

# ENERGY AUDITING REPORT



**GOVERNMENT COLLEGE SANAWAL(C.G.)**



**DISTT.–BALRAMPUR-RMANUJGANJ(C.G.)**

**SESSION – 2020-21**

**SUBMITTED TO**

**Internal Quality Assurance Cell**

**As on dated 08-07-2021**

## Preface

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Data collection for energy audit of govt. College Sanawal, Campus was conceded by team for the period of 1 July 2020 to 30 June 2021. This audit was over sighted to inquire about convenience to progress the energy competence of the campus. To drop of energy utilization whilst cultivate or humanizing comfort, health and safety were of prime anxiety. This audit required to recognize the mainly energy proficient appliances. Besides, several each day processes concerning common appliances have been provided which facilitate sinking the energy expenditure. In the contemporary scenario energy has been identified as a crucial and balancing factor in the indices for sustainable development. the heavy and unbalanced energy consumption adversely affect energy price and economic growth. The energy conservation act,2001, defines energy auditing as “the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis”. It facilitates a systematic approach to the energy management in a system, trying to balance the total energy input with its use. It identifies all the energy streams in a system and quantifies the use of energy according to its discrete functions. It is a study to determine how and where energy is used, and to identify methods for energy savings. The Energy Auditing for a day is the index of the consumption which normalizes the situation of Energy crisis by providing the schemes for conservation of energy. The opportunities lie in the use of existing renewable energy technologies, greater efforts at energy efficiency and the dissemination of latest technologies This report is our mite in contributing to the larger picture of effective energy management and conservation. As is known, energy auditing is an on-going process, a part of a larger procedure to ensure long-term sustainable development.

Any suggestions to further enhance the quality of this work are always welcome. Kindly email your comments and suggestions to email: [principalgcs7575@gmail.com](mailto:principalgcs7575@gmail.com)

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## ABBREVIATION

A	Amps
AC	Air Conditioner
AC	Alternating Current
AMET	Academy of Maritime Education and Training
CFL	Compact fluorescent lamp
CIP	Comprehensive Inspection Program
DC	Direct Current
HSD	High Speed Diesel
Hz	Hertz
Kg	Kilogram
kVA	kilo-volt-ampere
kW	kilo Watts
kWh	kilowatt hour
kWp	Kilowatt peak
LED	Light Emitting Diode
LPG	Liquefied Petroleum Gas
MMS	Module mounting structure
MPPT	Maximum Power Point Tracker
NAAC	The National Assessment and Accreditation Council
SECS	Specific Energy Consumption
SPV	Solar Photovoltaic
STC	Standard Test Condition
CSPDCL	Chhattisgarh state power distribution company limited
TV	Television
V	Volts
W	Watts
W/m <sup>2</sup>	Watt per square meter

## ***1.Introduction***

A nation is tiring to advance in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other field of intelligence activity had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides.

This audit was undertaken in order to verify how effective these steps were, and also to identify

loop holes, if any, in the existing practices, along with outlining measures for enhancing energy utilization.

## ***2.Objectives***

The Energy Audit Manual of the Energy Management Centre, Government of Chhattisgarh, defines the primary objective of any energy audit as determining “ways to reduce energy consumption per unit of product output or to lower operating costs”. The recommendations of the study will become a basis for future schemes of better energy consumption and preservation throughout the organization.

### **Specific objectives of the study are:**

- √Verify the steps adopted for energy management in the campus
- √Spot the inefficient or inadequate practices, if any
- √Improve the energy preserving measures and methods
- √Identify potential energy saving opportunities
- √Formulate Possible steps and measures to be adopted in the campus

### ***3.Methodology***

An energy audit is an inspection, survey and analysis of energy flows, for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the output.

Method use for Energy audit is a Preliminary Audit. preliminary audit uses existing data to look extensively at the existing energy consumption patterns and identifies the areas for improvement.

