ENERGY AUDIT REPORT
CONSULTATION

Jeypore College of Pharmacy
Rondapalli, Jeypore, Dist. Koraput, Odisha
Year 2021-22

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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(2021-22)

CONTENT

PRINCIPAL
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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Jeypore College of Pharmacy Rondapalli, Jeypore Dist. Koraput, Odisha** for giving us an opportunity to conduct 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 the course of study.

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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)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

Certificate of Accreditation

ENERGY IS LIFE
CONSERVE IT

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

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The Audit Team

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

- **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- **Mr. Rakesh Pathak**, [Director & Electrical Expert]
- **Mrs. Laxmi Raikwar Singadiya** [Chemical Engineer]
- **Mr. Sachin Kumawat** [Sr. Project Engineer]
- **Mr. Charchit Pathak** [Asst.Project Engineer]
- **Mr. Aakash Kumawat** [Junior Engineer]
- **Mr. Ajay Nahra** [Sr. Accountant & admin]

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Green Monitoring Committee

JEYPORE COLLEGE OF PHARMACY
(Under the patronage of Banagiri Development Trust)
Approved by Government of Odisha & All India Council for Technical Education, New Delhi
Affiliated to Biju Pattnaik University of Technology & Pharmacy Council of India, New Delhi

Ref. No.: JCP/ 2211/7860 Date: 21/11/22

Constitution of Committee for Energy / Environment/ Green

In view of Environmental impact assessment& procedure for situation requiring urgent action regarding regular assessment of pollution, soil degradation & waste management following Committee are required to be constituted for saving the Environment w.e.f. date of issue, for the period of three years.

Name of the Committee	Proposed Name of the Members.
1.Green Audit	1. Dr.Sangram Keshari Panda 2. Mr.Manasi Khadanga 3. Miss.subhasree Sahu 4. Mr.Manoj Kumar Dhanphul
2.Environment Audit	1. Mr.Soubhgya Ranjan Sahu 2. Mrs.Gitanjali Dash 3. Mr.Rama Krushna Gouda 4. Mr.Ranjit Kumar Satapathy
3.Energy Audit	1. Mr.Sujit Kumar Martha 2. Mr.Saswat Kumar Rath 3. Mr. Dhana Paika

Committee shal submit audit reports to the undersigned. In addition to above Mrs.Manasi Khadanga, Asst.Professor and Dr.Sangram Keshari Panda, Principal shall be responsible to provide all the required details and documents to the audit committee as and when required.

21/11/2022
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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 COLLEGE

- **SOLAR SYSTEM (15 KWp)**

College has recently placed work order 15 KWp solar system of SCM Solar (OPC) Energy Pvt. Ltd expected unit generation from above system will be 21900 units per year. **Its appreciable .**

- **LIGHTING SYSTEM**

College has illuminated with 100 % Energy Effiecint LED Lighting System.during the audit there is some project is under construction. As per the discussion with college management future lighting system will be installed with energy efficient LED lighting as per the discussion green monitoring committee. **Its appreciable.**

RECOMMENDATION: -

- CEILING FAN

Replacement of conventional ceiling fan (50 Watt) by energy efficient star rated fan or BLDC based energy efficient fan (28 Watt) in class rooms, laboratories and faculties cabin have great potential for energy saving

- TIMER CONTROLLED STREET LIGHTS

It is recommended to implement "Timer control on street light" for energy saving of the collage campus.

- MOTION SENSOR

It is recommended to implement of motion sensor in faculty cabins, admin offices, washroom and non working areas to conserve energy.

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IOT BASED ENERGY MONITORING SYSTEM

Installation of "Cloud based (IoT based) energy monitoring system" including harmonic measurement (total voltage and current harmonic distortion %) in electrical panel will be good initiate for energy management. Expected energy saving potential about 5 to 6%.

Installation of energy meters between transformer and main electrical panel with IOT system will monitor line losses of the system. It will give real time measurement of power factor and line losses from the cable.

ENERGY MANAGEMENT WORKSHOP AND TRAINING

Conduct awareness, training programs, seminars, workshops, exhibitions for faculty, management and non teaching staff.

