4	2	6	0	0	0	16	13	29	-	-	0	2	3	5	1	-	1	-	-	-	
9	B.Sc. II nd year (Bio)	6	11	17	31	65	96	3	10	13	0	2	2	40	88	128	-	-	0	-	-	0	-	-	0	-	-	-	
10	B.Sc. II nd year (Maths)	3	3	6	8	9	17	2	0	2	0	0	0	13	12	25	-	-	0	-	-	0	-	-	0	-	-	-	
11	B.Sc. III rd year (Bio)	6	16	22	39	47	86	11	10	21	2	1	3	58	74	132	-	-	0	-	-	0	-	-	-	-	-	-	
12	B.Sc. III rd Year (Maths)	5	4	9	8	2	10	2	1	3	0	0	0	15	7	22	-	-	0	-	-	0	-	-	-	-	-	-	
13	M.Com 1st Sem	4	9	13	8	4	12	2	1	3	0	0	0	14	14	28	-	-	0	-	-	0	-	-	-	-	-	-	
14	M.Com IIrd Sem	7	3	10	6	7	13	0	1	1	0	0	0	13	11	24	-	-	0	-	-	0	-	-	-	-	-	-	
15	MA 1st Sem (Pol. Sci.)	7	9	16	10	32	42	9	11	20	0	2	2	26	54	80	1	1	2	2	1	3	-	-	-	-	-	-	
16	MA III Sem (Pol.Sci.)	6	6	12	20	25	45	3	3	6	0	0	0	29	34	63	1	1	2	-	-	0	-	-	-	-	-	-	
17	MA 1st Sem (Soc.)	13	5	18	22	30	52	2	6	8	0	2	2	37	43	80	-	-	0	2	3	5	-	-	-	-	-	-	
18	MA IIrd Sem (Soc.)	7	1	8	17	21	38	1	3	4	0	1	1	25	26	51	-	-	0	-	-	0	-	-	-	-	-	-	
	Total	265	222	487	1128	991	2119	285	196	481	44	51	95	1722	1460	3182	6	4	10	19	43	99	10	5	15	-	-	-	
Class		Boys	Girls	Total	Class		Boys	Girls	Total	%	%	Class		Boys	Girls	Total	Class		Boys	Girls	To.	Online Admission 2021-22							
B.A. I, II, & III Y		1249	931	2180	M.A. (Pol. Sci. I & III)		55	88	143	54.12	45.88	BA/MA		1366	1088	2454	BA		1249	931	2180	BA / Bcom / B.Sc. (Bio & Maths) 1st Year		Class	Boys	Girls	Total		
B.Com. I, II, & III Y		102	76	178	M.A. (Soc. I & III)		62	69	131			B.Com./Mcom.		129	101	230	MA		117	157	274								
B.Sc. (Bio) I, II, & III Y		183	239	422	M.Com. I & III		27	25	52			B.Sc. (Maths/ Bio)		227	271	498	B.Com.		102	76	178			653	482	1135			
B.Sc. (Maths) I, II, & III Y		44	32	76	Post Graduation		144	182	326			Total		1722	1460	3182	M.com.		27	25	52			M.A. (Pol./Soc.) M.com. 1st Sem.	77	111	188		
Under Graduation		1578	1278	2856													B.Sc. (Bio)		183	239	422	Total		730	593	1323			
(स्नातक स्तर पर)				(स्नातकोत्तर स्तर पर)								(संकायवार)				B.Sc. (Maths)				44	32	76	प्रथम वर्ष ऑनलाइन 2021-22						
																Total				1722	1460	3182							

PRINCIPAL



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



For Teaching/Non-teaching staff

Shri Rajiv Gandhi Govt. Degree College Banda 2022-23
(All College Staff)