### ***4.Data collection***

For the purpose of this audit, audit groups for specific areas were formed. Data was collected

through

- √Inspection and observation
- √Identification of energy consumption
- √Calculations, analysis
- √Validation

### ***5.Data analysis***

The gathered data was then quantified and separated according to the following criteria:

- √Energy consumption by end use
- √Average energy use block-wise
- √Consumption equipment-wise
- √Rate of consumption month-wise
- √Rate of consumption time-wise

## Historical Data Analysis

### 5.1: Study of Variation of Monthly Units consumption & Power Factor:

In this Chapter, we study the details of the 12-month Electricity Bills.

**Table No 5.1 Variation in Units Consumption & Power Factor (PF)**

<b>Sr.no.</b>	<b>Month</b>	<b>No. Units kWh</b>	<b>Power Factor</b>
1	June 2021	60	0.00
2	May 2021	1398	0.00
3	April 2021	1500	0.00
4	March 2021	1197	0.00
5	February 2021	205	0.00
6	January 2021	200	0.00
7	December 2020	200	0.00
8	November 2020	235	0.00
9	October 2020	200	0.00
10	September 2020	15	0.00
11	August 2020	50	0.00
12	July 2020	937	0.00
Total		6197 AVERAGE=516	Average =0.0

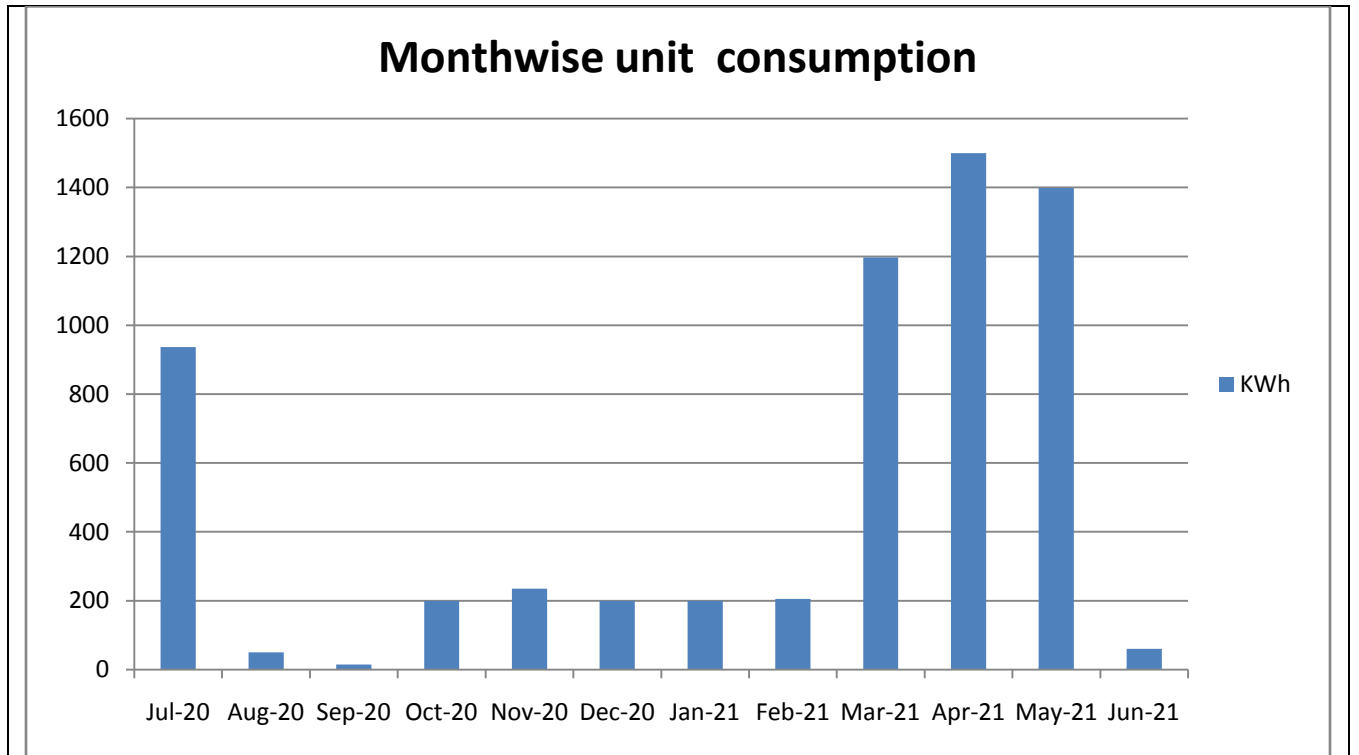


Fig-1 Month wise Energy consumption for the year 2020-21

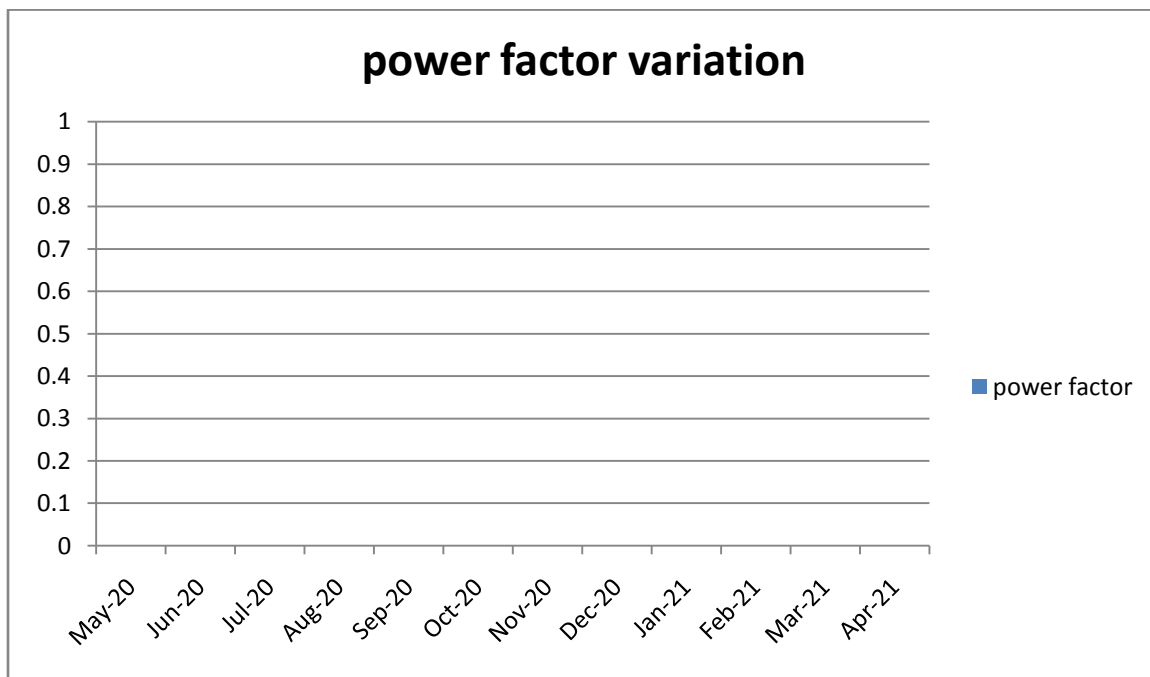
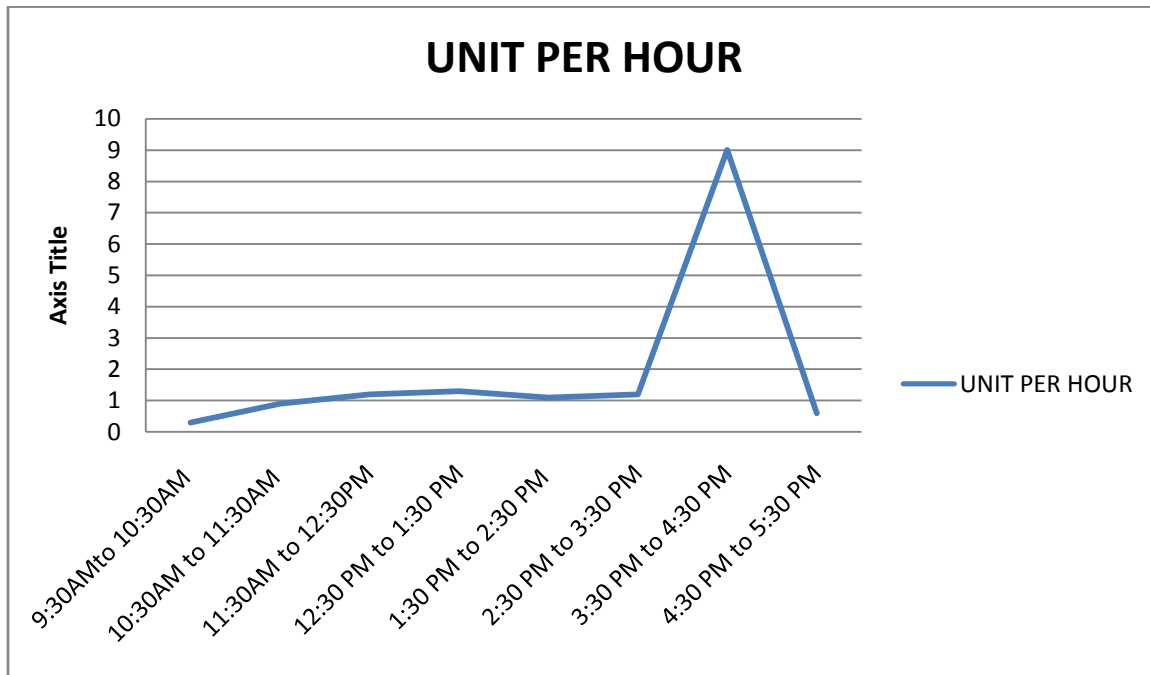


