DRONACHARYA
Group of Institutions

Energy Audit Report of

Dronacharya Group of Institutions

B-27, APJ Abdul Kalam Rd, Knowledge Park III, Greater Noida, Uttar

Conducted by

Tetrahedron Manufacturing Services

Date : 30 May, 2024

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For Tetrahedron Manufacturing Services Pvt. Ltd.
Authorized Signatory

Energy Audit Report

DISCLAIMER

This report is based on the information provided by the management of **Dronacharya Group of Institutions** & on-site observations on **29 May 2024 & 30 May 2024**. We certify that this information and following analysis is correct to the best of our knowledge and ability. The validity of the recommendations is dependent on the accuracy of log books and historical data supplied to us. This report (including any enclosures and attachments) has been prepared for the exclusive use and benefit of the addressee(s) and solely for the purpose for which it is provided. Unless we provide express prior written consent, no part of this report should be reproduced, distributed or communicated to any third party. We do not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The recommendations and findings are to be used by client at their own accord and Tetrahedron Manufacturing Services or its associates would not be responsible for any material or non-material losses (if any) occurring in any way due to their implementation

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Contents

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A. TABLE OF CONTENT

List of tables

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List Of Figures

List of Abbreviations

ECM : Energy Conservation Measures
kWh : kilo Watt hour
kVAh : kilo Volt Amp Hour
LT : Low Tension
HT : High Tension
MT : Metric Ton
MTOE : Metric Ton Oil Equivalent
kW : Kilo Watt
SEC : Specific Energy Consumption
SPC : Specific Power Consumption
TPH : Tons Per Hour
VFD : Variable Frequency Drive
DOL : Direct on Line
Yr. : Year
Kg : Kilo Gram
W : Watt
C : Celsius
kVA : kilo volt Amp
V : Volt
I : Current
P : Power

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B. ACKNOWLEDGEMENT

Energy Audit Team of **Tetrahedron Manufacturing Services Pvt Ltd.** Expresses Our Sincere Gratitude to Management of **Dronacharya Group of Institutions**, for providing us an opportunity to conduct an energy audit of their organization located In B-27, APJ Abdul Kalam Rd, Knowledge Park III, Greater Noida, Uttar Pradesh 201306. We are grateful to Dr.S.K.Srivastava and other officials for showing keen interest in the study and for the help and cooperation extended to Energy Audit Team during study.

We do hope that you will find the recommendations given in this report useful in helping you save energy. While we have made every attempt to adhere to high quality standards, in both data collection and analysis, as well as in presentation through the report, we should welcome any suggestions from your side as to how we can improve further.

In case of any suggestions or queries:

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C. EXECUTIVE SUMMARY

Energy is one of the major inputs in any facility and is the mainstay of the economic development of the country. Rising Electricity & fuel costs coupled with increased global competition is forcing players to slash the energy costs. Energy Audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating & maintenance practices of the system. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply, decision on appropriate energy mix, decision on using improved energy conservation's, equipment's and technology.

Energy conservation is a continuous process and there is always scope for further improvements, with this objective the Energy Audit team with the active involvement of **Dronacharya Group of Institutions** have identified the following energy conservation opportunities (ECO's) implementation of ECO's can further help reducing energy consumption.

Highlights

Table01: - Energy Usage Highlights

Description	Units	Values
Annual electricity consumption	Units	237356
Annual electricity cost/annum	INR	2512389

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Table02: - Summary of Energy Conservation Measures

Sr. No	Energy Conservation Measures	Annual Saving		Investment	Payback Period
		kWh	INR	INR	Years
1	Replace conventional ceiling fan with energy efficient fan	2636.55	32429.56	170887.5	5.3
2	Replace conventional tube with energy efficient tube	7752.8	83730	99113	1.2
3	Replace LCD monitor with LED monitor	60750	747225	2250000	3
4	Replacement of old pumps with energy efficient pumps	5500	58190	60000	1

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D. INTRODUCTION

OBJECTIVE OF ENERGY AUDIT:

Energy audit is the key to a systematic approach for decision-making in the area of energy management and gives a positive orientation to the energy resource cost reduction. The primary objective of the energy audit is to determine ways to reduce energy consumption to lower operating costs.

The Energy audit is conducted with the following Objectives:

1. Detailed studies of the intended energy consuming equipment including historical and present energy performance trends
2. Quantification of Energy Losses, and Energy Saving Potential
3. Presentations of Energy Efficiency Measures with cost benefit analysis
4. Identifying potential areas of electrical energy economy.

This energy audit assumes significance due to the fact that the Dronacharya Group of Institutions, total ***electricity bill crossed INR. 25 Lakhs from Apr,23 to Mar,24*** and it was aimed at obtaining a detailed idea about the various end use energy consumption activities and identifying, enumerating and evaluating the possible energy savings opportunities.

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ABOUT AUDIT TEAM MEMBERS:

We have dedicated an expert team for services. Your first point of contact with Tetrahedron Manufacturing Service will be with our dedicated customer services team. We are highly skilled, motivated and fully trained to assist you. Our services team includes our expert, highly experienced advisors for power factor correction systems, harmonic filter and others Energy and Power Quality problems who have over 40 years combined experience for the same. Each team member is dedicated to offering a high level of customer care and also strives for excellence to ensure that you receive the perfect service

METHODOLOGY OF WORK:

The methodology adopted for this audit was

- A preliminary energy audit has been conducted to establish the energy consumption of the organization by analysing the available past energy consumption data, identification of the areas requiring more detailed study and measurements.
- Visual inspection and data collection.
- Identification/verification of energy consumption and other parameters by measurements.
- 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.
- Potential energy saving opportunities
- Flow Chart for Methodology for report preparation

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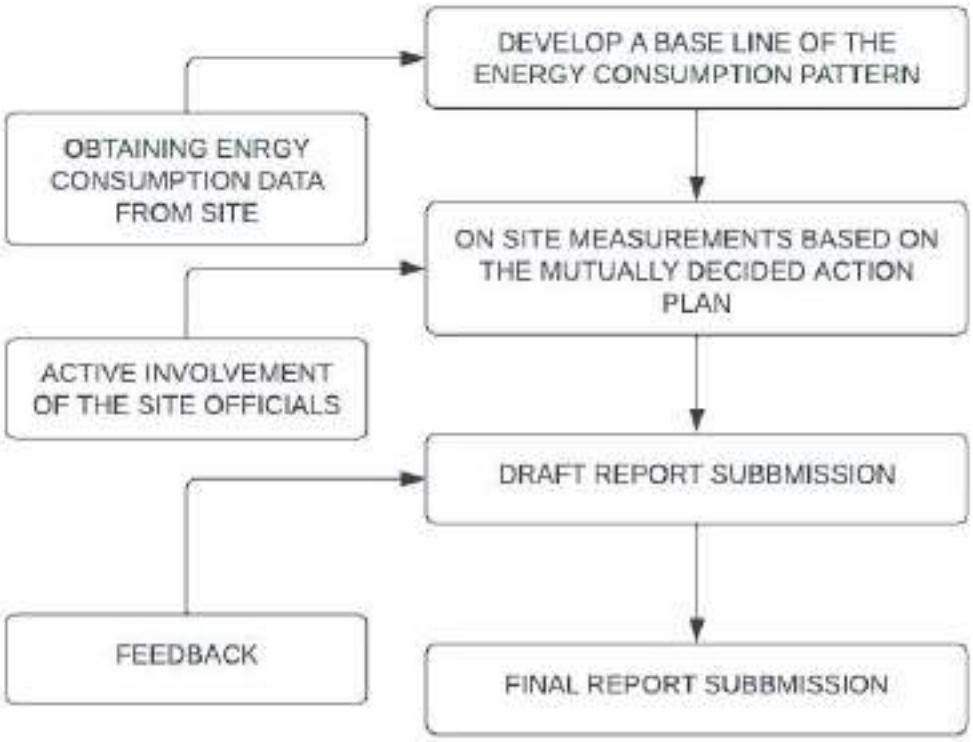

Figure 1 Energy Audit Flowchart

This report is just first step, a mere mile marker towards our destination of achieving energy efficiency and we would like to emphasize that an energy audit is a continuous process. We have compiled a list of possible actions to conserve and efficiently utilize our scarce resources and identified their savings potential.