Sr.N.	Name	Designation	Sr.N.	Name	Designation
Academic			Guest Faculty		
1	Dr. B.D. Ahirwar	Principal	11	Dr. Anant Prakash Dubey	History
2	Dr. Siddharth Ganvir	Professor, Commerce	12	Dr. Rajesh kumar Ahirwar	Economics
3	Dr. H.R. Thakur	Professor, Hindi	13	Dr. Apeksha Mishra	Economics
4	Dr. Kuldeep Yadav	Asstt. Professor, Political Science	Librarian		
5	Dr. R.K. Nagarch	Asstt. Professor, Physics	1	Mr. Sanjay kumar Thakur	Librarian
6	Mr. Vivek Dwivedi	Asstt. Professor, Chemistry	Office Staff		
7	Dr. Sweetee Mishra	Asstt. Professor, Mathematics	1	Shri M.K. Sirothiya	Asstt. Grade III
8	Ms Aakarsha Tiwari	Asstt. Professor, Commerce	2	Shri Vinod kumar Pathak	Asstt. Grade III
9	Dr. Pradeep Shrivastava	Asstt. Professor, Commerce	3	Smt. Pushpa Goliya	Asstt. Grade III
10	Dr. Nitesh Obrien	Asstt. Professor, Political Science	4	Shri Narayan Prasad	Peon
11	Mr. Shailendra Sakvar	Asstt. Professor, Sociology	5	Shri Kamta Prasad	Sweepor
Guest Faculty			Janbhagidari		
1	Dr. Rajesh Kushwaha	Commerce	1	Shri Brijesh Soni	
2	Dr. Babul Ahirwar	Commerce	2	Shri Sukhandan Raikwar	
3	Dr. Rashmi Priti Guru	Hindi	3	Shri Omprakash Shrivastava	
4	Dr. Ashok Pannaya	Political Science	4	Shri Kapil Raikwar	
5	Dr. Mirdul Sen	Sociology	5	Shri Bhupendra Dixit	
6	Shri Gajraj Ahirwar	English	6	Shri Nandkishor Patel	
7	Shri Suneel Chakravarti	Sports	7	Shri Narayan Ahirwar	
8	Shri Rajkumar Prajapati	Botany	8	Shri Rupram Vishvakarma	
9	Shri Rajaram Ahirwar	History	9	Shri Rameshwar Raikwar	
10	Dr. Rekha Rai	Zoology			

Principal
 Shri Rajiv Gandhi Govt.
 College Banda, Dist. Sagar (M.P.)
 Pin- 470335, 07683-252252



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



1.2 About Energy Audit

An energy audit helps to understand more about the ways energy is used in any college and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to the final consumer becomes 50%. Hence one unit saved by the end user is equivalent to two units generated in the power plant.

An energy audit is the most efficient way to identify the strength and weaknesses of energy management practices and to find a way to solve problems. An energy audit is a professional approach to utilizing economic, financial, social, and natural resources responsibly. Energy audits “adds value” to management control and are a way of evaluating the system.

Empirical Exergy Private Limited (EEPL), Indore M.P. carried out the “Energy Audit” at the site to find gaps in the energy consumption pattern for **Shri Rajiv Gandhi Govt. College Banda Dist. Sagar (M.P.)**. A technical report is prepared as per the need and the requirement of the project.

1.3 Objectives of Energy Auditing

An energy audit provides a vital information base for an overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures. It aims at:

- Identifying the quality and cost of various energy inputs.
- Assessing the present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of the thermal and electrical energy economy.
- Highlighting wastage in major areas.
- Fixing energy-saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



1.4 Methodology

The methodology adopted for achieving the desired objectives viz. Assessment of the current operational status and energy savings includes the following:

- ✚ Discussions with the concerned officials for identification of major areas of focus and other related systems.
- ✚ A team of engineers visited the site and had discussions with the concerned officials/supervisors to collect data/information on the operations and load distribution within the plant and the same for the overall premises. The data were analyzed to arrive at a baseline energy consumption pattern.
- ✚ Measurements and monitoring with the help of appropriate instruments including continuous and/or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- ✚ Trend analysis of costs and consumptions.
- ✚ Capacity and efficiency test of major utility equipment, wherever applicable.
- ✚ Estimation of various losses
- ✚ Computation and **in-depth analysis** of the collected data, including utilization of computerized analysis and other techniques as appropriate, were done to draw inferences and to evolve a suitable energy conservation plan for improvements/ reduction in specific energy consumption.

