Greenserve Energy
Managment Solutions
Endless in Optimization

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

Date: 12/04/2023

Certificate

We hereby certify that we have conducted the **"Energy Audit"** of the building of **"CHOUKSEY ENGINEERING COLLEGE, BILASPUR" in April-2023** with the best of our ability. We have calculated the total Energy consumption, Energy saving analysis and given suggestions for Optimum utilization of resources by the college management. The Energy Savings potential in monitored areas are also mentioned in Energy Audit report.

We herewith certify that this study has been carried out by our BEE Certified Energy Auditor teams.

Certified Energy Auditor EA-20984 BEE Rahul Agrawal

Mr. Rahul Agrawal
Certified Energy Auditor
(EA-20984)

Place : Durg (C.G.)

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE

Greenserve Energy
Managment Solutions
Endless in Optimization

2023

ENERGY AUDIT REPORT
Chouksey Engineering College, Bilaspur (C.G.)

April 2023

Prepared By:
Greenserve Energy Management Solutions
Vijay Nagar,
Durg (C.G.) - 491001

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

Acknowledgement

We are thankful to the Management and the Principal of the Chouksey Engineering 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	Rahul Agrawal	Certified Energy Auditor
2	Jayendra Mohabe	Senior Energy Engineer
3	Bhumesh Jagnit	Energy Engineer

For Greenserve Energy Management Solutions,

Greenserve Energy
Management Solutions
Durg (C.G.)

Rahul Agrawal

Certified Energy Auditor (EA-20984)

Bureau of Energy Efficiency (MoP)

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

Table of Contents

List of Figures

List of Tables

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

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 (T-12 & T-8)	Fluorescent Tube Light
LED	Light Emitting Diodes
FY	Financial Year
HP	Horse Power

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

Section 1: Executive Summary

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

1. Executive Summary

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 Ceiling Fan to Energy Efficient Fan in Campus in a phase manner.	14.75	47200	3.30	54
	Total	**14.75**	**47200**	**3.30**	**54**

The Annual electrical energy savings (in kWh) are calculated and mentioned in the below table:

Total annual Energy savings, kWh	**47200**
Total Investment, Rs Lakh	14.75
Total Monetary savings, Rs Lakh	**3.30**
Simple Payback Period, Months	**54**

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

Section 2: Introduction

PRINCIPAL
CHOUKSEY ENGINEERING COLLE
LAL KHADAN, BILASPUR (C.G.)

2. Introduction

2.1 About Chouksey Engineering College,Bilaspur

Chouksey Engineering College,Bilaspur was established under the aegis of the H. K. Kalchuri Educational Trust, Bhopal, known as LNCT GROUP, started with the aim of providing educational opportunities to the deserving and under-privileged section of the society. It was established in the year 2001 with the moto of 'Working towards being the Best'

It has achieved commendable progress in attracting and retaining highly qualified and experienced faculty, developing high profile academic infrastructure including various well established laboratories, a team of well trained teachers who have created conductive atmosphere for learning and research.

With an aim to remain quality conscious, efficient and responsive to current rapid changing economic and technological developments, Chouksey Engineering College Bilaspur has taken up the challenge not only to give technical and corporate training to the students but also to make them self confident and better human being with leadership qualities.

Presently, it has expanded its foray in the educational sphere by establishing MBA, MTECH, PHARMACY, HOMEOPATHY, SCIENCE AND COMMERCE together forming CHOUKSEY GROUP OF COLLEGES to achieve the vision:- "Education is a movement from Darkness to Light".

Vision of Institute

To be a leading technical institute of National and International repute, providing quality education and to produce technically competent, ethical and socially responsible professionals.

Mission of Institute

- To provide students with the best possible inputs through faculty,infrastructural facilities and opportunities by the best available means.
- To produce best engineers and managers with the sense of duty to humanity and a commitment to their society and country.
- Producing technically skilled manpower to meet the unique needs of industries that forge new paths, develop new products and come up with innovative solutions.
- To prepare students to be eligible for placement in PSUs/Government Sectors/MNCs/Private Sectors.

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

Location:

Chouksey Engineering College is located at, NH-49, Masturi - Jairamnagar Rd, Lalkhadan, Mehmand, Chhattisgarh 495004 and the GPS Coordinates of the college are 22°02'46.3"N 82°12'27.2"E.