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ENERGY CONSERVATION MEASURES FOR ELECTRICAL SYSTEM

Case Study	Section	Identification	Observation	Recommendation	Expected Annual energy saving (kWh)	Expected Annual cost saving (Rs.)	Expected Investment (Rs.)	Simple payback period
1	Celling Fan	74 No. celling fan working with 50 Watt	Power consumption by exesting celling fan (50 Watt)	Replacement of 50W conventional ceiling fan by 28W BLDC energy efficient ceiling fan	3,256	22,629/-	1,39,860/-	6.2 year
2	Street Light	9 no. of street light pole	Manual operation	Operated with timer controll	Energy saving will be depend on an occupied hours and load factor		considerable	-
3	Office lighting	Faculty cabins, Lab etc	Manual control	Motion Senser	Energy saving will be depend on an occupied hours and load factor		considerable	-

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CHAPTER-1
INTRODUCTION

1.1 About College

The Jeypore College of Pharmacy founded in the year 2000, has today grown to become one of the forefront educational Colleges in KBK District. Jeypore College of Pharmacy started in the year 2001. The College is managed by Banagiri Development Trust. It is teeming with academic research, medicinal garden, canteen, play ground and personal development activities.Jeypore College of Pharmacy is one among the 33 plus Pharmacy College in Orissa, securing a place among the top ten private institutions. The College offers D. Pharm, (2 years) B. Pharm (4 years) and M. Pharm (Pharmceutical Technology, Pharmaceutical Analysis & Quality Assurance, Pharmacognosy and Pharmacology) (2 years) complying with the norms of AICTE & PCI. The institution is approved by All India Council for Technical Education (AICTE), Pharmacy Council of India (PCI), Ministry of Health & Family Welfare, Government of Orissa and affiliated to Biju Patnaik University of Technology, Odisha & Orissa State Board of Pharmacy, Odisha.

Figure 1.1: - Satellite Image of JCP, Jeypore from Google map

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Vision

To provide affordable quality education in pharmacy, with the goal of equipping students with knowledge and skills relevant to their particular domain of interest to undertake research & innovations, realize their full potential, instill values, and identify hidden talents and become future professional leaders, entrepreneurs, and responsible citizens.

Mission

The college is dedicated for academic development along with outreach and community engagement through collaborations and linkages to achieve national level of recognition. The college is committed to a supportive teaching, learning and research environment that instills cultural competence, ethics, critical thinking in the students preparing them for leadership roles as healthcare providers, practitioners, innovators, researchers and lifelong learners.

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Quality Policy

- ✓ It is our goal to provide students with the opportunity to develop their full potential so that they can meet the high demands of industry and society.
- ✓ To instil innovative thinking in the next generation of pharmacists.
- ✓ It is our mission to provide knowledge through experienced academicians and the creation of an ideal environment for research, skill and innovation for our students.
- ✓ Provide rural youths with high levels of proficiency and skill as pharmacists in the pharmaceutical industry.
- ✓ Our goal is to instil social responsibility and discipline in our students, not only to make them better technocrats but also to make them better individuals.

Objectives

- Provide a comprehensive, value-based approach to teaching and learning that is based on traditional and innovative methodologies to impart the highest standard of education.
- Establish a platform that allows students to explore their creative potential and cultivate the spirit of entrepreneurship and critical thinking in the classroom
- To make them socially responsible citizens, it is paramount to develop in them a sense of honesty, a strong belief in human rights, gender equality, and an understanding of the environment

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College build-up area

Sr.No.	Name of the Building	Area in Sqmt.
1	UG Building	1547.4
2	UG Ground Floor+PG Building	1728.8
3	Office+Library	776.8
4	HOD D.Pharma	264
5	Store + House keeping	311.6
6	D.Pharma Practical Room	300
7	Canteen	225
8	Animal House	100
9	Security Room	10
	Total	5263.6

COLLEGE POPULATION

Sr.No.	College Population	Quntity (Nos)
1	No. of student	480
2	No. of teaching faculty	36
3	No. of non-teaching faculty	44
	Total	560