1.5 College Present Energy Scenario

The college uses energy in the form of electricity purchased from MPPKVVCL grid. The college has a contract demand of 10.3 KW. The total billing amount of Shri Rajiv Gandhi Govt. college is Rs. 1, 25,997/- concerning annual energy consumption of 14,931 units and overall, per unit charge of 7.92 per unit in the period from Apr-22 to Mar-23



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



CHAPTER- 2
POWER SUPPLY SYSTEM

2.1 Power Supply System

The source of power supply for the college is grid power and DG Set.

Grid power

The detail of power supply in Shri Rajiv Gandhi Govt. College, Banda Dist. Sagar, Madhya Pradesh.

Power supply grid	Madhya Pradesh Poorv Kshetra Vidyut Vitran Company Ltd.
Consumer Name	Shri Rajiv Gandhi Govt. College
Consumer Number	1266006974
Sanctioned load	10.3 KW
Tariff	LV2.1
Feeder Name	10488

2.2 DG Set

There is one DG set on the college campus. Details of the DG Set are in the given table. 2.1

Table 2.1 Technical specifications for DG set

Sr. No.	Parameter	Technical Specification
1	Make	Kirloskar
2	M/c No	BS1H09645374H
3	Capacity (KVA)	7.5
4	Rated Voltage (V)	240
5	Frequency (HZ)	50
6	Power Factor	0.8
7	Speed (RPM)	1500
8	Phase	1



Figure 2.1:- DG set on the college campus

Observation

- ✚ DG set is used only in case of power failure.
- ✚ There is requirement of energy and fuel meters to monitor total unit generation with respect to diesel consumption.



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



CHAPTER- 3

ELECTRICITY BILL ANALYSIS

3.1 Electricity Bill Analysis 2022-23

Electricity bills for the last years were analysed. Detailed unit consumption, Overall unit charges are in Table 3.1

Table-3.1: Monthly energy consumption 2022-23

Sr. No.	Month & Year	Total Unit Consumption (kWh/Month)	Total Amount (Rs./Month)	Overall Per Unit Charges (Rs./kWh)
1	Apr-22	1,836	13,228/-	7.20
2	May-22	1,396	10,406/-	7.45
3	Jun-22	1,578	11,604/-	7.35
4	Jul-22	0	1,248/-	NA
5	Aug-22	2,029	14,625/-	7.21
6	Sep-22	1,660	12,211/-	7.36
7	Oct-22	1,101	8,594/-	7.81
8	Nov-22	976	7,759/-	7.95
9	Dec-22	1,071	16,736/-	15.63
10	Jan-23	918	8,271/-	9.01
11	Feb-23	1,266	11,369/-	8.98
12	Mar-23	1,100	9,946/-	9.04
	Total	14,931	1,25,997/-	7.92