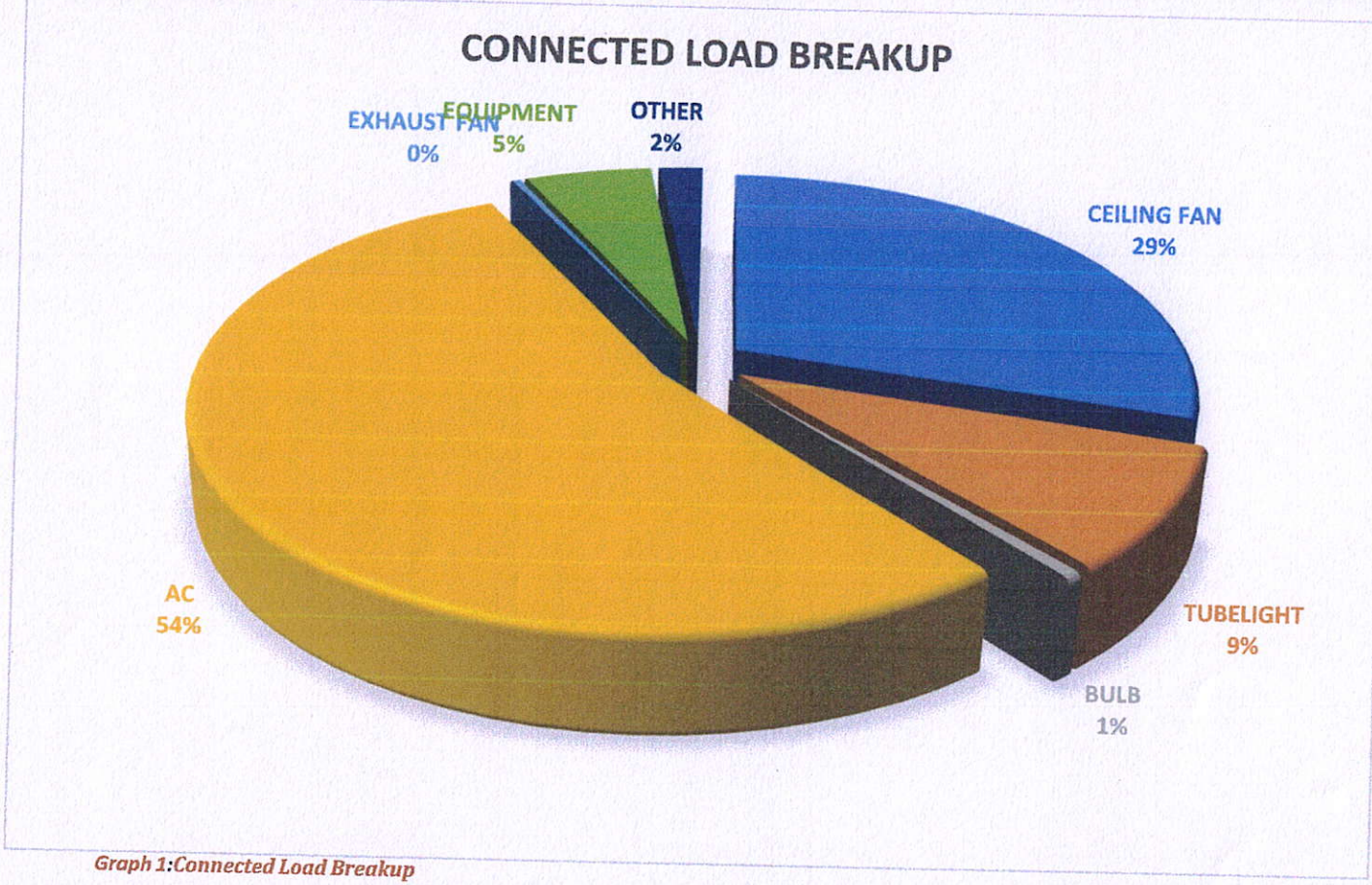
Connected Load Breakup

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

The installed capacity of each load is given as follows:

