



**Energy Audit Report
Dyal Singh College Karnal-132001,
Haryana Year 2021-22**



**ENERGY AUDIT REPORT
CONSULTATION**



**Dyal Singh College
Karnal-132001, Haryana**

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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(2021-22)

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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Dyal Singh College Karnal, Haryana** 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 course of study.


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]




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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



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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



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A committee of the following members has been constituted for the conduction of Energy, Green & Environmental Audit:

1. Sh Sanjay Kumar, Overall Incharge (NAAC)
2. Sh Sushil Kumar, Coordinator (NAAC)
3. Dr Devinder Singh
4. Dr Ritu Sharma (Eng.)
5. Dr Anita Agarwal
6. Dr Shweta Yadav
7. Dr Tejpal
8. Dr Aditi Shreeya Bali
9. Sh Kiran Kumar
10. Dr Omvir Singh, External Expert
11. Ms Meenu Sharma, External Expert

Committee shall submit audit reports to the undersigned. In addition to the above, Sh Azad Singh (Offg. Deputy Supdt.) and Parveen Kumar (Clerk) will be responsible to provide all the required details and documents to the committee as and when required.



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ENERGY, ENVIRONMENT, GREEN AND WASTE MANAGEMENT POLICY



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ENERGY, ENVIRONMENT, GREEN AND WASTE MANAGEMENT POLICY

Preamble

Environment friendly practices of the college are unsurpassable. Crowded with trees and plants, the campus is a real treat to one's eyes. Celebrating nature's gift has always been our way of life. The college works towards responsible living by contributing towards what we get in abundance from Mother Nature. Institution spreads its tentacles in developing a green campus and disseminates the eco-friendly culture to the nearby community through various programs and events.

We earnestly believe that an environment that is clean, green, and pollution-free is the perfect setting for a successful learning experience. We consequently make deliberate efforts to create a green ecology in order to provide a healthy environment to the students. As an academic institution, our emphasis lies on the prudent use, conservation, and strategic sustenance of resources.

The Pivots of Environmental Policy

1. Energy conservation programmes
2. Waste management programmes for biodegradable as well as nonbiodegradable materials
3. Water conservation efforts
4. Green campus initiatives
5. Quality audits on environment
6. Environmental promotion programmes beyond the campus

Green-Campus Policy

Green-Campus offers the opportunities to:

1. Create a campus where administration, staff, and students may come together and discuss environmental issues and concerns.
2. Include more members of the campus community in the discussion of environmental issues.
3. Enhance student confidence and sense of responsibility through participation and by introducing them to the fields of sustainability and environmental protection.
4. Enhance the environmental performance of the campus, lower environmental risks and consequences.
5. Lead by example in the neighbourhood, mentor local stakeholders, and engage them in protecting the environment.
6. Create sensitisation on the campus.
7. The college works under the motto "Save Energy" every day.

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Energy Conservation / Energy Saving Initiatives

1. The architecture of the college building is helpful in the conservation of natural resources and energy.
2. Provision of large windows encourages natural light in the classrooms and makes use of wind and buoyancy to draw in fresh air.
3. Insisting the users to turn on power management features so that their computer and monitor enter a low power "sleep" mode when they aren't using them.
4. Users are guided to turn off their monitor before leaving their desk.
5. Users are motivated to enable the printer's power management functions.
6. Shutting down the computer rather than signing off whenever it's possible.
7. Turning off superfluous lights and substituting natural light or daylight.
8. Making use of LED or CFL lamps.
9. Using the fans only when they are needed.

Degradable and Non-Degradable Waste Management Initiatives

The college community is well aware of the importance of proper disposal of waste produced on campus. All sorts of garbage accumulated in the college are effectively treated through cooperative efforts. The institution manages all types of garbage according to the 3R Principle: Reduce, Reuse, and Recycle. Students are often taught the proper awareness.

Solid waste Management

1. Waste disposal bins are placed in the classrooms, staff rooms, laboratories, utility rooms, and other strategic locations.
2. Degradable and non-degradable wastes are collected separately in various containers for the treatment of solid waste.
3. In the labs the indiscriminate use of chemicals is discouraged.
4. The non-biodegradable waste is regularly collected by the municipal workers.
5. For the treatment of degradable waste the college maintain a Vermi Compost pit, which turns bio-waste into organic manure.
6. In the Girls Common Room Sanitary napkin Incinerator has been installed for the proper disposal of sanitary napkins.
7. The College has established a "Green Protocol" and adheres to it while holding major or official activities.
8. The use of plastic water bottles is avoided during events and other official programmes, the dignitaries are given water in steel/glass bottles.

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Waste Management of Liquids

1. To manage the liquid waste produced by all of the campus's restrooms and the canteen, the college has a well-designed drainage system.
2. Sewerage system with a network of underground pipes is there for transporting the waste water.
3. The campus is equipped with a sufficient supply of drinking water. Water waste is minimised through effective monitoring.
4. Periodically, taps, drainage systems, and water pipelines are checked and repaired in order to regulate water usage in an effective manner.

Management of E-Waste

E-waste (Electronic Waste) is waste arising from end-of-life of electronic products. It is one of the fastest growing waste streams in the world today.

1. The college community is very well aware of the dangers associated with an e-waste buildup. Every effort is made in order to reuse the computer and other electronic devices.
2. Excessive electronic equipment purchases are discouraged.
3. To prevent the unnecessary acquisition and accumulating of electronic things, strict monitoring, checking, and repairs of electronic equipment are made.
4. Measures are taken to limit e-waste by regularly maintaining the hardware .
5. Reusable components are segregated and applied to different systems. Batteries and damaged computers are safely disposed of by independent organisations.
6. The students are made to understand that the growing problem of e-waste calls for greater emphasis on recycling e-waste and better e-waste management. They are motivated and guided to play their part in this regard.

Initiatives for water conservation

Water is a valuable resource, even if it is not endless and flows freely from the tap. As a result, we must work toward waste water management. The college contributes in this direction.

1. An appropriate provisions for water recharging and rain water harvesting facilities has been made where the rain water is collected that recharges the ground water level. This helps in waste water management and rainwater harvesting.
2. Sensitization is done through guest lecturers who are specialists in watershed management, rainwater collection, and sustainable water saving methods.