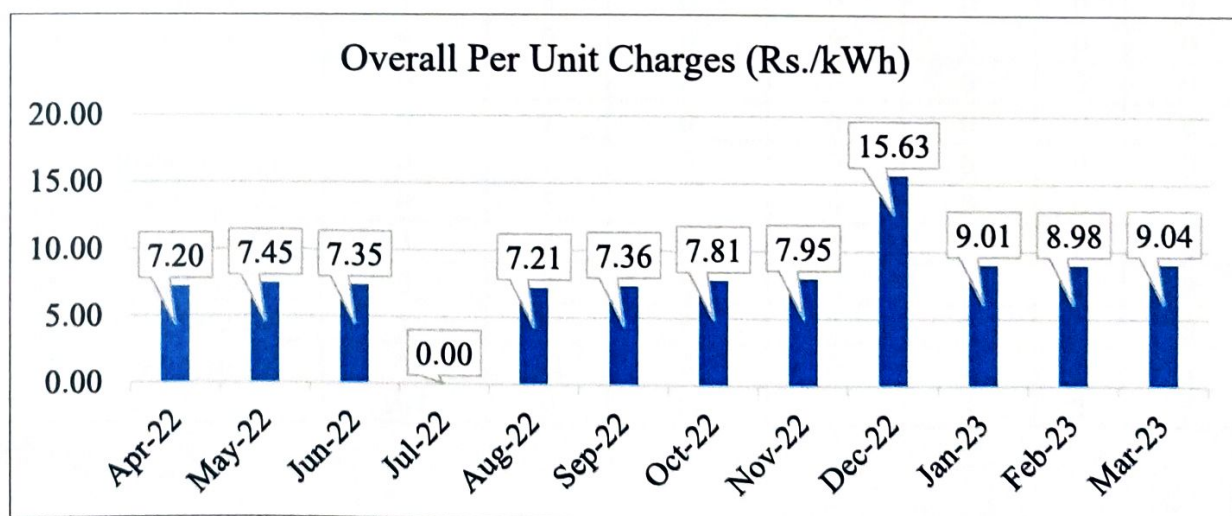


Figure 3.1:- Monthly Unit Consumption year-2022-23

Observation - Annual energy consumption of the above connection is 14,931 units and the overall charge is Rs.7.92 per unit.



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



CHAPTER-4
CONNECTED LOAD

4.1 Connected load details of the college

Table 4.1: Connected load details of the college

Sr. No.	Location	LED Tube Light (18W)	Fan (60W)	Computer	LED Bulb (20W)	Printer	AC	LED Bulb (18W)
1	Room no. 15	2	1	2	1	1	0	0
2	Room no. 16	1	1	0	1	0	0	0
3	Library	20	15	5	0	0	0	0
4	Room no. 14	4	0	3	0	1	0	0
5	Room no. 13	2	1	0	1	1	0	0
6	Room no. 12	1	2	1	0	1	0	0
7	Principal room	1	2	0	2	0	2	0
8	Staff room	6	6	0	0	0	0	1
9	Room no. 9	6	6	0	0	0	0	0
10	Corridor	17	1	0	0	0	0	0
11	Room no. 8	4	5	0	0	0	0	0
12	Room no. 6	7	4	0	0	0	0	0
13	Room no. 5	6	5	0	0	0	0	0
14	Room no. 4	6	5	0	0	0	0	0
15	Room no. 3	6	5	0	0	0	0	0
16	Room no. 2	6	5	0	0	0	0	0
17	Room no. 17	1	4	0	0	0	0	0
18	Room no. 18	6	0	0	0	0	0	0
19	Room no. 19	0	5	0	0	0	0	0
20	Room no. 20	0	1	0	0	0	0	0
21	Room no. 21	0	1	0	0	0	0	0
22	Room no. 22	0	5	0	0	0	0	0
23	Room no.24	3	4	0	0	0	0	0
24	Room no.25	0	2	0	0	0	0	0
25	Room no.23	1	0	0	0	0	0	0
25	Room no.26	1	10	0	0	0	0	4
Total		107	96	11	5	4	2	5



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



Sr. No.	Electrical Equipment's	Quantity (Nos)
1	Cooler (175W)	6
2	CFL (27W)	2
3	LED bulb (10W)	2
4	Street light (30W)	10
5	Bore well motor (5HP)	1
6	Wall fan (45W)	7

	Energy Audit Report Shri Rajiv Gandhi Govt. College, Banda Banda, Dist. Sagar (M.P.) Academic Year 2022-23	
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4.2 Connected Load sharing electrical equipment