Sr.No.	Type of Fitting	Qty.	Watts	Total KW
1	CEILING FAN	590	60	35.4
2	TUBELIGHT	550	20	11.0
3	BULB	70	9	0.6
4	AC	43	1500	64.5
5	EXHAUST FAN	9	45	0.4
6	EQUIPMENT		6220	6.2
7	OTHER		2190	2.2
	Total Load			**120.3**

Table 1: Connected Load Break up



Graph 1:Connected Load Breakup

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

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: 0.01m^3/hr

Table 1: Instruments used for the study

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

Climatic condition

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

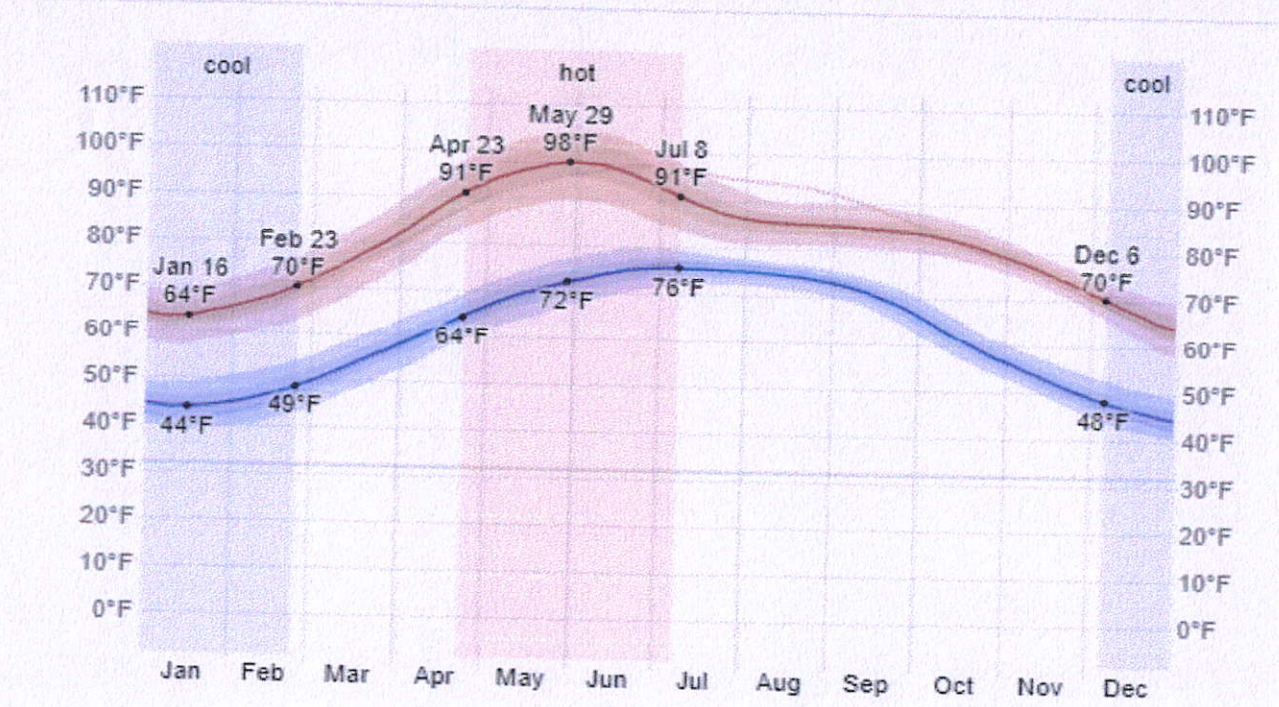


Figure 1: Climatic condition of Pamgarh

The hot season lasts for 2.5 months, from April 23 to July 8, with an average daily high temperature above 91°F. The hottest month of the year in Bilaspur is June, with an average high of 96°F and low of 75°F.

The cool season lasts for 2.6 months, from December 6 to February 23, with an average daily high temperature below 70°F. The coldest month of the year in Bilaspur is January, with an average low of 44°F and high of 64°F.

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

Section3: Performance Assessment

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

3. Performance Assessment

Chouksey Engineering College, Bilaspur has Common Energy Meter For all Department. 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.