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3. Students are motivated to conserve water not only while in campus but also in their day to day life. They are guided to contribute to water conservation. They are motivated to adopt some easy but important ways for conservation of water:
- Keeping the taps closed when not in use.
 - Check for the openings or leaks in water distribution pipes
 - Not running more water than necessary.
 - Work for rain water harvesting.

Green Initiatives on Campus

1. Green landscaping with trees.
2. Improving the campus's green spaces.
3. Signage illustrating environmental preservation and concern.
4. Prohibiting the usage of plastics on campus.
5. Honoring days that are significant for the environment.
6. Students plant seedlings to add to the campus's existing greenery and to foster a sense of appreciation for the natural world.

Audits of Environmental Quality


With the help of a green audit, we can identify where and how we consume the most energy, water, and other resources. From there, we can think about how to change things up and save money. In order to better waste minimization plans or start recycling projects, it can also be used to determine the type and volume of garbage. Green audits and the application of mitigation strategies benefit the college, the students, and the environment. Additionally, it can increase environmental awareness, ethical behaviour, and health consciousness. It helps employees and students understand the effects of going green on campus. Green auditing encourages financial savings through using less resources. It offers students and teachers the chance to build a sense of personal ownership and social responsibility.

The college consequently promotes conducting a self-study on improving campus sustainability and greenness through environmental quality audits.

Beyond the Campus Initiatives to Protect the Environment

Our students have taken part in a variety of projects that go above and beyond campus environmental advocacy, taking part and getting involved in Swachh Bharat programmes, All the students in general and NSS volunteers and NCC cadets of the college in particular very actively participate in the initiatives taken and programmes conducted for

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environment protection not only by the college but also by the various organisations and agencies. The basic motto inhaled by our students is to Save Environment and they are always ready to undertake any task assigned to them in this regard.

The social community as a whole has benefited from campus cleanup campaigns, numerous extension activities, and outreach programmes.

"Earth offers enough to satisfy every man's need, but not every man's greed."

-Mahatma Gandhi

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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

Institute and The State Project data RUSA Haryana initiative to install solar system. **Its appreciable**


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ENERGY AUDIT RECOMMENDATION

✦ LIGHTING SYSTEM

College has already initiated installation of energy efficient lighting in building and replacement of “conventional tube light (36 watt) by energy efficient LED light (20 Watt). Still there are good potential for replacement of 197 no. of conventional T-8 (36Watt)” tube light by energy efficient 20Watt LED lighting in college. Estimated energy saving potential is 11440 units/year.

✦ CEILING FAN


Replacement of “conventional ceiling fan (80 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 install “Timer control on street lighting” in the campus.

✦ IOT BASED ENERGY MONITORING SYSTEM.

Installation of “Cloud based (IoT based) energy monitoring system” on electrical feeder as well as energy monitoring on individual building will be good initiate for energy monitoring.


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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	Celling Fan	110 No ceiling fan working with 80 Watt	Power consumption by exesting celling fan (80 Watt)	Replacement of 80W conventional ceiling fan by 28W BLDC energy efficient ceiling fan	11,440	1,09,183/-	2,31,000/-	2.1 year
2	Lighting System	197 No. FTL tubelight	Power consumption by T-8 FTL (36 Watt)	Replacement of conventional (T-8) (36 watt) with Energy efficient LED lighting (20W)	6,340	60,165/-	41,370/-	8 month

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CHAPTER-1 INTRODUCTION

1.1 About College

Dyal Singh College, Karnal, as it stands today, is a premier co-educational centre of learning of Northern India. With a strength of 3152 students, the college has all the three streams of learning – Arts, Science and Commerce, with Post Graduate courses in English, Hindi, Political Science, Commerce and Chemistry, along with the add-on and vocational courses. The college also offers a 5-year Integrated Course M.Sc. Forensic Science under innovative programme sponsored by the UGC. The college is making progress under the esteemed guidance of Shri D.K. Raina – an embodiment of rare wisdom, learning and love for academia-President, Dyal Singh College Governing Body, and the dynamic leadership of Vice Admiral (Retd.) Satish Soni, PVSM, AVSM, NM, a man of letters with administrative acumen, who holds the office of the General Secretary. This unique centre of teaching and learning completed hundred years and more than a decade of its birth and turned into a century-old Fortress of Learning and Education... maintaining the tradition of Spirituality and Scientific temper in a world of diminishing human values... inculcating in young minds, a harmonious blend of the “Wisdom of the East and West”. To quote our honourable Ex-President, Dewan Gajendra Kumar, “The lead word in our motto is Wisdom and Morality and Ethics are not far behind.” True to the Will of our Illustrious Founder, Late Sardar Dyal Singh Majithia, the path of Wisdom, Morality and Ethics has been the kindling force all along.



Source : Satellite Image of Dyal Singh College from Google map



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Vision

Excellence is a journey, not an end.....

Mission

1. To create top quality human resource by developing the innate talent of our students.
2. To provide conducive environment for holistic development of personality and improve the overall academic performance.
3. To inculcate the spirit of Secularism, Nationalism, Communal Harmony & Rationalism.
4. To inculcate discipline as a value system and motivate youth to render service to the society at large.