Sr. No.	Equipment's	Unit Power (Watt)	Quantity	Total Power (Watt)	Load share%
1	LED tube light	18	107	1926	11.05
2	Fan	60	96	5760	33.04
3	Computer	70	11	770	4.42
4	LED bulb	20	5	100	0.57
5	Printer	27	4	108	0.62
6	AC	1615	2	3230	18.53
7	LED bulb	18	5	90	0.52
8	Cooler	175	6	1050	6.02
9	CFL	27	2	54	0.31
10	Street light	30	10	300	1.72
11	Wall fan	45	7	315	1.81
12	Bore well motor	3728	1	3728	21.39
				17431	100.00

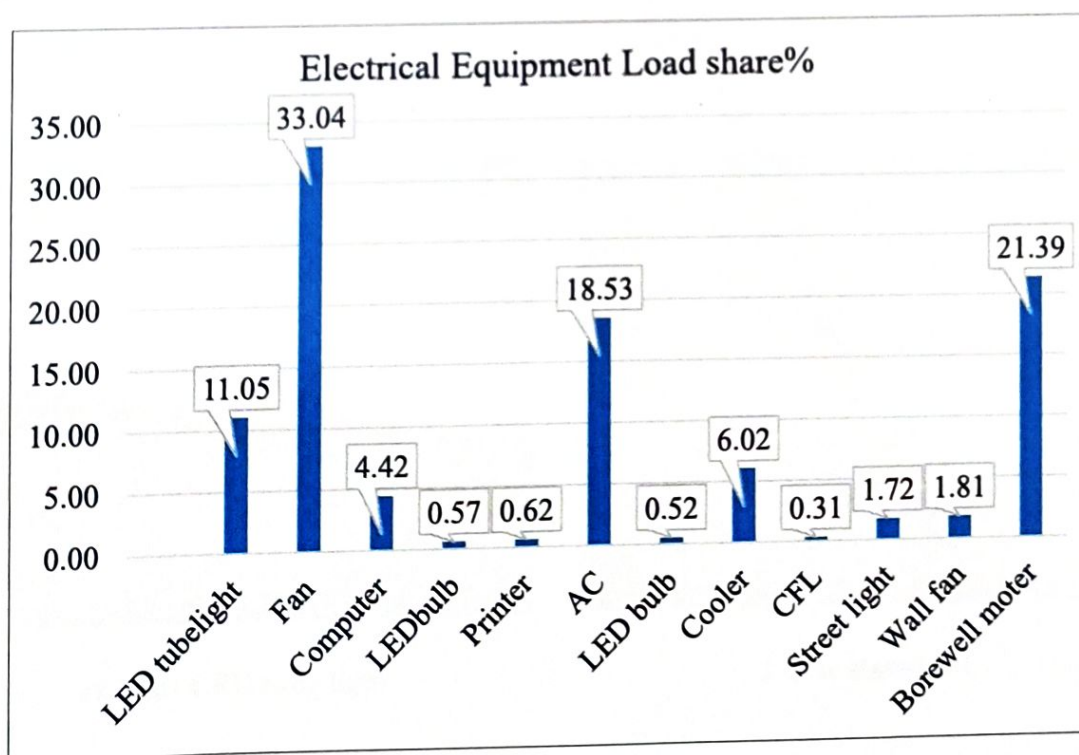


Figure4.1:-Electrical Equipment load Share % year-2022-23



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



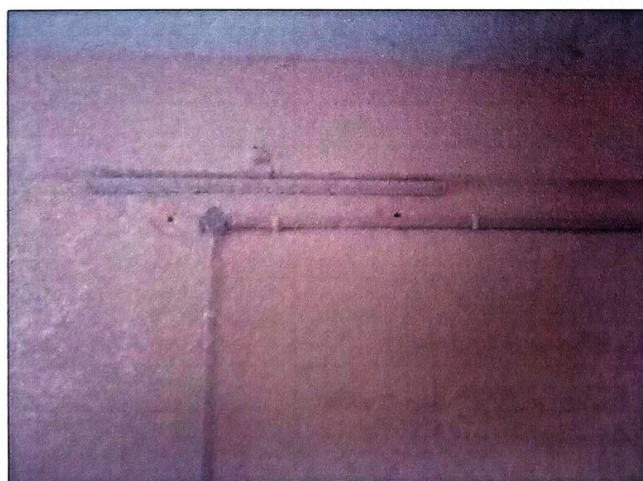
4.3 Some Photographs of Electrical Equipment



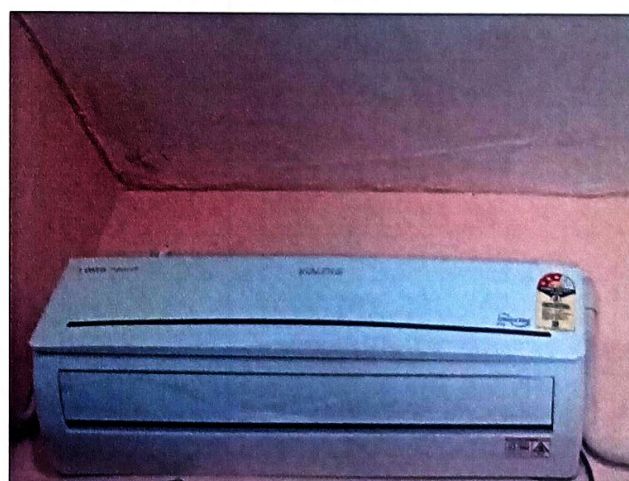
Printer



60 watt Ceiling fan



18 Watt LED tube light



3-Star Rated A.C.

4.4 Lux Measurement

Lux Measurement given in the below table 4.3

Sr.No.	Location	Lux reading
1	Room no. 15	370,382, 298
2	Room no. 16	258, 194, 186
3	Library	293,223, 241
4	Room no. 14	372, 345, 364
5	Room no. 13	413, 226, 312
6	Room no. 12	417, 386, 301
7	Principal room	261, 295, 282
8	Staff room	331, 310, 319
9	Room no. 9	264, 294, 305
10	Room no. 8	396, 295, 292
11	Room no. 6	634, 594, 432
12	Room no. 5	282, 272, 254
13	Room no. 4	321, 285, 261
14	Room no. 3	391, 402, 454
15	Room no. 2	276, 372, 301
16	Room no. 17	427, 502, 417
17	Room no. 18	472, 418, 394
18	Room no. 19	441, 378, 382
19	Room no. 20	407,392, 418