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1. Energy and Utility System Description

Major utilities in the campus are

1. General
2. Electrical

1.1 Brief Description of each Facility

This study is being done under the indicative scope of work for conduct of Energy Audit specified by Dronacharya Group of Institutions. This study is mainly carried out to identify saving areas in Dronacharya Group of Institutions with short term, medium term & long-term investments, yielding significant savings. The study can be mainly divided into following groups.

2.1.1 General

Energy Audit focuses on study of correlation of electricity consumption on production. Opportunities for load factor improvement, power factor improvements, etc.

b. Electrical

It includes motor load study of 1 HP & above by measuring input parameters (Voltage, Current, P.F., & kW), performance analysis of water pumps having capacities above 1 HP, performance analysis and identification of energy efficiency opportunities in motors, pumps, air compressors, lighting, etc.

1.2 Instrument Used

Following instruments are used for the study:

a. 3 Phase Power Analyzer-Fluke 1736
b. Lux Meter
c. Measuring tape
d. Thermal imager
e. Ultrasonic Water flow meter
f. Power Clamp
g. Distance Meter
h. Hygrometer
i. Others as required

Power Quality Analyzer

Thermal Imager

UE System (Leak Detect System)

Anemometer

Ultrasonic
Flow Meter

LUX System

Pressure Gauge

Hygrometer

Distance Meter

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TDS Meter

Flu Gas Analyzer

Clamp Meter

Figure 2 Energy Audit Equipment

1.3 Energy Audit Team

Pratosh Saxena – Energy Auditor TMS
Nayan Kumar – Senior Energy Consultant TMS
Sushanta Bhattaray – Energy Consultant TMS
Tanshul Sharma – Energy Consultant TMS

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2. Description and Energy Consumption

2.1 About Dronacharya Group of Institutions :

Dronacharya group of institutions Greater Noida was established in 2006 by Smt. Anguri Devi Charitable Trust. Dronacharya Group of Institutions, Greater Noida is affiliated with Dr. A. P. J. Abdul Kalam Technical University (AKTU), Lucknow and the institute is approved by the All- India Council for Technical Education (AICTE). Dronacharya group of institutions Greater Noida is ranked 26 out of 50 by ARHA. It offers undergraduate and postgraduate courses such as B.Tech & MBA. Dronacharya Group of Institutions admissions are based on the candidate's performance in entrance exams.

Dronacharya group of institutions Greater Noida has recorded the highest package 18 LPA in placement drive in 2023. The top recruiters are Adobe, Josh Technology Group, Info Edge, Limeroad, Accolite Digital, Detect Technologies, Accenture, Cognizant, IBM, HashedIn Technologies, Ameyo, Amazon.

Dronacharya Group of Institutions Greater Noida Placement

- Dronacharya Group of Institutions placements 2023 finished recently, with over 325 recruiters giving BTech and MBA students recruitment possibilities.
- According to the most recent data, the maximum package available to BTech students was INR 18 LPA, while the lowest package was INR 3 LPA. Moreover, training possibilities were made available to students throughout the placement session 2023.
- Pasona India Pvt Ltd awarded the highest stipend of INR 23,600. Dronacharya Group of Institutions' top recruiters in 2023 were RTCamp Solutions Pvt Ltd., Adobe, Info Edge, Cognizant, IBM, Amazon, and others

Dronacharya Group of Institutions Greater Noida Facilities

The Dronacharya Group of Institutions in Greater Noida offers a variety of amenities to help its students' academic, extracurricular, and general growth. These amenities are intended to provide a positive learning environment and to improve the overall college experience. While individual amenities may differ, I will present an outline of common facilities found at educational institutions.

Library: The college has a well-stocked library that acts as a knowledge centre for students. The library has a large collection of books, periodicals, research papers, and digital resources spanning a wide range of subjects. It gives students access to study materials, reference books, and internet databases to help them with their academic endeavours.

Laboratories: Cutting-edge laboratories are provided to meet the practical learning needs of students studying engineering, computer science, electronics, and other subjects. These labs are outfitted with cutting-edge instruments, tools, and software to allow for hands-on study and research.

Computer laboratories: The university has specialised computer laboratories that are outfitted with the most up-to-date gear, software, and high-speed internet access. Students can use these laboratories to improve their computer abilities, participate in programming exercises, perform experiments, and work on projects.

Classrooms: To establish an ideal learning environment, classrooms are spacious and well-designed. To assist successful teaching and learning, these classrooms are outfitted with audio-visual aids, projectors, and other modern teaching tools.

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They are intended to encourage student participation and engagement in interactive sessions.

Auditorium and Seminar Halls: The institution has an auditorium and seminar halls that may be used to organise a variety of events such as guest lectures, seminars, workshops, cultural activities, and academic conferences. These rooms have audio-visual technology and seating layouts that can accommodate a big audience.

Sporting and Recreation: The organisation values physical fitness and provides sporting facilities to encourage a healthy lifestyle. It has a playground, indoor sports facilities, and a fully equipped gymnasium. Students can engage in a variety of sports including cricket, football, basketball, badminton, table tennis, and others.

Hostel & Accommodation: The institution provides on-campus or adjacent hostel facilities for outstation students. These hostels offer a safe and comfortable living environment with services such as furnished rooms, study areas, common rooms, mess facilities, and 24-hour security. The hostels encourage a sense of community while also providing an environment suitable to study and personal growth.

Cafeteria & Food Services: The university features a large and clean cafeteria or food court where students may eat, snack, and drink. The cafeteria provides a variety of meal alternatives to accommodate a wide range of tastes and dietary needs.

Wi-Fi Internet connection: The campus has high-speed internet connection, allowing students to access online resources, research materials, and educational portals. Wi-Fi is offered in classrooms, libraries, dorms, and social spaces, allowing for seamless connectivity across the campus.

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Medical Facilities: Basic medical facilities are offered on campus to meet students' healthcare requirements. A medical centre with certified medical experts who provide first aid, basic medical consultations, and emergency services may be available at the institution. Furthermore, collaborations with adjacent hospitals or clinics guarantee access to specialised medical treatment as needed.

Transportation: The university may provide transportation to students and employees to make commuting easier.

Placement and Career Development: The university provides specialised placement and career development cells to help students advance in their careers. These cells organise placement drives, invite industry experts to provide guest lectures, hold resume and interview skills seminars, and enable internships and industrial partnerships.

Extracurricular Activities: It may include cultural event spaces, music and dance practise rooms, art studios, and clubs for a variety of hobbies such as robotics, coding, entrepreneurship, photography, and more.

Counselling and Support Services: Because the university recognises the value of mental health and well-being, it offers counselling and support services to students. Students having academic, personal, or emotional issues can seek guidance, assistance, and support from qualified counsellors.

Security and Safety: Security and safety are top priorities for the college, which maintains a watchful security system on campus. To guarantee a safe and secure workplace, security officers are employed, and CCTV cameras may be put in critical spots.