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College build-up area

Details are the total build-up area given in the table:-

Campus area in sq. mts.	32374.85	
Built up area in sq. mts.	13310.53	

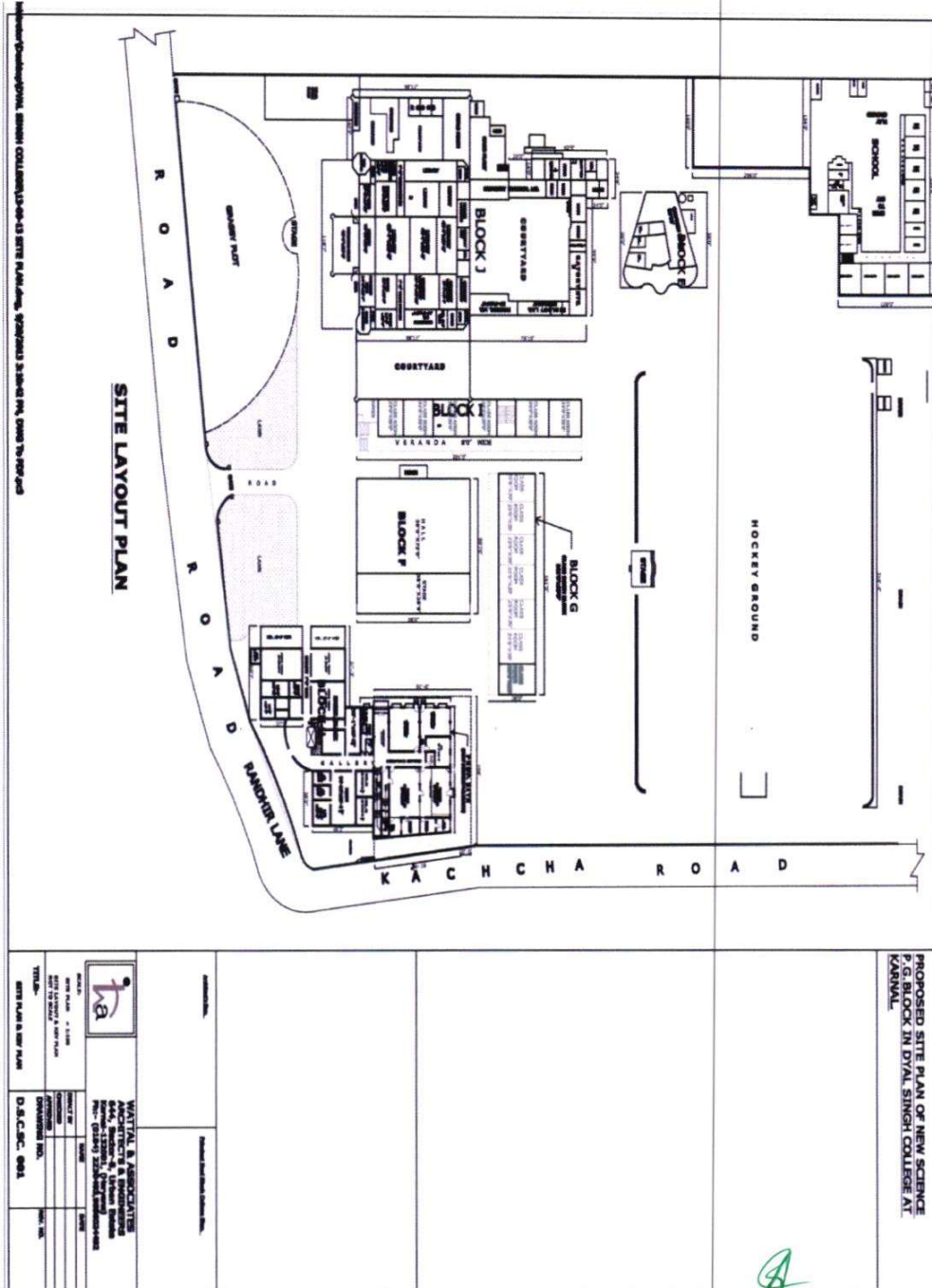
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Layout of college campus



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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 **Dyal Singh College, Karnal (H.R.)** 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 Present Energy Scenario

- ✦ College uses energy in the form of electricity purchased from Uttar Haryana Bijli Vitran Nigam Limited grid with sanctioned load of 139 kW. Total billing amount of Dyal Singh College is Rs.9,89,717/- with respect to annual energy consumption 1,08,544 unit analysis period from Jul-2021 to Jun-2022.
- ✦ Annual average per unit charges paid by college Rs. 9.15 per unit.

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CHAPTER- 2 POWER SUPPLY SYSTEM

2.1 Transformer Details.

The power supply for **Dyal Singh College, Karnal (H.R.)** is from Uttar Haryana Bijli Vitran Nigam Limited with sanctioned load of 139 kW. There is single transformer has capacity of 200 kVA. The details are given in following table 2.1

Table: 2.1 Technical details of transformer.

Sr.No.	Items	Technical Specification
1	Make	MELCON
2	Year	2013
3	Rating (kVA)	200
4	Volts at No load (HV/ LV)	11000/433
5	Current Rating (HV/ LV)	10.50 / 266.68
6	Frequency (Hz)	50
7	Impedance	4.5 %
8	Vector group	Dyn-11
9	Type of cooling	ONAN

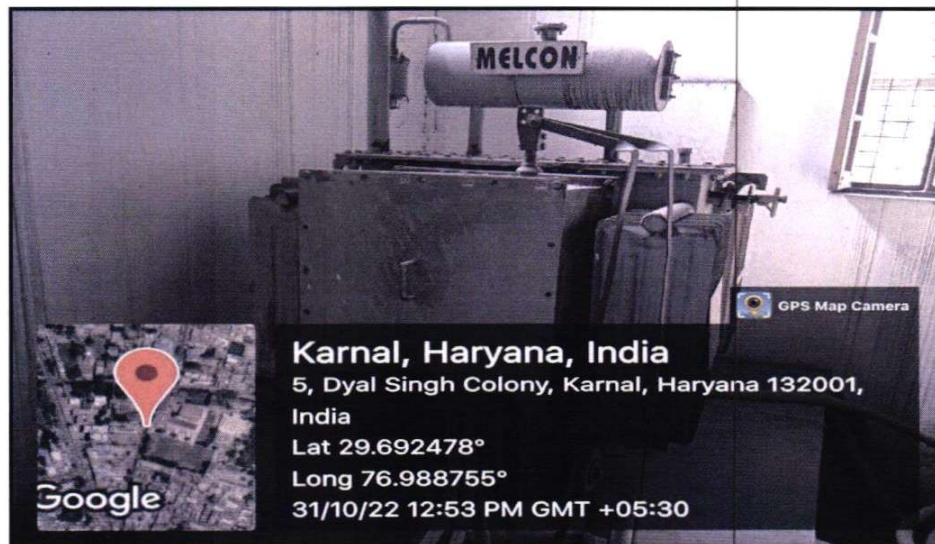


Figure 2.1:- 200 kVA Transformer

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Power Measurement and Loading of the Transformer.

Sr.No.	Voltage	Current	Power Factor	KW	KVA	TR Loading %
1	419	49.8	0.9	32.53	36	18.07

Observation :-

- ✦ It is observed that during the energy audit transformer was in working condition .
- ✦ Transformer loading is 18.07% Its is acceptable.