20	Room no. 21	354, 292, 264
21	Room no. 22	333, 301, 284
22	Room no.24	241, 232, 228
23	Room no.25	120,105, 84
24	Room no.23	264, 255, 249
25	Room no.26	283, 291, 264
26	Department of Political Science	132, 98, 82
27	Department of Sociology	129, 101, 88
28	Department of Commerce	126, 107, 82

Observation

The standard range of lux reading is 150/200/250. Department of political science, Department of Sociology, Department of Commerce, and room no. 25, lux readings are low.



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



CHAPTER- 5
ENERGY CONSERVATION MEASURES

5.1 Case Study

Installation of 10 kWp solar rooftop system

Solar unit (Energy) Generation calculation

Sr. No.	Parameter	Value	Unit
1	Expected solar potential capacity (As per unit consumption Year-2022-23)	10	kWp
2	Expected solar unit generation @4 unit/day/kWp	40	kWh/Day
3	Expected Annual solar unit generation of the Solar Plant	14600	KWh/Year
4	Annual unit consumption of college (Year 2022-23)	14931	kWh/Year
5	Potential solar energy share	98	%
Payback Period Calculation			
1	Total solar unit generation of the system (10 kWp)	14600	kWh/ year
2	Overall energy charges per unit as per electricity bill	7.1	Rs/kWh
3	Expected revenue generation	1,03,660/-	Rs./year
4	Expected cost of 1kw solar plant @50Rs.perwatt	50,000/-	Rs./kw
5	Expected total investment	5,00,000/-	Rs.
6	Simple payback period of the project	4.8	year