Main Incomer reading

Sr No.	Name of Feeder	Voltage (Volt)					Current (Amp)					Power Factor (PF)	Power	
		RY	YB	BR	Avg.	% Imbalance	R	Y	B	Avg.	% Imbalance		(kW)	(KVA)
1	Main Incomer	401	399	398	399	0.42	24.0	26.0	29.0	26.3	10.13	0.85	15.5	18

Voltage profile

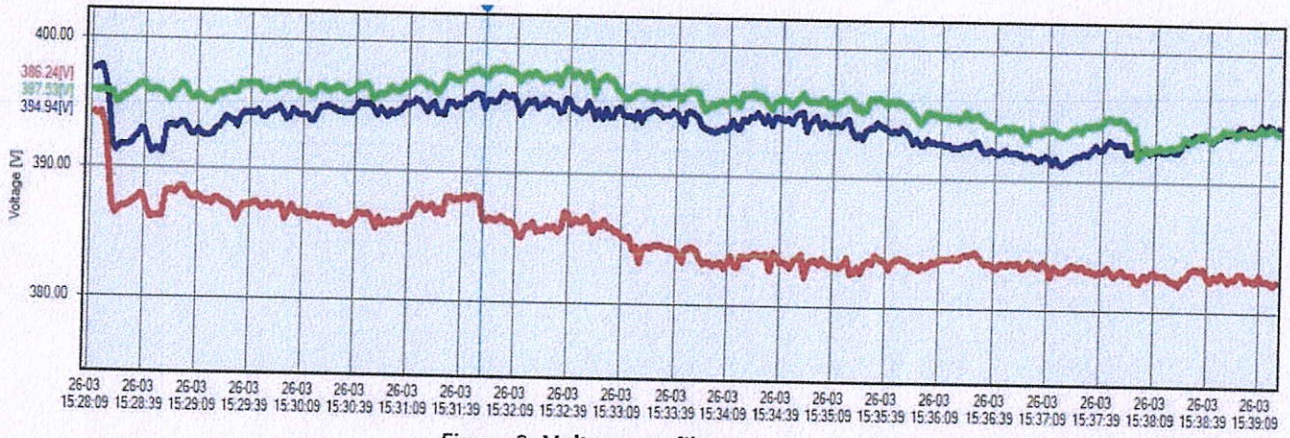
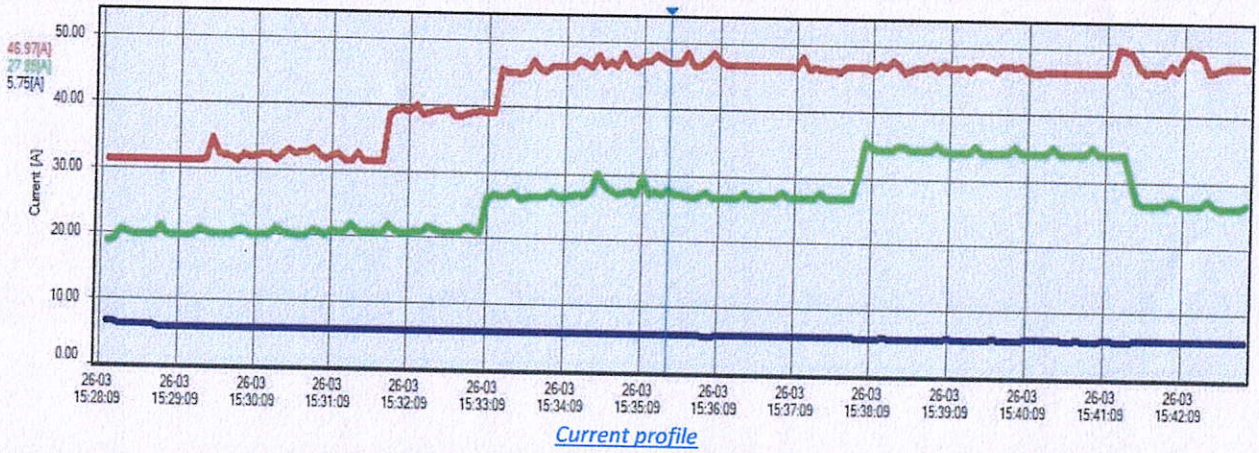