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2.2 DG Set

There is one DG set in the 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 Set-01
1	Make	Kirloskar
2	M/C No	ES3H011C124751
3	Capacity (KVA)	125
4	Rated Voltage	415
5	Frequency	50
6	Power factor	0.8
7	RPM	1500
8	Phase	3

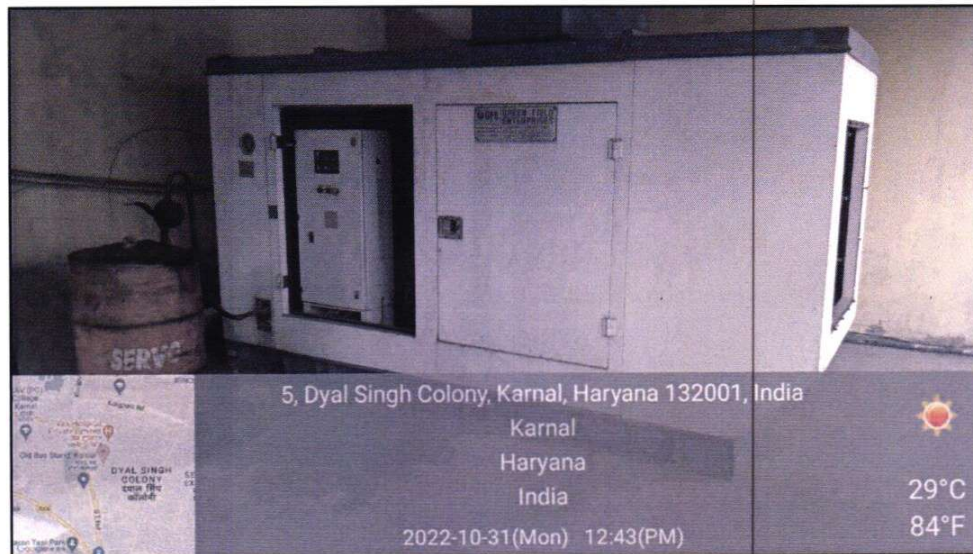



Figure 2.3:- DG set in power house

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 fuel consumption.

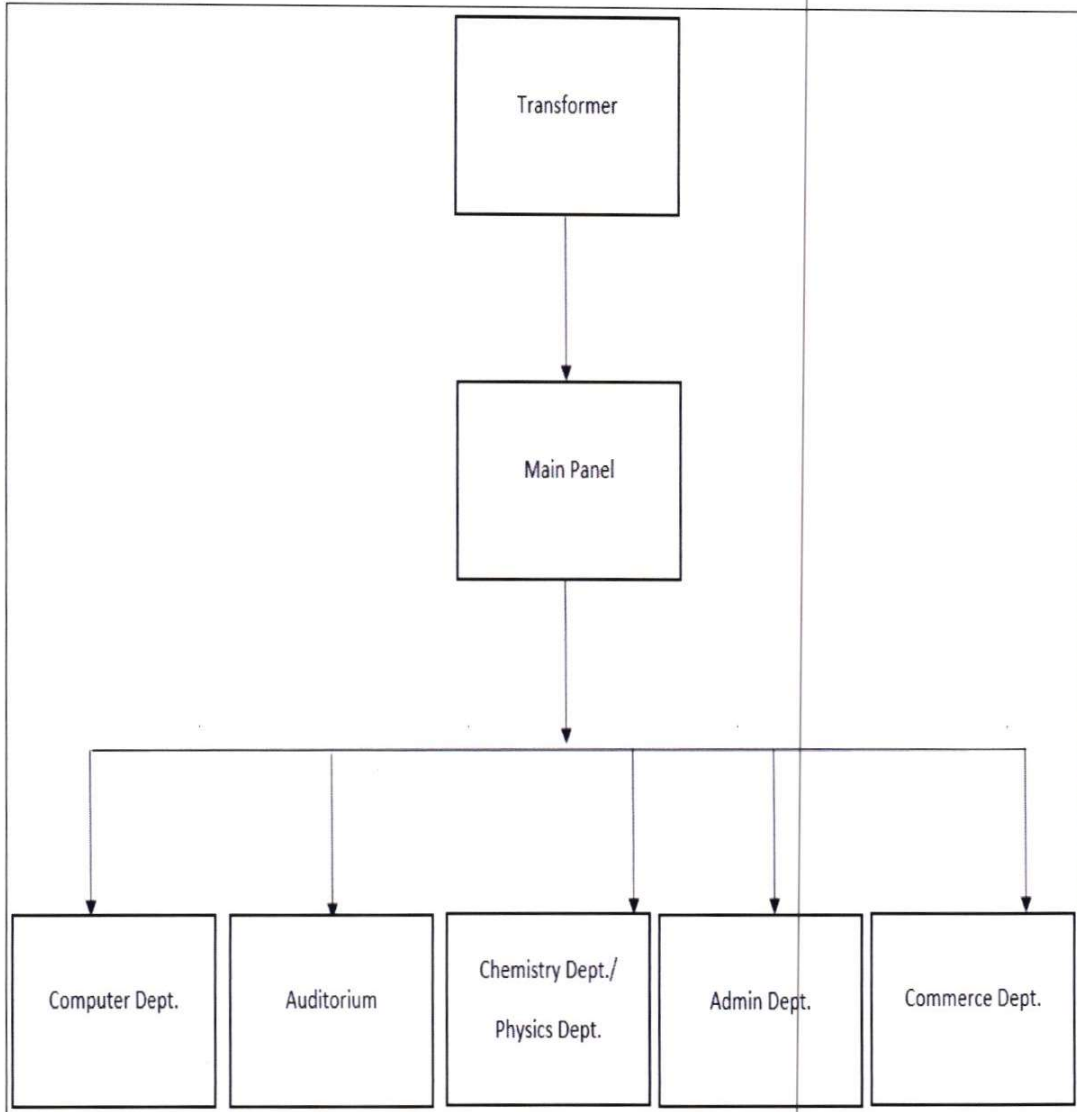

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Single Line Diagram(SLD)