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



Annexure-I

 Office of the Principal -Shri Rajiv Gandhi Govt. College Banda,Sagar (M.P.) "B" Grade By NAAC ■ 97583-292011		
E-mail : bsgchansag@mp.gov.in	Website: http://mphiighereducation.mic.in/bandacollege	
No. 599/NAAC/2021	CASHLESS CAMPUS	Dated- 15/12/2021
//Energy Policy//		
Developing an effective energy policy for a college is crucial step towards promoting sustainability, reducing carbon emissions and minimizing energy costs. It will help us to promote environmental and efficiency based awareness into our everyday activities, thus helping us to realize our responsibilities and commitment to conservation of natural resources and to limit its usage. Energy audit helps us to assess the college's current energy patterns, identify areas of high energy usage and determine potential efficiency improvements and further in understanding the baseline and setting realistic targets for improvement. Guidelines stated below have been formulated by IQAC of the College to manage and reduce energy consumption in the campus.		
<u>Policy Guidelines:</u>		
➤ To replace regular or incandescent bulbs by LEDs in the whole campus to save energy. ➤ To organize Energy Audit at least once in a year to know the current status of energy and resource usage in the college premises. ➤ To install solar panels for the generation of renewable energy. ➤ To foster partnership with the government agencies, municipal body and the affiliating university and actively work with the local organizations in the areas of environment, energy efficiency and sustainable development. ➤ To implement energy -efficient building design and construction standards for new structures and renovations. Upgrade existing buildings with energy -efficient lighting, HVAC systems, insulation and windows. ➤ To monitor and respond to emerging environmental and energy issues. To strengthen our employees' and students' environmental knowledge and skills to improve our own environmental performance. ➤ To adopt energy management system and software to monitor and analyze energy consumption data in real time. To use data driven insights to make informed decisions and prioritize energy efficient projects in the college campus. ➤ To repair and reuse the old monitors and CPUs if possible otherwise recommended for condemnation or further auctioned accordingly.		



Energy Audit Report
Shri Rajiv Gandhi Govt. College, Banda
Banda, Dist. Sagar (M.P.)
Academic Year 2022-23



- To regularly review and update the energy policy as new technologies, regulations and best practices emerge in time gap.
- To Follow and implement the **Four R's** in life and institute i.e. **Refuse, Reduce, Reuse and Recycle**

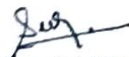
Stakeholders' Responsibilities:

- Turn off lights and appliances before leaving the class or rooms.
- Turn off computer at the end of the day.
- Keep copiers, printers, & fax machines on standby when not in use.
- Keep windows closed when ACs are on.
- Follow and implement the **Four R's** in life and institute i.e. **Refuse, Reduce, Reuse and Recycle**.

Energy Saving Practices by Administration:

- To purchase energy star or maximum star rated Electrical equipments.
- To incorporate renewable energy projects like Solar Panels in the campus.
- Windows and doors should be kept closed when the heater and air conditioning system is operating.
- To promote **electric vehicles** instead of conventional fossil fuel based vehicles in the campus.
- To install sensor based lights as and where required and feasible.

This policy with holistic and green approach will be communicated to the students and all the stakeholders through college's internal communication channel and will also be made available on the institutional website for awareness and implementation. The Energy Policy, objectives and targets will be reviewed on a regular basis by a committee chaired by Principal and committee members of the College.


Dr. Sweetee Mishra
Co-ordinator IQAC


Dr. B.D. Ahirwar
Principal
Shri Rajiv Gandhi Govt. College, Banda
Dist. Sagar, M.P. 471002