Alumni Network: The university has an active alumni network that allows current students and successful alumni to engage. The network offers mentorship, assistance, and networking opportunities, allowing students to make crucial contacts for their future jobs.

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Table03: - College Details

College Details		
No	**Particulars**	**Details**
1	Name of the College	Dronacharya Group of Institutions
2	Address	B -27 Knowledge Park -III , Greater Noida
3	Contact Person	Dr.S.K.Srivastava
4	Contact Phone number&	9910380113
5	E-mail	sk.srivastava@gnindia.dronacharya.info
6	Web site	www.dronacharya.info
7	Type of Building	Educational Institute
8	Annual Working Days	225
9	No: of Shifts	Morning
10	No: of students enrolled	1350
11	No: of teaching staff	127
12	No: of non-teaching staff	70
13	No: of departments	9
14	No of UG courses	B.Tech
15	No: of PG courses	MBA
16	Total campus area	51125 sq. meter
17	Total Built Up area	4084 sq. meter
18	No: of hostel students	Nil
19	No: of plants in college	1000
20	No: of various species	500
21	Carbon Sequestration (ton) per anum	nil
22	Grounds and stadiums	Ground

Table04: - Building Area Details

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Building Area			
Sl.No:	**Floor /Block**	**No Of Floors**	**Total Built Up Area(M2)**
1	05 Block	G+3F	21325 sq. meter
2	03 Block	Ist + IInd F	13000 sq. meter
3	03 Block	IInd F	5500 sq. meter

2.2 Annual Energy Consumption

Electricity

Dronacharya Group of Institutions is receiving electricity from NPCL (Noida Power Company Limited) Contract demand with NPCL is 50 KW.

3. Energy Scenario

3.1 Electrical Systems

3.1.1 Electrical bill analysis

Dronacharya Group of Institutions is getting electricity supply from NPCL (Noida Power Company Limited) Major portion of the energy consumption is used for academics and hostel.

The observations made during the study are given in the following sections.

The Tariff Structure at the college

Tariff structure of the facility is given below

- Tariff Category LMV-4(Institution)
- Supply voltage 440 V
- Contracted demand 50 kW
- Demand charges INR 350/kW/month
- Unit charge INR 8.1/kVAh

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1. Power factor (PF)

In an ideal scenario, power factor should be maintained unity, FY 23-24 power factor is almost unity, although it's not unity but its approximately unity. Details are as follows:

Maximum power factor = 0.98

Minimum power factor = 0.96

Average power factor = 0.97

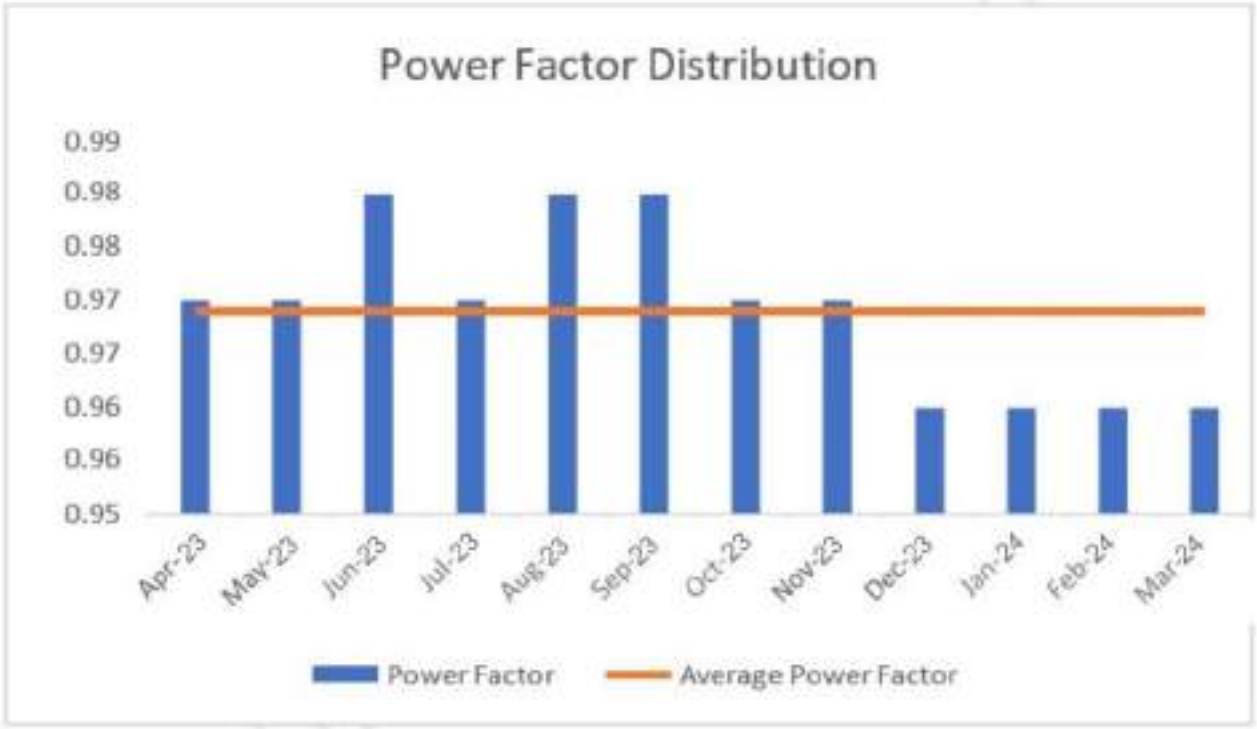

Figure 3 Power Factor

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TABLE 05: - Electrical Bill analysis

Month	Contractual Load (kW)	Contract Demand (KVA)	Billable Demand (KVA)	Power Factor	Billable Demand Charges	Energy Charges	Penal Dema-nd Charges	Electricity Duty Charges	Rebate @ 1.00%	Regulation Discount @ 10%	Delay Payment Surcharge	Prev. Adj.	Int. on SD	TDS on Int. on SD	Total Units	Total Amount
Apr-23	50	52	70	0.97	26474	131783	10866	11869	927				13314	1331	132709	168082
May-23	50	52	105	0.97	37346	184801	35240	16661	1583						186383	272466
Jun-23	50	51	92	0.98	32489	191722	25525	16816	2221						193944	264331
Jul-23	50	52	100	0.97	35620	204910	31789	18040			441	3305			204910	287495
Aug-23	50	51	111	0.98	38365	237542	38264	20693	2405	12149					239948	320310
Sep-23	50	51	125	0.98	40182	245002	44692	21389	2759	28518					247761	319987
Oct-23	50	52	101	0.97	33345	206667	29868	18001	2852	24001					209518	261028
Nov-23	50	52	74	0.97	22110	132830	10851	11621	2400	15494					135230	159517
Dec-23	50	52	51	0.96	15864	112087		9596	1549	12795					113637	123203
Jan-24	50	52	48	0.96	15526	108024		9266	1280	12355					109304	119182
Feb-24	50	52	47	0.96	15450	109230		9351	1236	12468					110465	120327
Mar-24	50	52	56	0.96	15787	83907	506	7477	1247	9969					85153	96461
Average	**50.00**	**52.00**	**81.64**	**0.97**	**27380**	**162375**	**25289**	**14232**	**1860**	**15969**	**441**	**3305**	**13314**	**1331**	**164080**	**209366**

Observation:

1) Maximum Energy charges INR 320310 in month of Aug-2023 and minimum INR 96461 in month of Mar-2024.
2) The average Power factor is 0.97.
3) The average Energy charges is INR 209366

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Figure 4 Units & Billed Amount Trend

Observation:

1) In Sep-23 Billed amount & Unit is maximum.