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2.3 Capacitor Bank

The energy audit team examine of existing capacitor bank at the power house. Details of the capacitor are given in table 2.3

Table: 2.3 Details of Capacitor bank

Sr.No.	Loaction No	Capacity kVAr	Phase	Measured Current	Rated Current	Output KVAr	% Derating	Remarks
1	Capacitor-1	5	R	3.8	6.1	3.1	37.7	OK
			Y	3.8				
			B	3.8				
			Avg.	3.8				
2	Capacitor-2	5	R	2.3	6.1	2.3	54.1	OK
			Y	2.9				
			B	3.2				
			Avg.	2.8				
3	Capacitor-3	10	R	12.9	13.1	9.8	2.3	OK
			Y	12.8				
			B	12.7				
			Avg.	12.8				
4	Capacitor-4	10	R	12.6	13.1	9.5	4.6	OK
			Y	12.1				
			B	12.8				
			Avg.	12.5				
5	Capacitor-5	10	R	12.6	13.1	9.7	2.5	OK
			Y	12.8				
			B	12.9				
			Avg.	12.8				



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Sr.No.	Loaction No	Capacity kVAr	Phase	Measured Current	Rated Current	Output KVAr	% Derating	Remarks
6	Capacitor-6	20	R	24.5	26.2	12.4	37.9	Need to replaced
			Y	24.3				
			B	0				
			Avg.	16.3				

Observation :-

- ✚ The college has 60 kVAr capacitor bank for maintain the power factor.
- ✚ During the health check up capacitor bank and find out one capacitor is not working condition .
- ✚ Total capacitor output is 46.8 kVAr

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CHAPTER-3

Electricity BILL ANALYSIS

3.1 Monthly Electrical Energy

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

Table 3.1 Energy consumption and billing amount (2021-22)

Sr. No.	Month & Year	Sanctioned Load	Total Consumption (kVAh)	Amount (Rs.)	Surcharge (Rs.)	Overall Unit charges (Rs/kWh)
1	Apr-21	139	7,260	78,328	1,112	10.8
2	May-21	139	8,236	84,096	1,227	10.2
3	Jun-21	139	5,578	63,814	932	11.4
4	Jul-21	139	7,374	79,539	1,161	10.8
5	Aug-21	139	13,634	1,24,021	1,806	9.1
6	Sep-21	139	11,578	1,07,126	1,480	9.3
7	Oct-21	139	11,252	99,659	1,426	8.9
8	Nov-21	139	12,220	1,07,852	1,545	8.8
9	Dec-21	139	7,582	77,688	1,109	10.2
10	Jan-22	139	7,772	79,979	1,141	10.3
11	Feb-22	139	9,014	88,529	1,264	9.8
12	Mar-22	139	7,044	70,015	995	9.9
	Total		1,08,544	10,60,646	15,198	9.96

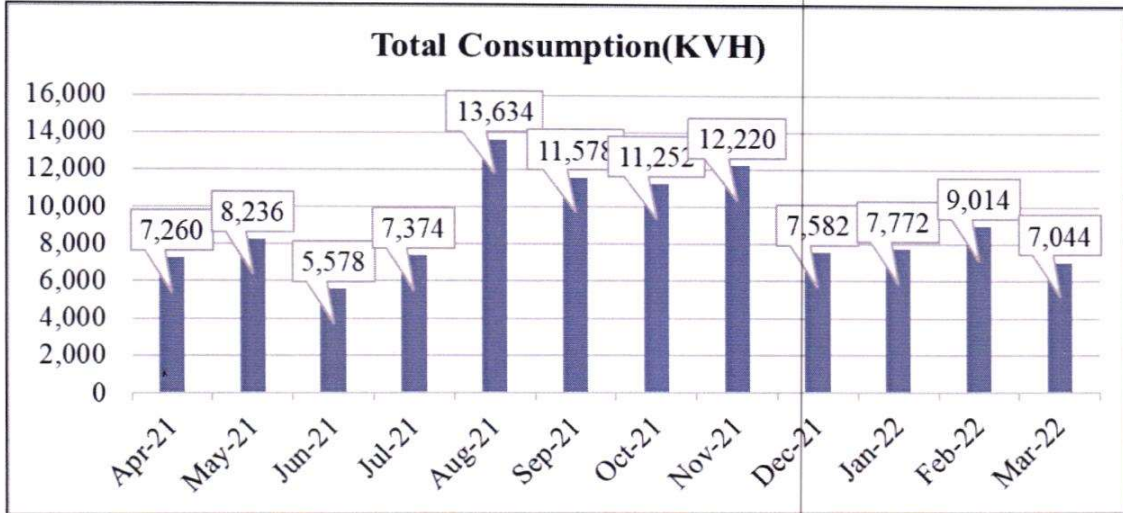
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Karnal



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Graphical Presentation of Unit Consumption year April-2021 to March-2022



Observation :-

- ✦ Annual unit consumption is 1,08,544 unit and total amount pay Rs 9,89,717/-
- ✦ Overall energy charges is Rs 9.15 per unit


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3.2 ON Site power measurement in the college

Sr.No.	Location	Voltage (V)	Current (A)	Power Factor	Input power KW
1	Computer science	425	24.7	0.86	15.6
2	Chemistry building	418	15.1	0.87	9.5
3	Admin building	421	17.3	0.88	11.1
4	Auditorium hall	420	5.8	0.88	3.7
5	Old building	416	4.8	0.87	3.0
6	Commerece building	415	5.1	0.85	3.1

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Chapter-4
CONNECTED LOAD

4.1 Connected Load Detail of the College

Sr. No.	Location	Ceiling Fan	Wall Fan	Exhaust Fan	Tube light	LED Tube	LED Bulb	CFL	Air Cooler	Pedestal Fan	Electric Kettle	Oven
1	Administrative Office	10	1	1	9	2	2	1	0	1	1	1
2	Principal Office	4	0	2	1	7	3	0	0	0	1	0
3	Staff Room	3	4	1	7	0	5	0	0	0	0	1
4	Mathematics Department	2	1	0	0	1	1	1	0	0	0	0
5	Physics Department	39	2	2	11	11	7	0	0	0	1	0
6	Chemistry Department	19	0	13	16	0	37	2	0	0	0	0
7	Botany Department	19	0	2	5	0	12	16	0	0	0	0
8	Zoology Department	16	1	3	13	0	2	1	0	0	0	0
9	Biotechnology Department	5	0	1	1	0	7	0	0	0	0	1
10	Bio-Informatics Department	0	0	0	0	0	0	0	0	0	0	0
11	Forensic Department	17	0	2	0	0	9	3	0	0	0	2
12	Commerce Department	3	1	1	2	0	1	0	1	2	0	1