*Figure 2: **Voltage profile-***



Current profile

Figure 3: Current profile

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

3.2 Room wise Energy Consumptions

BUILDING NAME - MAIN BUILDING **FLOOR - GROUND FLOOR**

S. No.	Room No.	Lab/Class Name	Fan		Tubelight		Bulb		A.C.		Exhaust		Equipment		other		Total	
			Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt
1	G-7	Dept.	4	60	4	20											8	320
2	G-6	Class Room	6	60	4	20											10	440
3	G-9	Class Room	7	60	6	20											13	540
4	G-8	Class Room	7	60	6	20											13	540
5		Deptt. of Physics	6	60	11	20											17	580
6		Deptt. of Chemistry	5	60	9	20					3	40					17	600
7		Workshop	5	60	6	20											11	420
8	G-4	NSS Office	4	60	2	20											6	280
9		Sports Room	4	60	4	20											8	320
10	G-5	Class Room	6	60	4	20	2	9									12	458
11		Conference Hall			16	20	20	9	14	1500					1	40	51	21540
			54	600	72	220	22	18	14	1500	3	40						**26038**

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

FLOOR - FIRST FLOOR

S. No.	Room No.	Lab/Class Name	Fan		Tubelight		Bulb		A.C.		Exhaust		Equipment		other		Total	
			Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt
1		Girls Toilet					2	9			1	45					3	63
2		Boys Toilet					1	9			1	45					2	54
3		Computer Lab + Server Room			30	20			1	1500					3	150	31	2550
4		Software Lab CS	8	60	5	20			2	1500					60	200	15	15580
5		Language Lab	6	60	4	20											10	440
6		Project Lab	4	60	6	20			2	1500					60	200	12	15360
7		Main Computer Lab	10	60	12	20			5	1500					90	200	27	26340
8		Auditorium	21	60	28	20			9	1500					1	200	58	15520
9		Exam Section	6	60	5	20									1	200	11	660
10		OSD Room	4	60	3	20			1	1500					2	200	8	2200
11		TPO Office	4	60	6	20	3	9	1	1500					2	200	14	2287
12		Visitor Room	2	60	2	20	3	9	1	1500					1	200	8	1887
13		Girls Common Room	3	60	2	20	1	9									6	229
14		Exam Section Coordinator			3	20	3	9							3	200	6	687
15	F-1	Class Room	8	60	4	20											12	560
16	F-4	Class Room	8	60	5	20											13	580
17	F-2	Class Room	8	60	6	20											14	600
18	F-3	Class Room	8	60	5	20											13	580
19		Coridoor CSE			4	20	4	9									8	116
20		M. Tech Lab	2	60	2	20			1	1500							5	1660
21		MBA Computer Lab	6	60					2	1500							8	3360
22	F-6	Class Room	4	60	2	20											6	280
23	F-5	Class Room	4	60	3	20											7	300
24		Research Lab	7	60	4	20											11	500
			123	1140	141	420	17	63	25	15000	2	90	0	0	223	1950	308	**92393**

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

FLOOR - SECOND FLOOR

S. No.	Room No.	Lab/Class Name	Fan		Tubelight		Bulb		A.C.		Exhaust		Equipment		Other		Total	
			Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt
1		HOD MBA Room	4	60			8	9	1	1500							13	1812
2		MBA Faculty Room	4	60			5	9									9	285
3		Seminar Hall	4	60	4	20											8	320
4	S-1	Tutorial Room	4	60	4	20											8	320
5	S-2	Clasas Room	6	60	9	20											15	540
6	S-3	Clasas Room	6	60	9	20											15	540
7		Library	36	60	23	20	10	9							3	200	69	3310
			64	420	49	100	23	27	1	1500	0	0	0	0	3	200	137	**7127**