2) In Mar-24 Billed amount & Unit is minimum.

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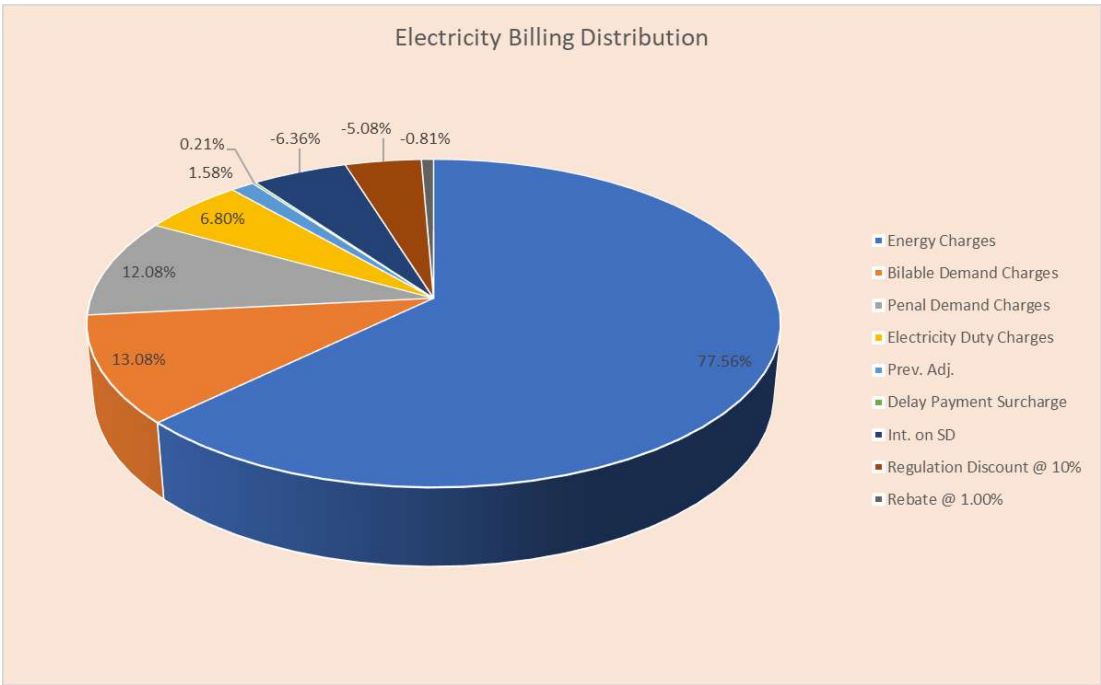

Figure 5 Billing Distribution

Observation:

1) Energy Charges are 77.56% of total bill.

2) Penal demand charges are 12.1% of total bill. which is a concern and it can be resolved by increasing contract demand or by proper utilization of electricity.

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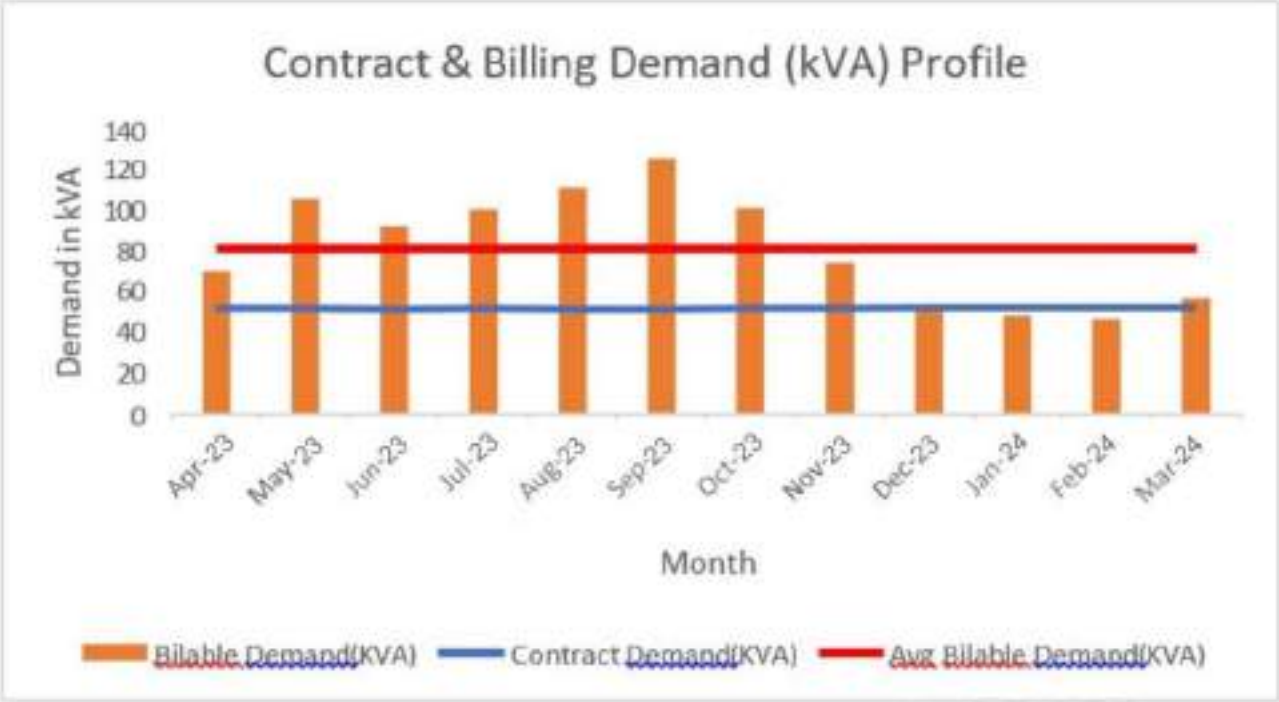

Figure 6 Contract & Billing Demand (kVA) Profile

Observation:

1) Demand is Maximum for Sep-23 i.e. 125 kVA.

2) Demand is Minimum for Feb-24 i.e. 47kVA

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Figure 7 Billed Demand Charges (INR) & Penalty (INR) Pattern

Observation:

1) Penalty is Maximum for Sep-23 i.e. INR 44692

2) Among billable penalty months, March-2024 was penalized least i.e., INR 506

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3.1.2 Diesel Generator

Following table shows the details of DG set.

Table06: - DG Set Details

Sl. No	Make	Capacity in KVA	Average Running Duration/hrs in day	kW	kWh	Diesel/hr in ltrs	Cost of Diesel/Ltr in Rs	Total Cost/day
1	Jakson	125	10	100	1000	11	86	9460
2	Kirloskar	15	6	12	72	3.25	86	1677

Recommendations:

1. Conversion of DG sets to Dual Fuel System
2. Use of Natural Gas with Diesel will reduce the diesel cost by at least 30%
3. GHG emissions will reduce by a minimum of 20%

After Implementing Dual Fuel System:

Table07: - DG Set Dual Fuel System

Sl. No	Make	Capacity in KVA	Average Running Duration/hrs in day	kW	kWh	Diesel/hr in ltrs	Cost of Diesel/Ltr in Rs	Total Cost/day
1	Jakson	125	10	100	1000	7.7	86	6622
2	Kirloskar	15	6	12	72	2.3	86	1174

3.2 Water Pump

The performance analysis of the pumps used for water required for the institute is done based on the present operating parameters like water flow, head and power. Pumps of different capacities are installed based on the water flow requirement at different sections of the college. The water supply of the institute is met by bore well. There are number of pumps are running mainly in the institute campus.