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Sr. No.	Location	Ceiling Fan	Wall Fan	Exhaust Fan	Tube light	LED Tube	LED Bulb	CFL	Air Cooler	Pedestal Fan	Electric Kettle	Oven
13	Computer Department	44	0	2	0	12	19	15	0	1	0	0
14	Geography Department	22	5	6	12	5	10	2	0	0	0	0
15	Economics Department	1	1	0	1	0	0	1	0	0	0	0
16	English Department	1	2	0	1	2	0	0	0	0	0	0
17	Hindi Department	1	1	0	0	1	1	0	0	0	0	0
18	Punjabi Department	1	0	0	1	0	1	0	0	0	0	0
19	History Department	1	1	1	0	2	0	0	0	0	0	0
20	Pol. Science Department	1	0	0	0	2	0	0	0	0	0	0
21	NCC Air Wing	1	1	0	1	0	1	0	0	0	0	0
22	NCC Store Air Wing	0	0	0	0	0	0	0	0	0	0	0
23	NCC Army	1	1	0	1	0	1	0	0	0	0	0
24	NCC Store Army	0	0	0	0	0	0	0	0	0	0	0
25	NSS	1	0	1	1	1	0	0	0	0	0	0
26	Retiring Room (W)	0	0	0	0	0	0	0	0	0	0	0



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Sr. No.	Location	Ceiling Fan	Wall Fan	Exhaust Fan	Tube light	LED Tube	LED Bulb	CFL	Air Cooler	Pedestal Fan	Electric Kettle	Oven
27	Sports Department	2	0	0	1	0	1	1	0	0	0	0
28	TT Room	0	0	0	0	0	0	0	0	0	0	0
29	Women Development Center	1	0	0	1	0	1	0	0	0	0	0
30	Department of Youth Welfare	1	0	0	1	1	1	0	0	0	0	0
31	UGC Room	0	0	0	0	0	0	0	0	0	0	0
32	Conference Room	0	0	0	0	0	0	0	0	0	0	0
33	Red-Cross Room	1	0	0	2	0	0	0	0	0	0	0
34	Alumni Room	1	0	0	0	2	0	0	0	0	0	0
35	Examination Room	1	0	1	0	2	0	1	0	0	0	0
36	Girls Common Room	13	0	1	4	0	0	0	0	0	0	0
37	Library	32	5	1	46	12	0	0	0	3	1	0
38	Canteen	10	0	1	6	0	4	4	0	0	0	1
39	Auditorium	65	0	1	5	0	4	15	0	0	0	0
	Total	339	27	43	149	63	130	63	1	7	4	7





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Sr. No.	Location	Room heater	Inverter	Computer	Printer	Scanners	Refrigerator	AC	LED Projector	Overhead Projector
1	Principal Office	4	2	10	9	3	1	3	0	0
2	Principal Room	1	0	1	0	0	1	3	0	0
3	Staff Room	0	0	0	0	0	1	3	0	0
4	Mathematics Department	1	0	1	1	0	0	0	1	0
5	Physics Department	3	0	46	4	1	1	2	1	0
6	Chemistry Department	0	0	7	2	0	1	0	1	1
7	Botany Department	2	0	2	1	0	1	0	1	0
8	Zoology Department	1	0	2	1	0	1	0	1	0
9	Biotechnology Department	0	1	1	0	0	2	0	1	0
10	Bio-Informatics Department	0	0	11	2	1	0	0	0	0
11	Forensic Department	1	0	4	1	1	1	0	1	0
12	Commerce Department	2	0	1	1	1	1	0	0	0
13	Computer Department	1	0	180	1	1	1	6	3	0
14	Geography Department	1	0	1	3	2	1	0	1	0



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Sr. No.	Location	Room heater	Inverter	Computer	Printer	Scanners	Refrigerator	AC	LED Projector	Overhead Projector
15	Economics Department	0	0	1	1	0	0	0	1	1
16	English Department	1	0	1	1	0	0	0	0	0
17	Hindi Department	1	0	1	1	0	0	0	0	0
18	Punjabi Department	0	0	0	0	0	0	0	0	0
19	History Department	1	0	1	1	0	0	0	0	0
20	Pol. Science Department	1	0	1	1	0	0	0	0	0
21	NCC Air Wing	1	0	1	1	0	0	0	0	0
22	NCC Store Air Wing	0	0	0	0	0	0	0	0	0
23	NCC Army	0	0	0	1	0	0	0	0	0
24	NCC Store Army	0	0	0	0	0	0	0	0	0
25	NSS	3	0	1	1	0	0	0	0	0
26	Retiring Room (W)	0	0	0	0	0	0	0	0	0
27	Sports Department	1	0	0	1	0	0	0	0	0
28	TT Room	0	0	0	0	0	0	0	0	0
29	Women Development	0	0	0	0	0	0	0	0	0



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Sr. No.	Location	Room heater	Inverter	Computer	Printer	Scanners	Refrigerator	AC	LED Projector	Overhead Projector
30	Department of Youth Welfare	1	0	0	0	0	0	0	0	0
31	UGC Room	0	0	0	0	0	0	0	0	0
32	Conference Room	0	0	0	0	0	0	0	0	0
33	Red-Cross Room	0	0	0	0	0	0	0	0	0
34	Alumni Room	0	0	0	0	0	0	0	0	0
35	Examination Room	0	0	0	1	0	0	0	0	0
36	Girls Common Room	0	0	0	0	0	0	0	0	0
37	Library	4	1	12	4	1	0	1	0	0
38	Canteen	0	0	0	0	0	0	0	0	0
	Total	31	4	286	40	11	13	18	12	2

Sr. No.	Location	LED light
1	Street Light (50W)	9
2	Street Light (Metal Halide) 400-W	3
3	Street Light (120 Watt)	7
4	Auditorium (100 Watt)	4
5	Auditorium (150 Watt)	1
6	Auditorium (12W)	12

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4.2 Electrical Equipment's and Load Sharing

Sr.No.	Equipment	Unit Power (Watt)	Quantity (No)	Total Power (Watt)	Load share (%)
1	Fan	50	473	23,650	10.73
2	Wall fan	50	30	1,500	0.68
3	Tube Light	36	197	7,092	3.22
4	LED tube Light	24	127	3,048	1.38
4	CFL	18	65	1,170	0.53
5	Air cooler	150	1	150	0.07
6	Pedestal fan	30	7	210	0.10
7	Electrical Kettle	1500	4	6,000	2.72
8	Microwave	2000	7	14,000	6.35
9	Room heater	400	31	12,400	5.63
10	Inverter	3000	4	12,000	5.44
11	Scanner	10	11	110	0.05
12	Printer	30	40	1,200	0.54



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Continues....