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

BUILDING NAME - EMEC BUILDING **FLOOR - GROUND FLOOR**

S. No.	Room No.	Lab/Class Name	Fan		Tubelight		Bulb		A.C.		Exhaust		Equipment		Other		Total	
			Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt
1		Canteen	7	60	3	20	2	9			2	40					14	578
2		Strength of Material Lab	4	60	2	20							4	500			10	2280
3	MG-4	Heat Mass Tranformer Lab	4	60	3	20	2	9					4	500			13	2318
4	MG-7	Automobile Lab	3	60	3	20							3	500			9	1740
5	MG-3	Machine Design Lab	4	60	4	20											8	320
6	MG-8	Fluid Mechanism Lab	4	60	3	20							8	1000			15	8300
7		Robotics Lab	2	60	3	20											5	180
8		HOD Mechanical	2	60	2	20											4	160
9		Mechanical Engineer Lab	6	60	5	20					1	40					12	500
10	MG-9	HOD Civil	4	60	4	20	1	9					5	200			14	1329
11	MG-10	Surveying Lab	5	60	3	20											8	360
12		Soil Mechanicas Lab	5	60	4	20							5	500			14	2880
13	MG-11	Transportation Lab	4	60	2	20							3	500			9	1780
14	MG-12	Enviromental Engg. Lab	6	60	4						1		4	250			15	1360
		Concrete Lab	3	60	3	20							3	500			9	1740
			63	900	48	280	5	27	0	0	4	80	39	4450	0	0	159	**25825**

PRINCIPAL
CHOUKSEY ENGINEERING COLLE
LAL KHADAN, BILASPUR (C.G

FLOOR - FIRST FLOOR

S. No.	Room No.	Lab/Class Name	Fan		Tubelight		Bulb		A.C.		Exhaust		Equipment		Other		Total	
			Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt
1	MF-4	Workshop	8	60	6	20											14	600
2	MF-3		6	60	3	20											9	420
3	MF-5	CAD/CAM Lab	10	60	10	20			3	1600			60	200			83	17600
4	MF-6		6	60	3	20											9	420
5	MF-2		6	60	4	20											10	440
6	MF-1		2	60	1	20											3	140
7	MF-12																0	0
8	MF-11		6	60	5	20											11	460
9	MF-8		6	60	3	20											9	420
10	MF-9		5	60	2	20											7	340
11	MF-10																0	0
12	MF-10W		7	60	6												13	420
			62	600	43	180	0	0	3	1600	0	0	60	200	0	0	168	**21260**

PRINCIPAL
CHOUKSEY ENGINEERING COLLE
LAL KHADAN, BILASPUR (C.G

FLOOR - SECOND FLOOR

S. No.	Room No.	Lab/Class Name	Fan		Tubelight		Bulb		A.C.		Exhaust		Equipment		Other		Total	
			Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt
1	MS-1	Electronics Workshop Lab	4	60	3	20							20	200			27	4300
2	MS-2	Micro Controller Lab	4	60	3	20							2	20			9	340
3	MS-16	Micro Processor Lab	6	60	5	20							10	100			21	1460
4	MS-3	LIC's Lab	6	60	4	20							20	100			30	2440
5	MS-15	Digital Electronicas Lab	6	60	5	20							10	100			21	1460
6	MS-14	Communication Lab	5	60	4	20							10	100			19	1380
7	MS-5	HOD Room	3	60	4	20											7	260
8	MS-4	Basic Electronics Lab	6	60	4	20	1	9					15	150			26	2699
9	MS-6	Lab	4	60	4	20							5	50			13	570
10	MS-7	HOD Room	3	60	4	20	1	9					3	250			11	1019
11	MS-8	Lab (IMTEE)	6	60	3	20	1	9					8	100			18	1229
12	MS-9	Lab (RoD)	4	60	4	20							5	100			13	820
13	MS-10	Seminar Hall	6	60	6	20											12	480
14	MS-11	Lab EEE	6	60	2	20							10	100			18	1400
15	MS-12	Lab (EMMI)	6	60	3	20							10	100			19	1420
16	MS-13	Lab Control	6	60	3	20							10	100			19	1420
			81	**960**	**61**	**320**	**3**	**27**	**0**	**0**	**0**	**0**	**138**	**1570**	**0**	**0**	**283**	**22697**

PRINCIPAL
CHOUKSEY ENGINEERING COLLE
LAL KHADAN, BILASPUR (C.G.)