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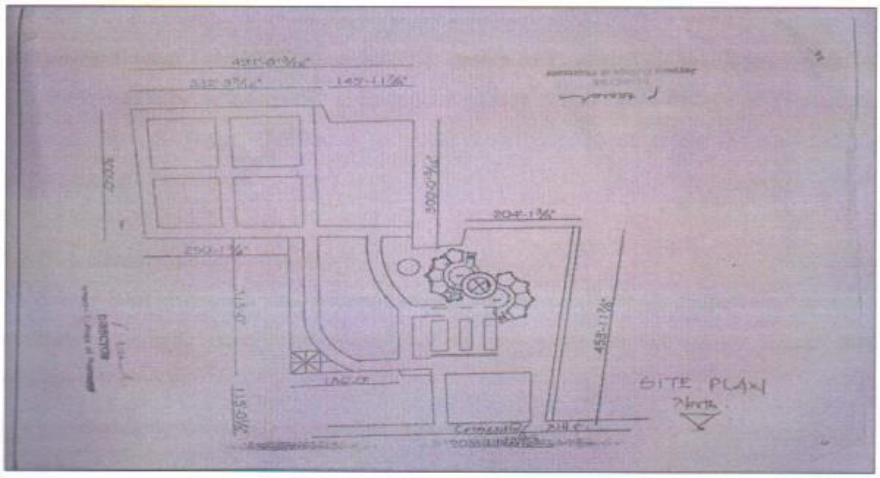
Layout of college campus



Master plan of jeypore college of pharmacy

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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 in 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 **Jeypore college of Pharmacy, Jeypore, Dist. Koraput, Odisha.** 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 of energy-saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.

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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 equipments, 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 suitable energy conservation plan's for improvements/ reduction in specific energy consumption.

1.5 College Present Energy Scenario

College uses energy in the form of electricity purchased from TPSODL grid. The college has contract demand 18 KW.Total billing amount of Jeypore College of Pharmacy is Rs. 1,50,643/- with respect to annual energy consumption 18,104 unit and overall per unit charge 6.95 per unit in period from Jul-2021 to Jun-2022.

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CHAPTER- 2
POWER SUPPLY SYSTEM

2.1 Transformer Details.

The power supply for **Jeypore College of Pharmacy** is from TPSODL with contract demand of 18 kW. There is a transformer having capacity of 25 kVA. The details are given in following table 2.1

Table: 2.1 Teacnical details of transformer.

Sr. No.	Items	Technical Specification
1	Location	Jeypore College of Pharmacy
2	Year of installation	2000
3	Rating (kVA)	25
4	Output Voltage	240
5	Frequency	50

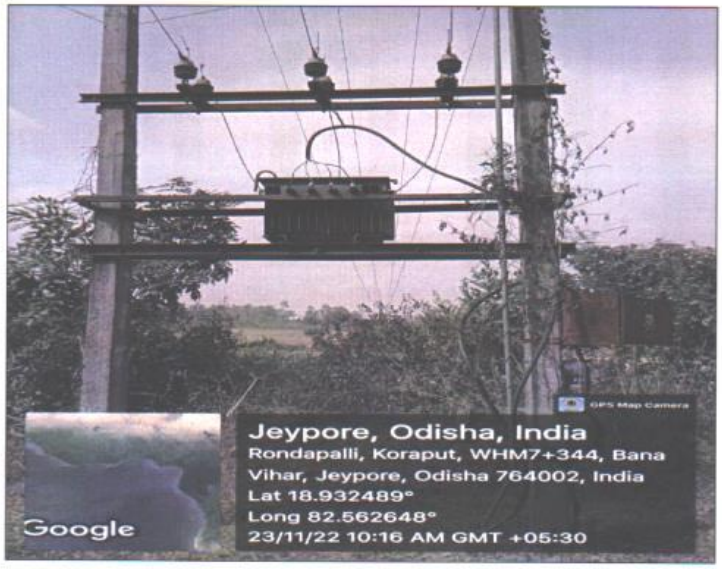

Figure 2.1:- 25 kVA Transformer

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Table 2.2: Calculated Transformer loading (%) Based on Electricity Bills Year (2021-22)

Sr. No.	Month & Year	Contract Demand (KVA)	Maximum Demand (KVA)	TR loading (%)
1	Jul-21	25	9.2	36.8
2	Sep-21	25	8.6	34.4
3	Oct-21	25	9.36	37.44
4	Apr-22	25	9.8	39.2
5	May-22	25	10.4	41.6
6	Jun-22	25	9.93	39.72
		Average Transformer loading %		38.19
		Maximum loading %		39.72

Figure 2.2:- Graphical presentation of TR loading percentage Year 2021-22

Observation: -

The average loading of the transformer is 38.19% and goes to maximum 41.6 % in the month of May 2022. Above loading is calculated is based on table 2.2 .