Table08: - Pump Table

Pump Table				
Description	**Units**	**At Generator Side**	**At Bartaman Side**	**At Bartaman Side**
Design parameter				
Rated output	hp	3	7.5	3
	kW	2	5	2
Pump Efficiency	%	52	61	58
Motor Efficiency	%	78	88	88
Measured Parameter				
Voltage	Volts	415	412	195
Current	Amps	8.11	8.17	18
Flow Rate	m^3/hrs	33.49	63.89	59.77
Diff Pressure	kg/cm^2	1.27	1.37	1.36
Calculated Parameter				
Power	kW	4.96	5.01	5.17
System Efficiency	%	23.39%	47.57%	42.86%
Age	Years	~15	~6	~7

Observation:

1) Pump at the Generator side has less efficiency than other pumps, which is about 23%.

2) Pump at generator side is about 15 years old and more than 3 windings has already happened so recommendation is to replace the pump, while Bartaman side pump is 6-7 years old and efficiency is in the range of 45%, recommendation is check for windings, impeller etc.

3.3) Air Conditioning

Table09: - AC Details

Sl NO	Name of Location	Type of AC	1 Ton	1.5 Ton	1.8 Ton	Star Rating
1	Classroom	Split	2			***
2	Laboratory	Split			16	***
		Window		8		***
3	Offices	Split		18		***
		Window		2		***
4	Library	Split		2		***
5	Guest Room	Window		2		***

ACs Data

Observation:

1). All ACs are 3 star rated.

2). As per BEE guidelines, energy efficient source should be employed across facilities i.e., 5* rated ACs should be used; as a huge capital is involved in it so a phase wise replacement can be done while prioritizing by older ACs replacement first.

3). ACs set temperature should be 24 degree C for human comfort as well as energy consumption point of view.

Although many ACs set temperature was found to be 24 degree C but some were not; so energy conservation visuals should be employed across facility to maintain 24 degree temperature and stating benefits of using set temperature at 24 degree C.

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3.4 Lighting System

Lighting is provided in commercial buildings, indoor and outdoor for providing comfortable working environment. The primary objective is to provide the required lighting effect for the lowest installed load i.e. highest lighting at lowest power consumption. There are number of buildings in Campus.

Table10: - Source Details

Sl NO	Name of Location	Type of Source	No of source	Each Wattage
1	Class Room	Tube light	285	20
2	Laboratory	Tube light	340	20
		2*2 LED Panel	157	36
3	Offices	Tube light	79	20
4	Library	Tube light	31	20
5	Canteen	Tube light	12	20
6	Guest Room	Tube light	10	20
7	Guard room	Tube light	4	20
8	IN BUILDING Other places (toilet/veranda /etc)	Tube light	120	20

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3.5 Fan Data

Majority of the fans are traditional type fans that consume more energy. Now in the market advanced BLDC type fans are available which consumes less energy and available advanced feature regulators

Table11: - Fan Details

Sl NO	Name of Location	No of Fan
1	Class Room	292
2	Laboratory	155
3	Offices	67
4	Library	19
5	Canteen	12
6	Guest Room	5
7	Guard room	1

4. Energy Conservation Measures

4.1 Replacing the Conventional fan with energy efficient fan

Recommendations:

These fans should be replaced with BLDC type fans, ceiling fan ROI is less than 4 years. as for all replacement a huge capital sum is involved so recommendations are to go in a phase wise manner. Other than wall fan, all other have ROI around 5 years, which is a good number so replacement in phase wise manner can be considered for them.

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Saving Potentials:

Table12: - Fan Replacement Savings

Fan Replacement Savings					
Description	**Units**	**Value**	**Value**	**Value**	**Value**
Present system					
Type of fan		**Ceiling fan**	**Wall fan**	**Pedestal fan**	**Exhaust fan**
Number of existing fan	Nos	426	23	9	93
Wattage /fan	Watt	60	45	55	40
Usage of fan per day	Hrs	8	8	8	12
Working days per annum	Days	225	225	225	225
Annual Energy consumption	kWh	46008	1863	891	10044
Proposed system					
Recommended for replacement	%	50%	50%	100%	75%
Recommended Energy Efficient fan	Nos	213	12	9	70
Wattage of Energy Efficient fan	watt	26	26	26	26
Annual Energy consumption	kWh	9968	538	421	4896
Annual Power saving	kWh	13035.6	393.3	469.8	2636.55
Energy tariff	INR	12.3	12.3	12.3	12.3
Monitory saving	INR	160337.9	4837.6	5778.54	32429.565
Investment/fan	INR	2800	3700	2750	2450
Total investment	INR	596400	42550	24750	170887.5
Simple Payback period	Years	3.7	8.8	4.3	5.3

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4.2 Replacing the Old Tube with LED tube

Findings:

Current lighting system is fluorescent type which is not energy efficient, now a days LED type energy efficient lighting system are available in market which should be considered.

Recommendations:

Replace the current tube light with LED tube which consumes less energy. In replacement table 2 scenario has been proposed while replacing all fluorescent light and while replacing 50% and their investment and ROI has also there.

Table13: - Current lighting with LED tube

Current lighting with LED tube			
Description	**Units**	**Value**	**Value**
Present system			
Number of existing tube lights	Nos	881	881
wattage /tube	watt	28	28
Total wattage	Watt	24668	24668
Daily usage	Hrs/day	8	8
Annual working days	days/yr.	275	275
Annual Energy consumption	kWh	54269.6	54269.6
Proposed system			
Recommended for replacement	%	100%	50%
Recommended of LED tube light	Nos	881	441
Wattage of LED tube light	Watt	20	20
Annual Energy consumption	kWh	38764	19382
Annual Power saving	kWh	15505.6	7752.8
Energy tariff	INR	10.8	10.8
Monetary saving	INR	167460	83730
Investment/LED tube light	INR	225	225
Total investment	INR	198225	99113
Simple Payback period	Years	1.2	1.2

4.3 Water Pumping System

Findings:

The submersible pump is used to supply the water for institute. Pumps are old and one of the pump is of around 15 years old which should be replaced as its efficiency is ~24% & its replacement ROI is around 1-1.25 years.

Other 2 pump is also old but one with an efficiency of 42% is on standby mode and by changing motor winding it can again be used more efficiently.

Recommendations:

Replace the existing pump with Energy Efficient water pump.

Table14: - Pump Replacement

Pump Replacement		
Description	**Units**	**Pump at front gate of admin building**
Design parameter		
Rated output	hp	3
	kW	2
Pump Efficiency	%	52
Type		Submersible
Measured Parameter		
Proposed Power	kW	5
Daily Usage	Hrs/day	4
Annual Working Days		275
Annual Power Savings	kWh	5500
Energy Tarrif	INR/kWh	10.58
Monetary Savings	INR	58190
Total Investment	INR	60000
Simple Payback Period	Years	1

4.4 Replace LCD monitor with LED monitor

Screen Monitors:

Existing Scenarios

Type of monitor (LCD/LED)	Total No of monitors
LCD type	450
LED Type	300

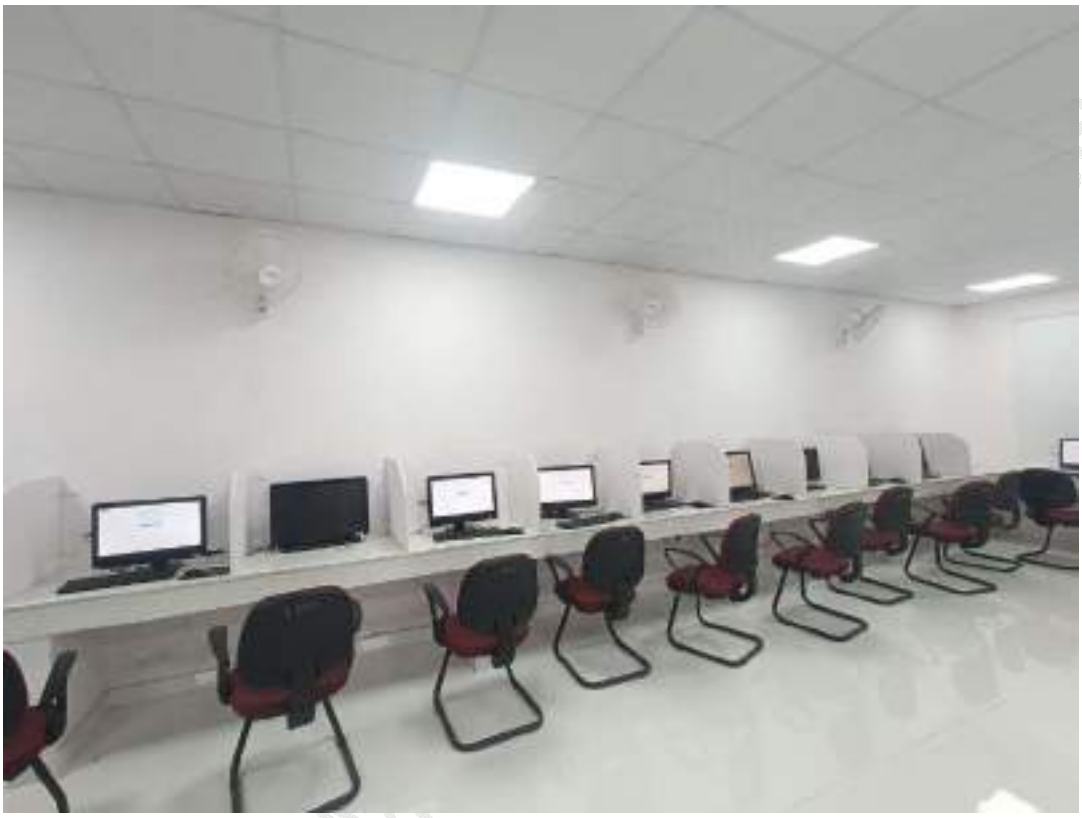
Recommendation:

Replace LCD monitor with LED monitor, although a capital sum is involved in but ROI is less than 3 years and product life cycle is much more than that.

Table15: - Replacement of LCD monitor with LED monitor

Replacement of LCD monitor with LED monitor		
Total no. LCD monitors	Nos	450
Avg. running hours per day	Hrs	6
Avg. working days per year	Nos	225
Avg. Power consumption of LCD monitor	W	150
Total electricity consumed by LCD monitor	kWh	91125
Avg. Power consumption of LED monitor	W	50
Total electricity consumed by LED monitor	kWh	30375
Total electricity saving per year	kWh	60750
Rate of electricity	INR	12.3
Total monetary saving per year	INR	747225
Investment	INR	2250000
Simple payback period	Yrs	3
Simple payback period	Months	36.1

Annexure



Observation:

1) The computer should be turned off when no one is using it.

2) Motion sensors can be used to automatically switch on the lights in the computer lab when there is movement, and switch them off when there is no movement in the computer lab.

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Observation:

1) Replacing the T12 tube lights by LED which leads to reducing the total annual energy cost and also energy is used effectively.

2) Motion sensors can be used there to automatically switch on the light when there is movement in corridor and switch off when there is no movement in corridor.

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Observation:

1) It has been observed that lights are on, even though there is no person in the Lab. Motion sensors can be used there to automatically switch on the light when there is movement and switch off when there is no movement.

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Observation:

1) Keeping the window open is not advisable for the air conditioner.

2) Here we can use the PVC strip curtains at the Window even though when the window is open there is no wastage of ac breeze.

3) It has been observed that the lights and fan are on, even though there is no person in the room. Therefore, please switch off the lights and fan when no one is in the room.

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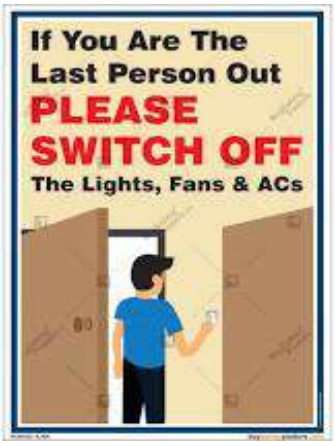
Observation:

1) Fans should be switched off when no one in the classroom.
2) Master switches should be installed outside the classroom

Recommendation: -

Visuals related to energy awareness should be implemented all across the facilities sample are as below: -



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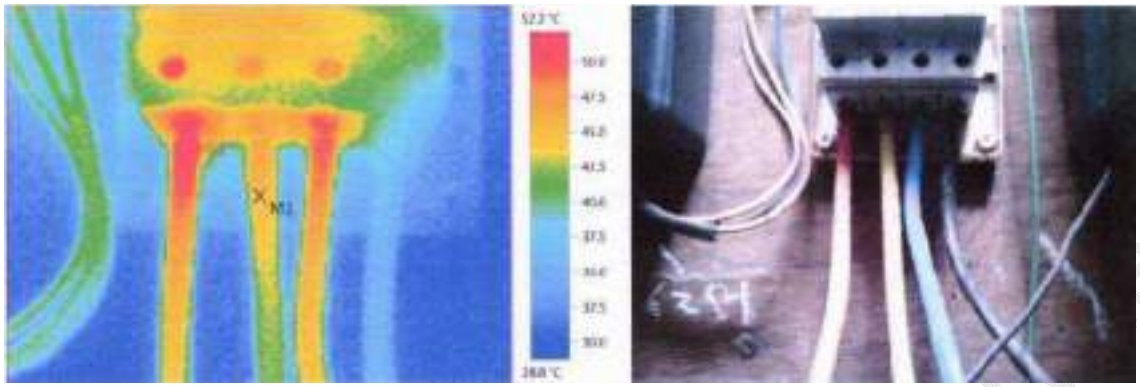

Picture parameters:

Emissivity: 0.99

Refl. temp. [°C]:20.0

Picture markings:

Measurement Objects	Temp. [˚C]	Emiss.	Refl. Temp. [˚C]	Remarks
Measure point 1	45.1	0.99	20.0	Center Spot
Hot Spot 1	52.2	0.99	20.0	-

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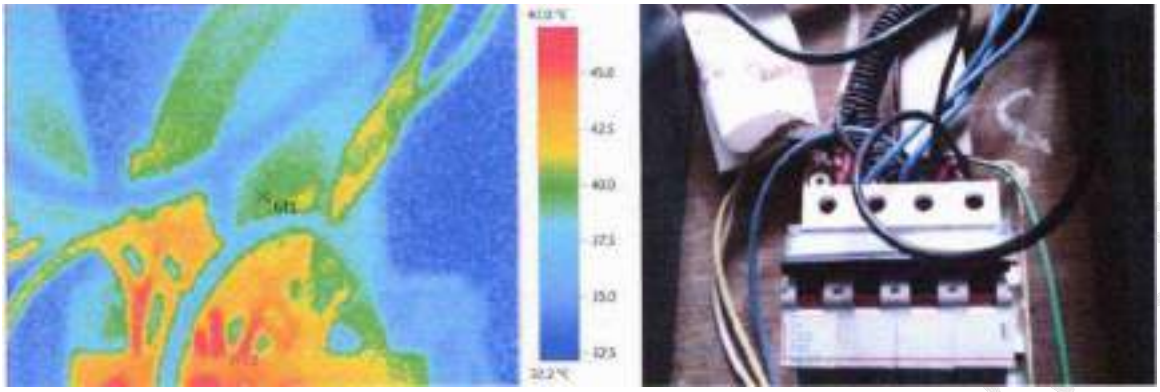