Sr.No.	Equipment	Unit Power(Watt)	Quantity	Total Power (Watt)	Load share%
13	Fan	80	110	8,800	3.99
14	Computer	70	286	20,020	9.08
15	Exhaust fan	40	43	1,720	0.78
16	AC	5275	18	94,950	43.08
17	Refrigerator	500	13	6,500	2.95
18	LED Projector	30	15	450	0.20
19	Overhead Projector	750	3	2,250	1.02
20	Street light	50	9	450	0.20
21	LED Street light	120	7	840	0.38
22	Metal helide	400	3	1,200	0.54
23	LED light	100	4	400	0.18
24	LED light	150	1	150	0.07
25	LED light	12	12	144	0.07
Total power in Watt				2,20,404	100.00

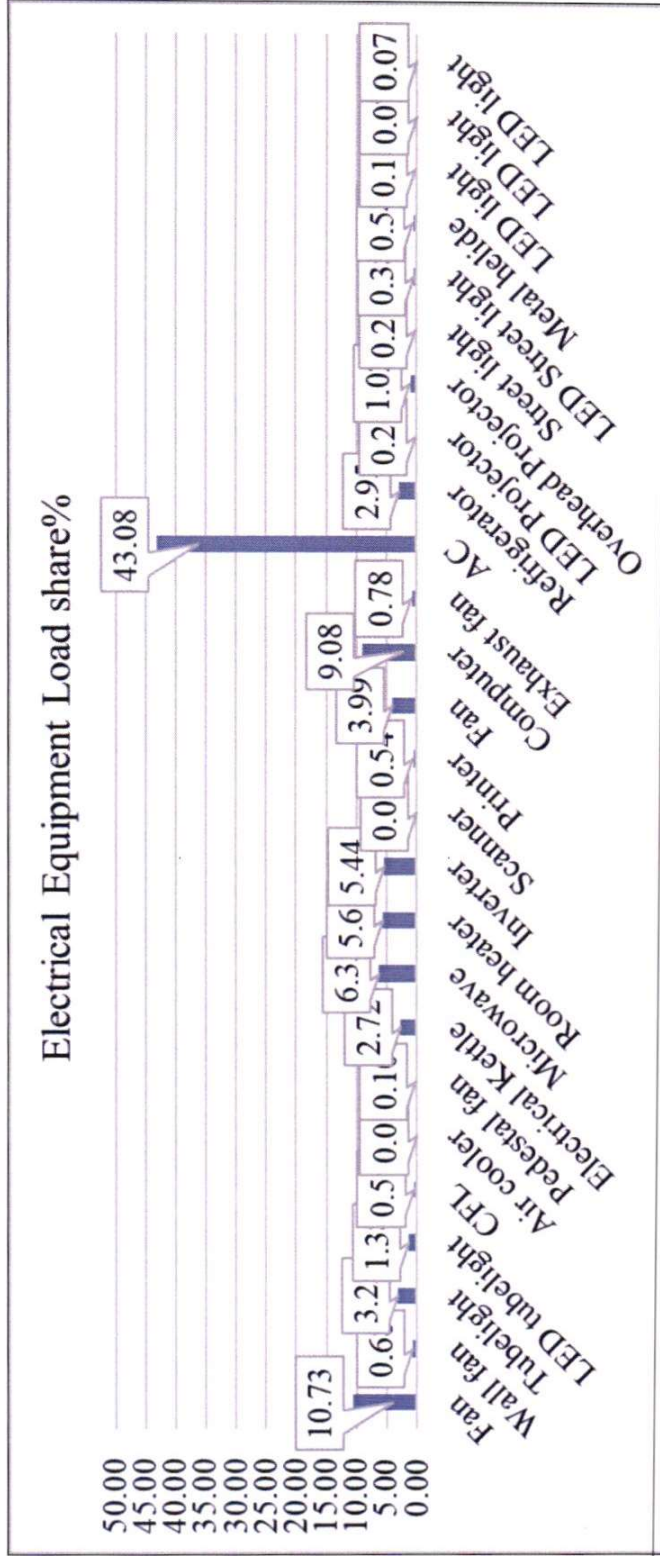

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Graphical Presentation of Electrical Equipments Load share %

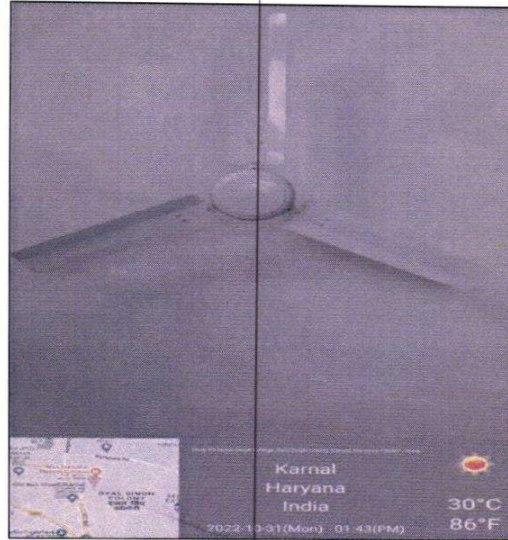
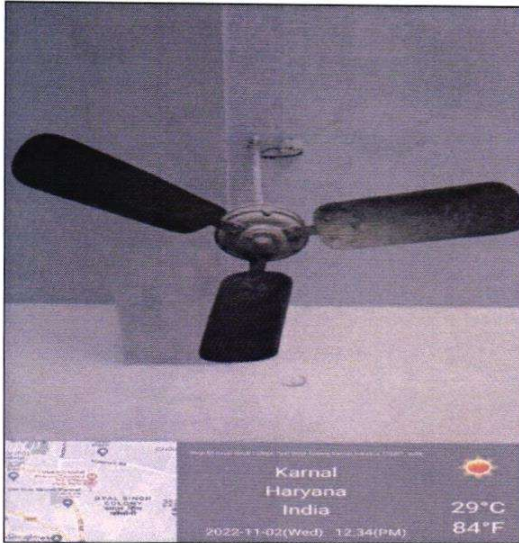