FLOOR - THIRD FLOOR

S. No.	Room No.	Lab/Class Name	Fan		Tubelight		Bulb		A.C.		Exhaust		Equipment		Other		Total	
			Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt
1	1	M.Tech Class	3	60	2	20											5	220
2	MT-6	Class Room	6	60	4	20											10	440
3		Tutorial Room	4	60	4	20											8	320
4		Girls Common Room	3	60	2	20											5	220
5	MT-9	Class Room	5	60	4	20											9	380
6	MT-13	Tutorial Room	6	60	3	20											9	420
7	MT-11	Seminar Hall	8	60	7	20											15	620
8	MT-12	Class Room	4	60	3	20											7	300
9	MT-5	Class Room	4	60	3	20											7	300
10	MT-4	Digital Class Room	7	60	2	20											9	460
11	MT-3	Class Room	5	60	3	20											8	360
12	MT-2	Class Room	5	60	4	20											9	380
13	MT-7	Class Room	6	60	4	20											10	440
14	MT-10	Class Room	5	60	4	20											9	380
			71	840	49	280	0	0	0	0	0	0	0	0	0	0	120	**5240**

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

BUILDING NAME - EMEC BUILDING **FLOOR - GROUND FLOOR**

S. No.	Room No.	Lab/Class Name	Fan		Tubelight		Bulb		A.C.		Exhaust		Equipment		Other		Total	
			Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt	Nos	Watt
1	18		1	60	1	20											2	80
2		Class Room-4	6	60	7	20											13	500
3		Computer Lab	4	60	5	20											9	340
4		Class Room-3	6	60	6	20											12	480
5		Office	2	60	3	20											5	180
6		Store	13	60	16	20											29	1100
7		Class Room - 1	6	60	6	20											12	480
8		Sports Room	1	60	4	20											5	140
9		Side Room	4	60	6	20											10	360
10		Boys Toilet			1	20											1	20
11		Girls Toilet			2	20											2	40
12		Room	1	60	2	20											3	100
13		Chemistry Lab	4	60	4	20											8	320
14		HAP Lab	4	60	4	20											8	320
15		Class Room	1	60	1	20											2	80
16		Class Room	4	60	4	20											8	320
17		Class Room	1	60	2	20											3	100
18		Class Room	3	60	4	20											7	260
19		Class Room-2	6	60	4	20											10	440
20		Class Room	1	60	1	20											2	80
21		Class Room	4	60	4	20											8	320

PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

Section4: Energy Conservation Measures (ECM)

PRINCIPAL
CHOUKSEY ENGINEERING COLLE
LAL KHADAN, BILASPUR (C.G.)

4. Energy Conservation Measures

ECM 1: Replacement of Existing Ceiling Fan to Energy Efficient BLDC Fan.

Replacement of Conventional Fans of 60 Watt by Energy Efficient Fans of 28 watt:

A BLDC fan takes in AC voltage and internally converts it into DC using SMPS.

The main difference between BLDC and ordinary DC fans is the commutation method. A commutation is basically the technique of changing the direction of current in the motor for the rotational movement. In a BLDC motor, as there are no brushes so the commutation is done by the driving algorithm in the Electronics. The main advantage is that over a period of time, due to mechanical contact in a brushed motor the commutators can undergo wear and tear, this thing is eliminated in BLDC Motor making the motor more rugged for long-term use.

Figure 15: BLDC motor of Energy Efficient fan

To explain, BLDC technology in simpler terms, BLDC uses a combination of Permanent Magnets and Electronics to achieve the kind of efficiency and performance it delivers. A BLDC fan composes of 3 main components:

1.Stator 2. Rotor 3. Electronics.

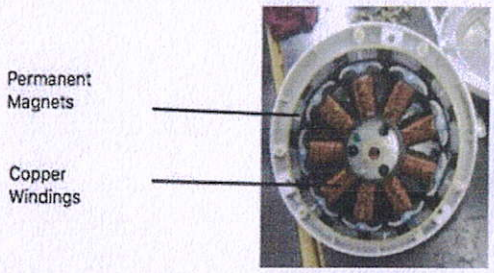


Figure 16: Inside view of BLDC motor

The electronics contains a driving algorithm which drives the BLDC motor. As discussed earlier in a BLDC motor the position of magnets in the fan is sensed by electronics that either uses a Hall effect sensor or back EMF. Modern BLDC motors use Back EMF for commutation due to proven disadvantages of hall effect sensor over period of time. To explain it in easier terms, we can take an example of a donkey who has a carrot fixed over his head as per shown in the picture below:

Consider the Stator to be the Carrot and the donkey to be the Magnets. The polarity of the stator will keep changing, due to attraction the magnets will create rotational moment, just like how the donkey tries hard to reach the carrot in the picture.