Picture parameters:

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Refl. temp. [°C]:20.0

Picture markings:

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Measure point 1	39.5	0.99	20.0	Center Spot
Hot Spot 1	47.0	0.99		

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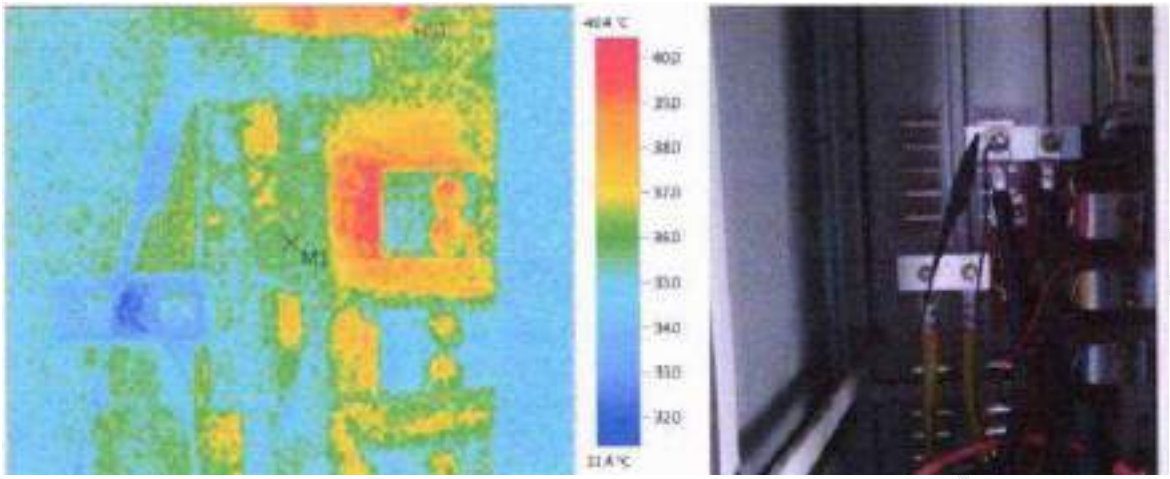

Picture parameters:

Emissivity:0.99

Refl. temp. [° C]: 20.0

Picture markings:

Measurement Objects	Temp. [˚C]	Emiss.	Refl. Temp. [t]	Remarks
Measure point 1	35.7	0.99	20.0	Center Spot
Hot Spot 1	40.4	0.99	20.0	-

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6.Conclusion

The college's energy consumption is significantly higher than the industry average for similar facilities, indicating significant opportunities for energy savings.

The lighting and HVAC systems are the two major energy consumers in the college, accounting for more than 70% of the total energy consumption.

The college can achieve significant energy savings by implementing a range of energy conservation measures (ECMs), such as installing LED lighting, upgrading HVAC systems, and improving building insulation.

The recommended ECMs have a high potential for energy savings and are financially viable with a reasonable ROI period.

The implementation of recommended ECMs can help the college to reduce its energy consumption, lower operating costs, and reduce its carbon footprint, contributing to its sustainability goals.

Overall, the energy audit report provides a comprehensive roadmap for the college to improve its energy efficiency and sustainability. The implementation of recommended ECMs can help the college to achieve significant energy savings and reduce its environmental impact while improving the learning and working environment for students, faculty, and staff.

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DRONACHARYA
Group of Institutions

Energy Audit Report of

Dronacharya Group of Institutions

B-27, APJ Abdul Kalam Rd, Knowledge Park III, Greater Noida, Uttar

Conducted by

Tetrahedron Manufacturing Services

Date : 30 May, 2024

G-7, near Hindi Khabar, G Block, Sector 63, Noida, Uttar Pradesh 201307

Call: 089841 89814

Email: - tms@tetrahedron.in

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DISCLAIMER

This report is based on the information provided by the management of **Dronacharya Group of Institutions** & on-site observations on **29 May 2023 & 30 May 2023**. We certify that this information and following analysis is correct to the best of our knowledge and ability. The validity of the recommendations is dependent on the accuracy of log books and historical data supplied to us. This report (including any enclosures and attachments) has been prepared for the exclusive use and benefit of the addressee(s) and solely for the purpose for which it is provided. Unless we provide express prior written consent, no part of this report should be reproduced, distributed or communicated to any third party. We do not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The recommendations and findings are to be used by client at their own accord and Tetrahedron Manufacturing Services or its associates would not be responsible for any material or non-material losses (if any) occurring in any way due to their implementation

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Contents

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27, KP-III, Greater Noida-201306

A. TABLE OF CONTENT

List of tables

Director
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List Of Figures

List of Abbreviations

ECM : Energy Conservation Measures
kWh : kilo Watt hour
kVAh : kilo Volt Amp Hour
LT : Low Tension
HT : High Tension
MT : Metric Ton
MTOE : Metric Ton Oil Equivalent
kW : Kilo Watt
SEC : Specific Energy Consumption
SPC : Specific Power Consumption
TPH : Tons Per Hour
VFD : Variable Frequency Drive
DOL : Direct on Line
Yr. : Year
Kg : Kilo Gram
W : Watt
C : Celsius
kVA : kilo volt Amp
V : Volt
I : Current
P : Power

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27, KP-III, Greater Noida-201306

B. ACKNOWLEDGEMENT

Energy Audit Team of **Tetrahedron Manufacturing Services Pvt Ltd.** Expresses Our Sincere Gratitude to Management of **Dronacharya Group of Institutions**, for providing us an opportunity to conduct an energy audit of their organization located In B-27, APJ Abdul Kalam Rd, Knowledge Park III, Greater Noida, Uttar Pradesh 201306. We are grateful to Dr.S.K.Srivastava and other officials for showing keen interest in the study and for the help and cooperation extended to Energy Audit Team during study.

We do hope that you will find the recommendations given in this report useful in helping you save energy. While we have made every attempt to adhere to high quality standards, in both data collection and analysis, as well as in presentation through the report, we should welcome any suggestions from your side as to how we can improve further.

In case of any suggestions or queries:

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C. EXECUTIVE SUMMARY

Energy is one of the major inputs in any facility and is the mainstay of the economic development of the country. Rising Electricity & fuel costs coupled with increased global competition is forcing players to slash the energy costs. Energy Audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating & maintenance practices of the system. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply, decision on appropriate energy mix, decision on using improved energy conservation's, equipment's and technology.

Energy conservation is a continuous process and there is always scope for further improvements, with this objective the Energy Audit team with the active involvement of **Dronacharya Group of Institutions** have identified the following energy conservation opportunities (ECO's) implementation of ECO's can further help reducing energy consumption.

Highlights

Table01: - Energy Usage Highlights

Description	Units	Values
Annual electricity consumption	Units	217876
Annual electricity cost/annum	INR	2212659

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Table02: - Summary of Energy Conservation Measures

Sr. No	Energy Conservation Measures	Annual Saving		Investment
		kWh	INR	INR
1	Replace conventional ceiling fan with energy efficient fan	2546.55	29829.56	169887.5
2	Replace conventional tube with energy efficient tube	7665.8	78630	99113
3	Replace LCD monitor with LED monitor	58750	757275	2189700
4	Replacement of old pumps with energy efficient pumps	5450	56534	58000

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D. INTRODUCTION

OBJECTIVE OF ENERGY AUDIT:

Energy audit is the key to a systematic approach for decision-making in the area of energy management and gives a positive orientation to the energy resource cost reduction. The primary objective of the energy audit is to determine ways to reduce energy consumption to lower operating costs.