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2.2 DG Set

There is one DG Set in the college campus. Details of the DG Set is given table. 2.2

Table 2.2 Technical specifications for DG set

Sr.No.	Parameter	Technical Specification DG
1	Make	Crompton Greaves Ltd.
2	M/C No	G1R15/43.34-SAL
3	Capacity (KVA)	15
4	Rated Voltage	415
5	Power factor	0.8
6	RPM	1500
7	Phase	3

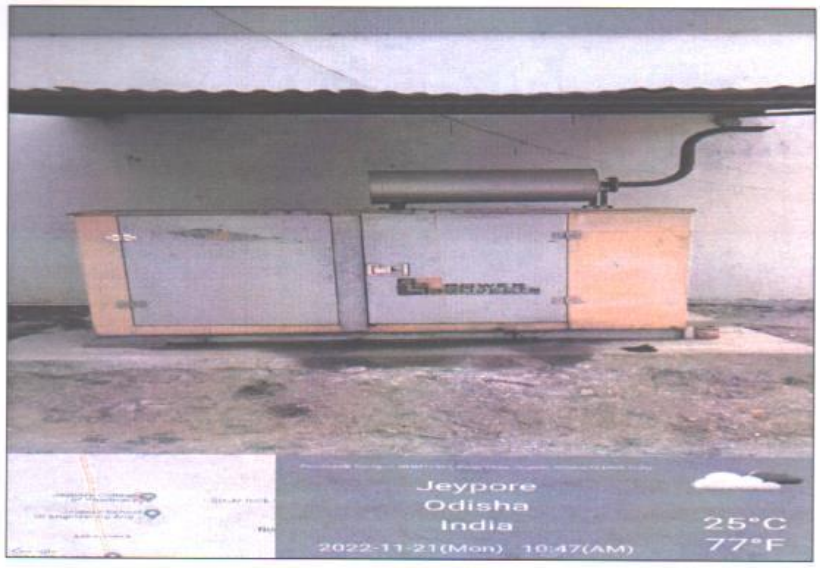

Figure 2.2:- DG set in college

Observation

- DG set is used only in case of power failure.
- There are requirement of energy and fuel monitoring meter for energy and fuel consumption.

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Single Line Diagram (SLD)