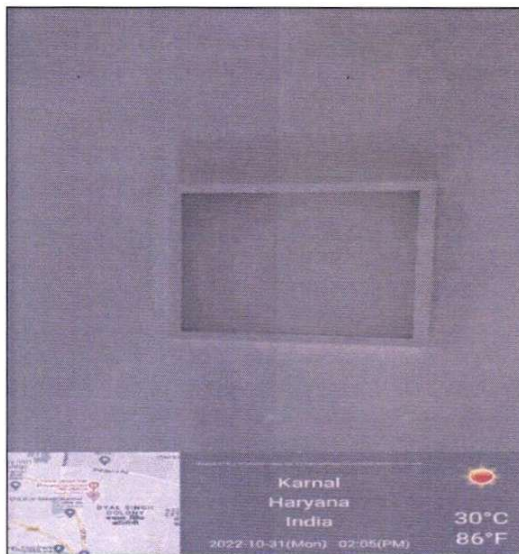
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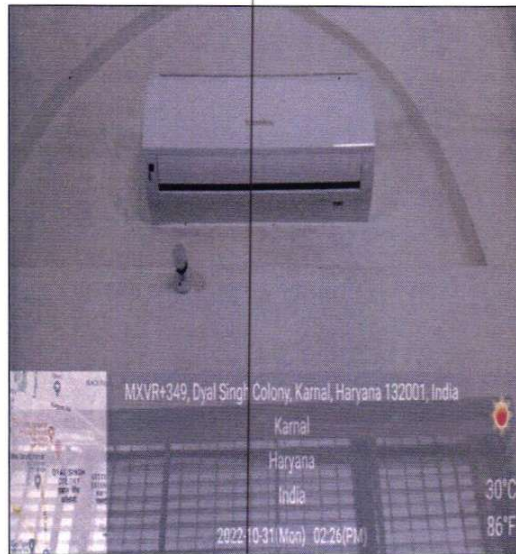
4.3 Some Photograph of Electrical Equipment's



Celling Fans



LED Light



AC

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CHAPTER- 5
ENERGY CONSERVATION MEASURES

4.1 Case Study

Replacement of 80W conventional ceiling fan by 28W BLDC Energy efficient ceiling fan: -

Sr. No	Item	Parameter	Unit
1	Rated Power of Ceiling Fan	80	W
2	No. of Fan	110	Nos
3	Working Hrs./Day	8	Hrs./Day
4	Working Days/Year	250	Days/Year
5	BLDC Fan Rated power	28	W
6	Energy Saving Potential	11440	kWh/Year
7	Load Factor	0.8	
8	Expected Annual Energy Saving	9152	kWh/Year
9	Per Unit Charges	11.93	Rs/kWh
10	Expected Money Saving	109183	Rs./Year
11	Cost of New Ceiling Fan	2,000	Rs./Pices
12	Investment on New Fan Purchasing	220000	Rs.
13	Maintenance Investment@5%	11,000	Rs.
14	Total Investment	2,31,000	Rs.
15	Simple Pay Back Period	2.1	Year

Total Calculated Monetary Saving Potential in Ceiling Fan = Rs 1,09,183/-

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4.2 Case Study

Replacement of conventional (tube light) 36 Watt by energy efficient 20 Watt LED tube light

Sr. No.	Items	Parameters	Units
1	Total Power Consumption by T-8 tube light	36	Watt
2	No of T-8	197	Nos.
3	Working Hrs./Day	8	Hrs./Day
4	Working Days/Year	250	Days/Year
5	Rated Power of T-5 (LED)	20	W
6	Energy Saving Potential	6304	kWh/Year
7	Load Factor	0.8	
8	Expected Annual Energy Saving	5043	kWh/Year
9	Overall Per Unit Charges	11.93	Rs./kWh
10	Expected Money Saving	60165	Rs./Year
11	Cost of T-5	200	Rs./ Pices
12	Investment on New Light Purchasing	39400	Rs.
13	Maintenance Investment@5%	1,970	Rs.
14	Total Investment	41,370	Rs
15	Simple Pay Back Period	8	Month

Total Calculated Monetary Saving Potential in light = Rs. 60,165/-


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Purchase Order of Solar System

From
The State Project Director RUSA,
Haryana, Panchkula

To
The Principal
Dyal Singh College, Karnal

Office File No. : DHE-270001/3/2021-RUSA-DHE
Dated, Panchkula, the: 10.06.2022

Subject: Regarding the Administrative Approval of Rs. 50 Lakh as the IInd Instalment of Infrastructure Grant under RUSA 2.0

Kindly refer to the subject cited above.

Sanction is hereby accorded for Administrative Approval to the tune of Rs. 50 Lakh for **Renovation/Upgradation and Purchasing of New Equipments** as per details given below, with the instructions that your total expenditure limits should not exceed beyond norms. Any exceeding amount/expenditure shall be met out from the college funds.

Renovation/ Up gradation of Existing Facilities			
Items	Physical Unit	Financial Unit	Sources
Campus Development	Solar Power Plant	20 Lakhs	GeM Portal
New Equipments/ Facilities			
Modern Tools of Education	Six -86" size Interactive flat panel Display (IFPD)	30 Lakhs	GeM Portal
	Three - Video Conferencing Camera		
	One- Audio Podium with inbuilt amplifier and Audio System		
	One- Library KIOSK		

Superintendent RUSA,
 for State Project Director (RUSA),
 Haryana, Panchkula.

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**END OF THE REPORT
THANKS**

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