Permanent magnets used in rotor are responsible for mass reduction in power consumption compared to windings used in the stator in an ordinary induction fan. One added advantage in a BLDC fans due to use of an electronic circuit is that you can add several additional features to increase convenience, few example of the same are sleep mode,

timer mode also it is compatible with Home automation systems. Most of the BLDC Ceiling fans are operated by remote unlike traditional regulator reducing the purchase cost of regulator.

Compared to regular induction fan, a BLDC fan can save upto Rs 1000-1500/ Year/fan. And because there is no heating of the motor, the life of a BLDC fan is also expected to be much higher than ordinary

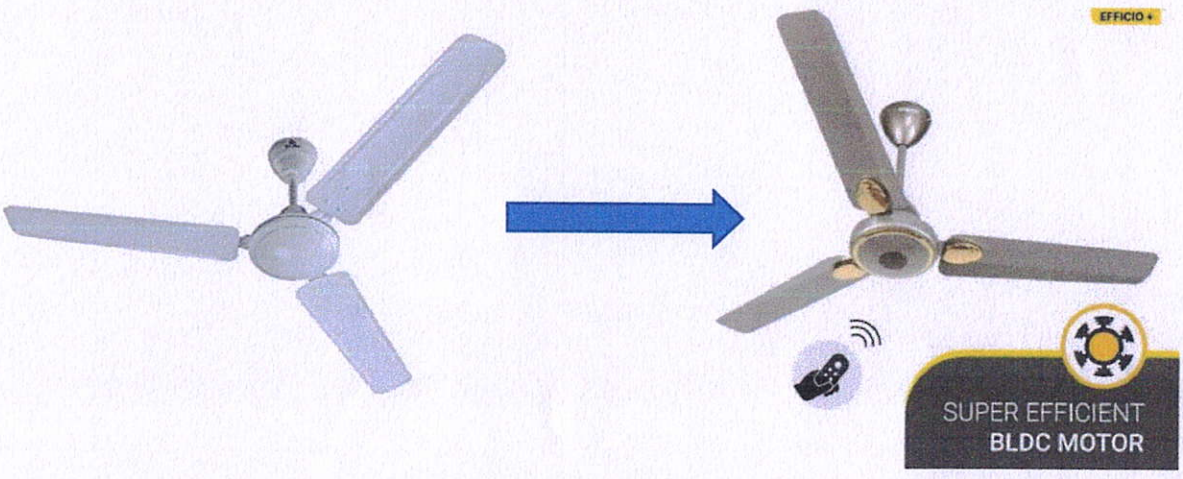
Energy Consumption: Ordinary Fans Vs BLDC Fans

Tag Name	Wattage	Daily Electricity Consumption
Regular Fan	60 Watts	1.125 units
BLDC Fan	**28 Watts**	0.45 units

Saving Calculation

Name of Particulars	Quantity	Total Wattage	Annual Operational Hours (10hr / D)	Total Unit Consumption (kWH)
Ceiling Fan (1400 mm), 60 W	**590**	**35400**	**2500**	**88500**
Saving Calculation				
Operating days per years				250 Days
Total Annual Energy Consumption (kWh) of old CF				88500
Proposed Total BLDC Fan (28W) Energy Consumption (kWh)				**41300**
Saving due to installation of BLDC Fan -kWh				**47200**
Total Monitory Saving considering Rs.7 @ per kWh				**3,30,400**
Total Investment of installing 590 nos. BLDC Fan @ Rs. 2500 per Fan				**14,75,000**
Simple Payback period in Months				**54**

These existing Fan can be replaced in a phase manner.



PRINCIPAL
CHOUKSEY ENGINEERING COLLEGE
LAL KHADAN, BILASPUR (C.G.)

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.

Signature:

Greenserve Energy
Management Solutions
Durg (C.G.)

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

PRINCIPAL
CHOUKSEY ENGINEERING COLLE
LAL KHADAN, BILASPUR (C.G.)