FIG-2 Month wise Power Factor variation



**Time-wise split up of energy consumption on a normal working day.**

TIME	UNIT PER HOUR
9:30AM to 10:30AM	0.3
10:30AM to 11:30AM	0.9
11:30AM to 12:30PM	1.2
12:30 PM to 1:30 PM	1.3
1:30 PM to 2:30 PM	1.1
2:30 PM to 3:30 PM	1.2
3:30 PM to 4:30 PM	0.9
4:30 PM to 5:30 PM	0.5

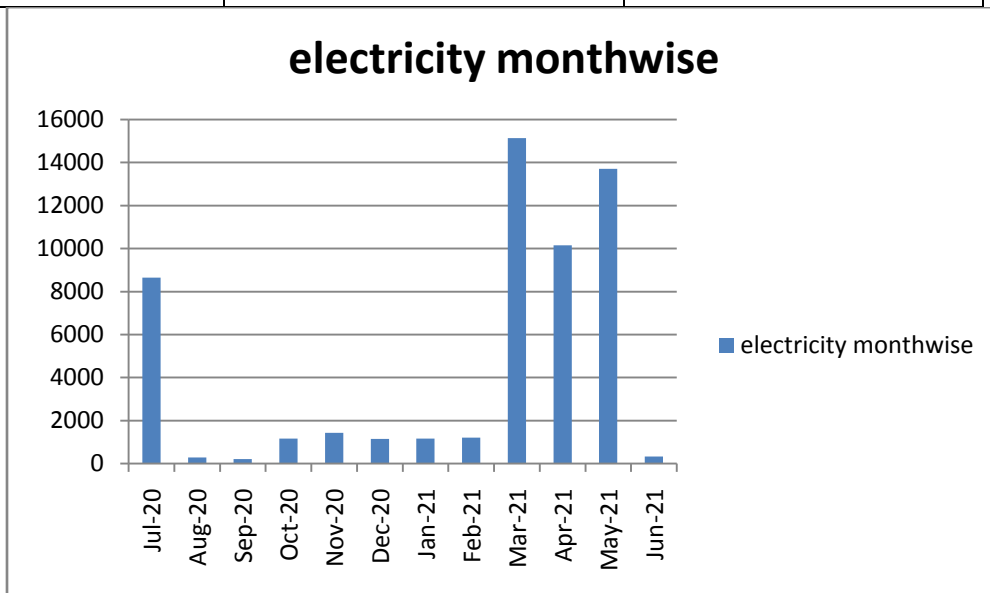


**FIG-3**Time-wise Energy consumption for the year 2020-21

## 5.2 Study of Month wise Electricity Bill Variation

**Table No 5.2 Variation in Electricity Bill**

Sr.	No. Month Electricity	Bill Amount
1	June 2021	332.43
2	May 2021	13711.86
3	April 2021	10152.33
4	March 2021	15138.56
5	February 2021	1211
6	January 2021	1158.04
7	December 2020	1148
8	November 2020	1433
9	October 2020	1155.05
10	September 2020	210.21
11	August 2020	281.09
12	July 2020	8649.25
Total	Total Annual Bill =	54580.82
	Average Monthly Bill =	4548.402



**FIG-4 Month wise Electricity Bill Variation**

## Equipment-data

S.No.	block	Tube Light	Led bulb	Ceiling Fan	Exhaust fan	fridge	computer	Led T.V.	Printer/photocopy machine	cooler	CCTV camera	projector	Lab equipment	Inverter	Halogen
1	Chemistry lab	4	0	4	1	1	0	0	0	0	0	0	9	0	
2	Zoology lab	4	0	3	1	0	0	0	0	0	0	0	7	0	
3	Botany lab	4	0	4	1	0	0	0	0	0	1	0	4	0	
4	Geography lab	2	1	0	1	0	0	0	0	0	0	0	1	0	
5	Sports/gym/store room	6	0	6	0	0	0	0	1	2	0	0	0	0	
6	Computer lab	2	0	2	0	0	10	0	1	0	0	0	0	0	
7	Canteen	1	2	1	1	1	0	0	0	0	0	0	0	0	
8	Library	4	0	6	1	0	1	0	1	0	0	0	0	0	
9	ICT room/English lab	4	0	4	0	0	1	0	0	0	1	1	0	0	
10	Meeting room	4	0	4	0	0	0	0	0	0	0	1	0	0	
11	Principal chamber	2	1	4	1	0	1	1	1	1	0	0	0	1	
12	Office	4	1	2	1	0	1	0	2	1	1	0	0	0	
13	Professor/staff room	2	1	4	1	0	0	0	0	0			0		
14	Seminar Hall	13	2	12	2	0	0	0	0	0	1	1	0	0	
15	Washroom	4	1	0	9	0	0	0	0	0	0	0	0	0	
16	Girls Common room	2	1	2	0	0	0	0	0	0			0		
17	Boys Common/NSS room	2	0	2	1	0	0	0	0	0			0	0	
18	Class Room	36	2	35	8	0	0	0	0	0	8	2	0	0	
19	All Gallery	29	6	19	0	0	0	0	0	0	3	0	0	0	4
	Total	129	18	114	29	2	14	1	6	4	15	5	10	1	4



**Computer department**



**office**



**AC**



**INVERTER**

**\*PHOTOS**

**Actual Measurements and its Analysis**

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr. (avg.)	Power Consumption/day (Watt)
A	B	C	D	$E=C*D$	F	$G=E*F$
1	Tube Light	240	129	30960	2	61920
2	Led bulb	09	18	162	1	162
3	Ceiling Fan	80	114	9120	4	36480
4	Exhaust fan	60	29	1740	1	1740
5	Fridge	2kwhr/day	2	4000	6	24000