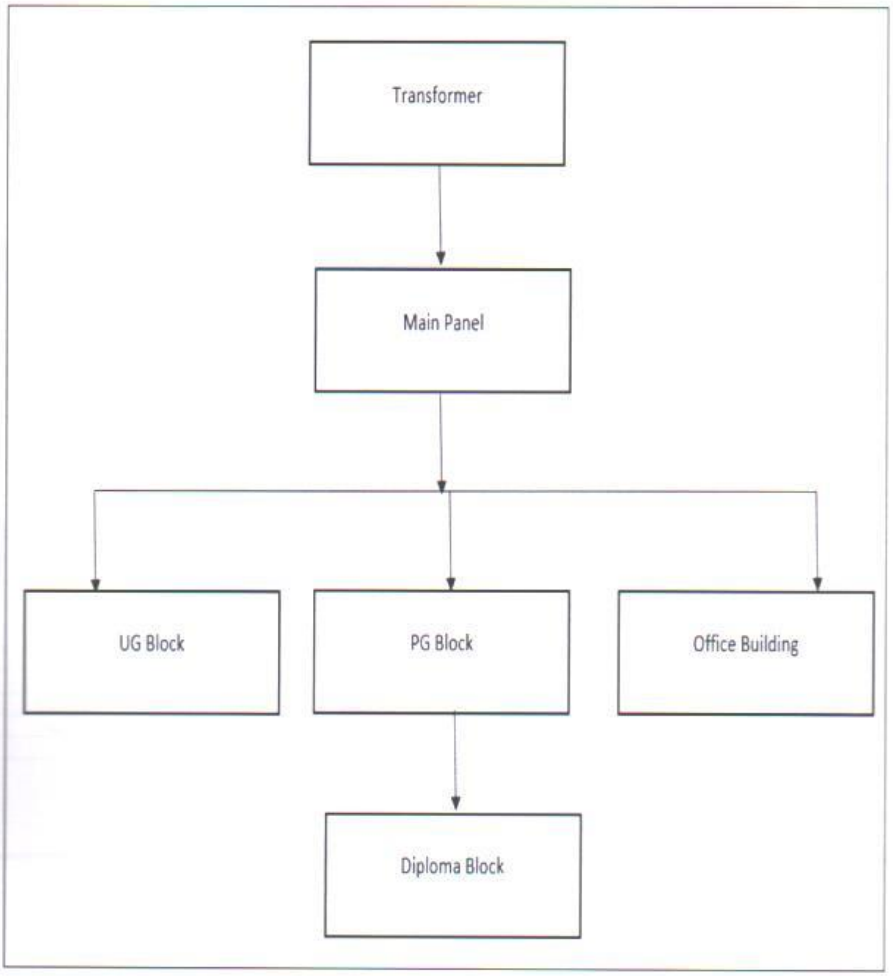

Figure 2.3:- Single line daigram of college campus

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CHAPTER- 3

ELECTRICITY BILL ANALYSIS

3.1 Monthly Electrical Energy Consumption 2021-22

The monthly electrical consumption for the college is given in the table.

Table 3.2 Energy consumption and billing amount (the year 2021-22)

Sr. No.	Month & Year	Contract Demand (KW)	Average power factor	Total Unit Consumption(kWh)	Total Amount (Rs.)	Overall Per Unit Charges (Rs./kWh)
1	Jul-21	18	0.99	630	4,962/-	7.88
2	Aug-21	18	0.99	1,145	8,431/-	7.36
3	Sep-21	18	0.99	990	7,506/-	7.58
4	Oct-21	18	0.99	1,262	9,227/-	7.31
5	Nov-21	18	0.99	1,479	10,500/-	7.10
6	Dec-21	18	0.99	1,876	12,980/-	6.92
7	Jan-22	18	0.99	1,839	10,786/-	5.87
8	Feb-22	18	0.99	1,860	12,000/-	6.45
9	Mar-22	18	0.99	1,943	13,610/-	7.00
10	Apr-22	18	0.99	1,479	10,305/-	6.97
11	May-22	18	0.99	1,683	10,470/-	6.22
12	Jun-22	18	0.99	1,918	12,921/-	6.74
	Total			**18,104**	**1,23,698/-**	**6.95**

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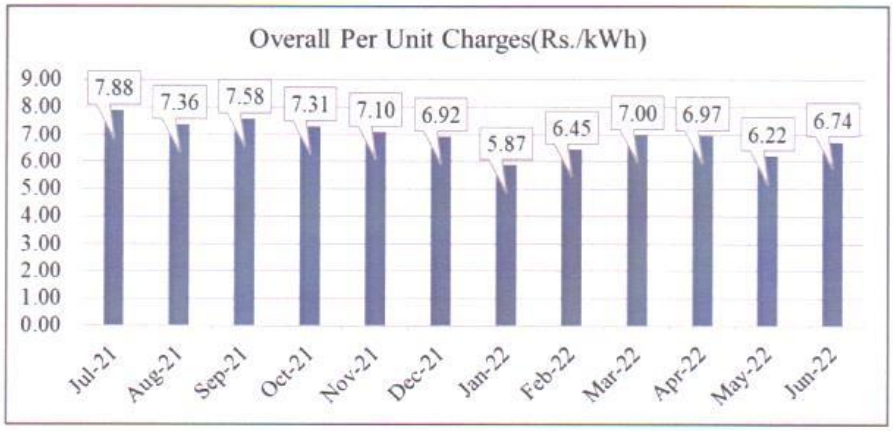
Graphical presentation of unit consumption year Jun-2021 to July-2022.



Observation :-

- Energy Audit team was analyzed 01 Year electricity bill and find out annual energy consumption 18,104 units and overall per unit charge Rs. 6.95 per unit period from Jul-2021 to Jun-2022.