6	Computer	60	14	840	2	1680
7	Led T.V.	50	1	50	1	50
8	Printer/photocopy machine	30-50	6	1800	1	1800
9	Cooler	2.8kwh/day	4	11200	1	11200
10	CCTV Camera	10	15	150	24	3600
11	Projector	282	5	1410	1	1410
12	Lab equipment	40	10	400	1	400
13	Inverter	2kv	1	2000	2	4000
14	Halogen	38	4	152	1	152

**It is expected to generate 14 units/day, 420 units per month.**

FIG-5 Energy Consumption by and use

**The consumption of energy block-wise.**

S. N	Block	Energy Consume Per Year Block Wise (kwh)
1	Chemistry lab	2020
2	Zoology lab	2440
3	Botany lab	2030
4	Geography lab	520
5	Sports/gym/store room	450
6	Computer lab	2560
7	Canteen	190
8	Library	326
9	ICT room/English lab	756
10	Meeting room	365
11	Principal chamber	845
12	Office	1050
13	Professor/staff room	858
14	Seminar Hall	542
15	Washroom	25
16	Girls Common room	103
17	Boys Common/ NSS room	230
18	Class Room	625
19	All Gally	382

## ***Major Findings***

Since this was a Preliminary Audit, the findings are formulated as per the norms for this stipulated

by the Energy Audit Manual.

1 establish energy consumption in the organization

From the quantitative analysis of the gathered data, the following findings have been reached.

1. The computers record the highest consumption based on end use
2. The Computer Science Block records the highest rate of consumption
3. The month of May shows the peak in consumption.
4. The time slots in the Afternoon record the highest consumption on a normal working day.

## ***Identify Easiest Areas Of Attention***

Based on the physical observation and the analysis of data collected, certain areas have been

identified as areas of attention.

1. Old wiring cables in many parts of the campus leading to loss of energy.
2. Use of CFL and tubes in certain rooms.
3. There is NO USE OF ANY RENEWABLE ENERGY.
4. Use of old equipment in laboratories.

## ***Estimate The Scope For Saving***

The study could identify a large scope for saving energy in the campus, including

- ✓ updating of technologies in laboratory equipment.
- ✓ replacing old electrical cables and pipelines.
- ✓ Turn off electrical equipment's when not in use
- ✓ Use energy efficient light-emitting diode (LED) bulbs instead of incandescent and CFL bulbs
- ✓ Use computers and electronic equipment's in power saving mode.

## ***Identify Immediate Areas Of Improvement***

Based on the study, certain areas were identified as requiring immediate improvement. These are

1. Replacing incandescent bulbs and tubes with LEDs
2. Repairing and updating laboratory equipment
3. Encouraging students and staff to switch off electrical instrument.
4. Ensuring even lighting facilities in rooms THROUGH WINDOWS.
5. Use of Solar panels as a main source of lighting, especially common areas

### ***Finding And Recommendation Of The Audit***

<b>Findings</b>	<b>Recommendations</b>
The electrical wiring of OLD buildings was found to be old and inefficient	Replace old electrical cables with new ones
There seem to be a lack of judicious use of power among students and staff. During the study, it was found that lights, fans and computers were kept on working mode in many rooms, without a single person present.	Students and staff should be exhorted constantly to use energy judiciously. Posters and pamphlets should be distributed and notices about saving energy should be posted at major points of use.
Many Departments still use incandescent bulbs causing heavy power loss	Incandescent bulbs should be replaced with LEDs

### ***Other Recommendations***

- ✓ Use electricity effectively.
- ✓ Use the „OFF“ switch, rather than the „STAND BY“ mode.
- ✓ Switch off fans & lights when not in use.
- ✓ Use LEDs instead of conventional light sources.
- ✓ Check for Green Tags before purchasing goods.
- ✓ Keep equipment's in power save mode.
- ✓ Make use of wind energy.

## CONCLUSION

1. A training /lecture for both students and staff to awareness for the need of energy conservation. If everyone ensures switching off lights, fans and electrical instrument that are not in use, roughly 10% of energy saving is possible.
2. The scope for non-conventional energy should be utilized
3. Solar plate should be used.



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