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3.2 ON Site power measurement in college

Sr.No.	Location	Voltage (V)	Current (Amp.)	Power Factor	Input Power (KW)
1	PG 1st floor	425	0.3	0.85	0.2
2	PG 2nd floor	423	0.2	0.87	0.1
3	PG Ground floor	421	0.2	0.83	0.1
4	6	427	0.8	0.88	0.5
5	9/Barracks	421	4.8	0.87	3.0
6	10	422	0	0.85	0.0
7	Admin block	426	0.4	0.85	0.3
8	UG Ground Floor	429	5.2	0.85	3.3
9	7/2nd floor	424	0	0.85	0.0
10	11/ Street lightSpare	428	0	0.85	0.0
11	8/3rd floor	423	0	0.86	0.0
11	Openwell	409	4.2	0.86	2.6
11	Borewell-1	411	6.3	0.86	3.9
11	Borewell-2	414	6.1	0.87	3.8

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Chapter-4
CONNECTED LOAD

4.1 Connected Load detail of College

Office Building

Sr.No.	Electrical Equipment	Quantity
1	Ceiling fan(50W)	14
2	LED light (18W)	14
3	Ceiling light (12W)	17
4	Ceiling light (5W)	3
5	Printer(250W)	6
6	Photocopy machine (800W)	1
7	Wall fan (50W)	4
8	AC (1200W)	1
9	Computer (75W)	10

UG Building

Sr.No.	Electrical Equipment	Quantity
1	Ceilling fan (50W)	26
2	LED light (18W)	55
3	Ceiling light (12W)	28
4	LED bulb (9W)	3
5	Exhaust fan (60W)	5

P.G. Building

Sr.No.	Electrical Equipment	Quantity
1	Ceiling fan (50W)	19
2	LED light (18W)	53
3	LED bulb (9W)	5
4	Exhaust fan (60W)	3
5	Computer (75W)	82

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Diploma Block

Sr.No.	Electrical Equipment	Quantity
1	Ceiling fan (50W)	15
2	LED light (18W)	33
3	Computer (75W)	1

Canteen

Sr.No.	Electrical Equipment	Quantity
1	LED bulb (9W)	8
2	LED light (18W)	2

Campus Street Light

Sr.No.	Electrical Equipment	Quantity
1	Solar street 1ight(50W)	3
2	LED street ight (45W)	9

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4.2 Connected Load sharing Electrical Equipment

Total load share of electrical equipment in college.

Sr. No.	Equipment equipment	Unit Power (Watt)	Quantity (Nos)	Total Power (Watt)	Electrical Equipment Load share%
1	Ceiling Light	12	45	540	2.87
2	Ceiling Light	5	3	15	0.08
3	Ceiling Fan	50	74	3700	19.70
4	LED light	18	157	2826	15.04
5	Printer	250	6	1500	7.99
6	Wall fan	50	4	200	1.06
7	Computer	75	93	6975	37.13
8	LED Bulb	9	16	144	0.77
9	A.C.	1200	1	1200	6.39
10	Street light(LED)	45	9	405	2.16
11	Photocopy Machine	800	1	800	4.26
12	Exhaust fan	60	8	480	2.56
	Total			18785	100.00

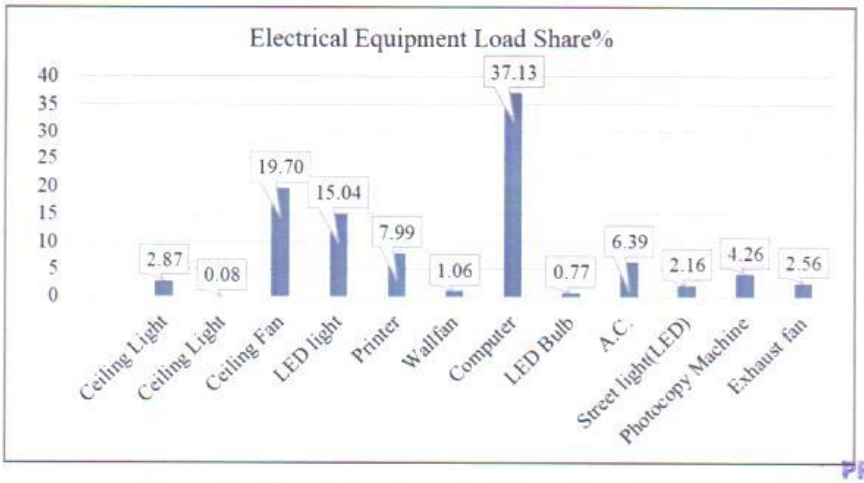

Figure 4.1:- Electrical equipment load share % year 2021-22

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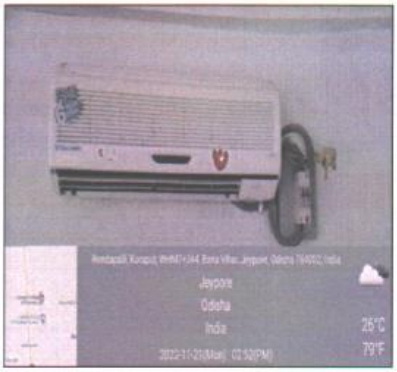
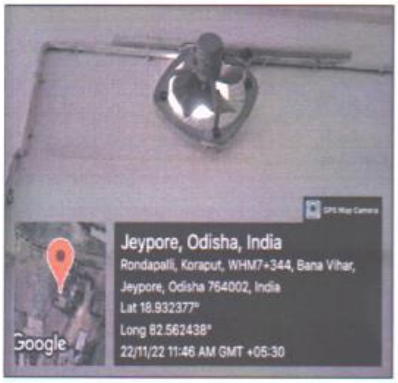
4.3 Some photograph of electrical equipment's



Air conditioner

Computer

Wall Fan



Exhaust Fan

LED Tubelight

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CHAPTER- 5
ENERGY CONSERVATION MEASURES

5.1 Case Study

Replacement of 50W conventional ceiling fan by 28W BLDC Energy efficient ceiling fan in college

Sr. No	Item	Parameter	Unit
1	Rated Power of Ceiling Fan	50	W
2	No. of Fan	74	Nos
3	Working Hrs./Day	8	Hrs./Day
4	Working Days/Year	250	Days/Year
5	Energy Efficient BLDC Fan Rated power	28	W
6	Energy Saving Potential	3,256	kWh/Year
7	Expected Annual Energy Saving	3,256	kWh/Year
8	Per Unit Charges	6.95	Rs/kWh
9	Expected Money Saving	22,629	Rs./Year
10	Cost of New Celling Fan	1,800	Rs./Pices
11	Investment on New Fan Purchasing	1,33,200	Rs.
12	Maintenance Investment@5%	6,660	Rs.
13	Total Investment	1,39,860	Rs.
14	Simple Pay Back Period	6.2	Year

Total Calculated Monetary Saving Potential in Celling Fan = Rs 22,629/-

PRINCIPAL
JEYPORE COLLEGE OF PHARMACY
RONDAPALLI, JEYPORE (K) 764002

Annexure-01

Solar work order

SCM SOLAR ENERGY (OPC) PRIVATE LIMITED

(CHANNEL PARTNER FOR WAAREE ENERGIES LIMITED)

Letter No: SCM/2022/23/17 **Date-21/09/22**

To,

The Principal,
Jeypore College of Pharmacy,
Rondapali ,Jeypore.

Sub: ***Quotation for 15 K.W ON-GRID SOLAR SYSTEM.***

Sir,

Please find our below details for lowest price for work as details below, for your kind approval.

Quotation

Sl	Description of Materials	Quantity	Total Amount
1	335 Wp solar panels(Waaree make)	44no	Rs.4,86,420/-
2.	15 Kw On-grid Inverter (Make Growatt)	1 no	Rs.94,000 /-
3	MS Structure for solar panels including civil works	1 set	Rs. 45,000/-
4	DCDB (MCB, SPD,FUSE)	1 NO	Rs.11,000/-
5	ACDB (ACMCB,SPD)	1mtrs	Rs.10,600/-
6	Generation Meter	1 no	Rs. 7,000/-
7	Bi-directional Meter	1 no	Rs. 10,000/-
8	Dc Cable(6 squre mm)	As per required	Rs.10,000/-
9	Ac Cable (10 squre mm)	As per required	Rs. 8,000/-
10	Copper Lightening Arrester	1	Rs. 5,000/-
11	Chemical Earthing System & Cable as for required.	1 set	Rs. 8000/-
12	MC4 Connectors, PVC Pipe, Flexible pipe, Cable tie, other accessories.	As per required	Rs.10,000/-
10	Installation Charge	lump sum	Rs. 40,000/-
	Total		**Rs. 7,45,020/-**

Thanking You,

Yours faithfully

For SCM SOLAR ENERGY (OPC) PVT LTD
Umesh Chandra Mishra
(Managing Director)

PRINCIPAL
JEYPORE COLLEGE OF PHARMACY
RONDAPALLI, JEYPORE (K) 764002

END OF THE REPORT

THANKS

PRINCIPAL
JEYPORE COLLEGE OF PHARMACY
RONDAPALLI, JEYPORE (O) 764002