The Energy audit is conducted with the following Objectives:

1. Detailed studies of the intended energy consuming equipment including historical and present energy performance trends
2. Quantification of Energy Losses, and Energy Saving Potential
3. Presentations of Energy Efficiency Measures with cost benefit analysis
4. Identifying potential areas of electrical energy economy.

This energy audit assumes significance due to the fact that the Dronacharya Group of Institutions, total ***electricity bill crossed INR. 21 Lakhs from Apr,22 to Mar,23*** and it was aimed at obtaining a detailed idea about the various end use energy consumption activities and identifying, enumerating and evaluating the possible energy savings opportunities.

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ABOUT AUDIT TEAM MEMBERS:

We have dedicated an expert team for services. Your first point of contact with Tetrahedron Manufacturing Service will be with our dedicated customer services team. We are highly skilled, motivated and fully trained to assist you. Our services team includes our expert, highly experienced advisors for power factor correction systems, harmonic filter and others Energy and Power Quality problems who have over 40 years combined experience for the same. Each team member is dedicated to offering a high level of customer care and also strives for excellence to ensure that you receive the perfect service

METHODOLOGY OF WORK:

The methodology adopted for this audit was

- A preliminary energy audit has been conducted to establish the energy consumption of the organization by analysing the available past energy consumption data, identification of the areas requiring more detailed study and measurements.
- Visual inspection and data collection.
- Identification/verification of energy consumption and other parameters by measurements.
- 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.
- Potential energy saving opportunities
- Flow Chart for Methodology for report preparation

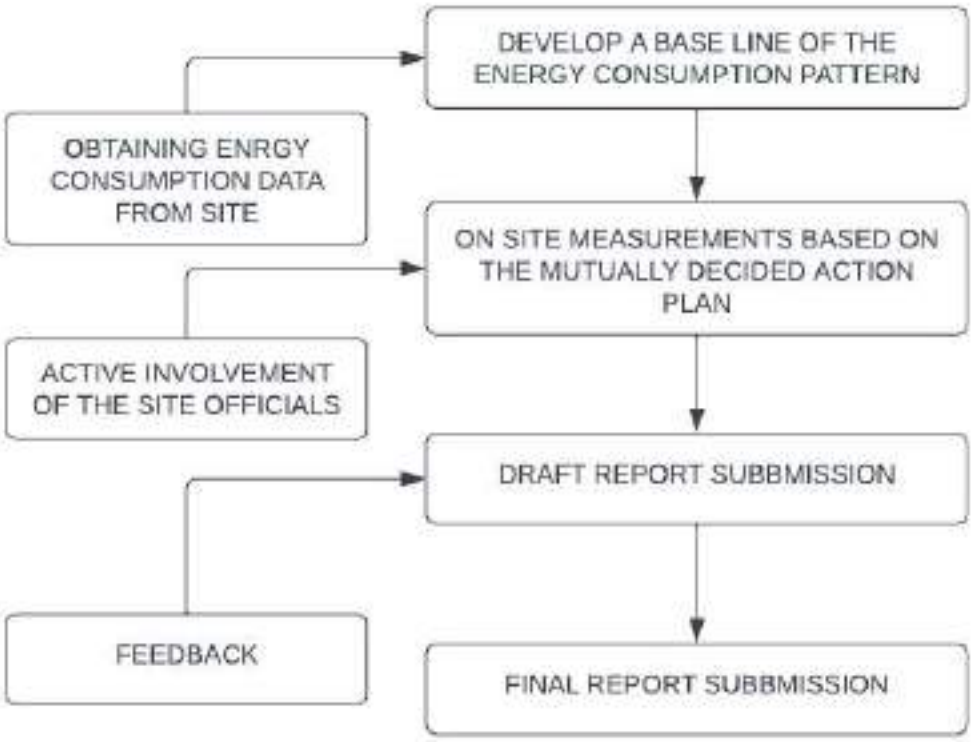

Figure 1 Energy Audit Flowchart

This report is just first step, a mere mile marker towards our destination of achieving energy efficiency and we would like to emphasize that an energy audit is a continuous process. We have compiled a list of possible actions to conserve and efficiently utilize our scarce resources and identified their savings potential.

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1. Energy and Utility System Description

Major utilities in the campus are

1. General
2. Electrical

1.1 Brief Description of each Facility

This study is being done under the indicative scope of work for conduct of Energy Audit specified by Dronacharya Group of Institutions. This study is mainly carried out to identify saving areas in Dronacharya Group of Institutions with short term, medium term & long-term investments, yielding significant savings. The study can be mainly divided into following groups.

2.1.1 General

Energy Audit focuses on study of correlation of electricity consumption on production. Opportunities for load factor improvement, power factor improvements, etc.

b. Electrical

It includes motor load study of 1 HP & above by measuring input parameters (Voltage, Current, P.F., & kW), performance analysis of water pumps having capacities above 1 HP, performance analysis and identification of energy efficiency opportunities in motors, pumps, air compressors, lighting, etc.

1.2 Instrument Used

Following instruments are used for the study:

a. 3 Phase Power Analyzer-Fluke 1736
b. Lux Meter
c. Measuring tape
d. Thermal imager
e. Ultrasonic Water flow meter
f. Power Clamp
g. Distance Meter
h. Hygrometer
i. Others as required

Power Quality Analyzer

Thermal Imager

UE System (Leak Detect System)

Anemometer

Ultrasonic
Flow Meter

LUX System

Pressure Gauge

Hygrometer

Distance Meter

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Authorized Signatory

TDS Meter

Flu Gas Analyzer

Clamp Meter

Figure 2 Energy Audit Equipment

1.3 Energy Audit Team

Pratosh Saxena – Energy Auditor TMS
Nayan Kumar – Senior Energy Consultant TMS
Sushanta Bhattaray – Energy Consultant TMS
Tanshul Sharma – Energy Consultant TMS

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2. Description and Energy Consumption

2.1 About Dronacharya Group of Institutions :

Dronacharya group of institutions Greater Noida was established in 2006 by Smt. Anguri Devi Charitable Trust. Dronacharya Group of Institutions, Greater Noida is affiliated with Dr. A. P. J. Abdul Kalam Technical University (AKTU), Lucknow and the institute is approved by the All- India Council for Technical Education (AICTE). Dronacharya group of institutions Greater Noida is ranked 26 out of 50 by ARIIA. It offers undergraduate and postgraduate courses such as B.Tech & MBA. Dronacharya Group of Institutions admissions are based on the candidate's performance in entrance exams.

Dronacharya group of institutions Greater Noida has recorded the highest package 12 LPA in placement drive in 2022. The top recruiters are Adobe, Josh Technology Group, Info Edge, Limeroad, Accolite Digital, Detect Technologies, Accenture, Cognizant, IBM, HashedIn Technologies, Ameyo, Amazon.

Dronacharya Group of Institutions Greater Noida Placement

- Dronacharya Group of Institutions placements 2022 finished recently, with over 325 recruiters giving BTech and MBA students recruitment possibilities.
- According to the most recent data, the maximum package available to BTech students was INR 12 LPA, while the lowest package was INR 3 LPA. Moreover, training possibilities were made available to students throughout the placement session 2022.
- Pasona India Pvt Ltd awarded the highest stipend of INR 23,600. Dronacharya Group of Institutions' top recruiters in 2022 were RTCamp Solutions Pvt Ltd., Adobe, Info Edge, Cognizant, IBM, Amazon, and others

Energy Audit Report

Dronacharya Group of Institutions Greater Noida Facilities

The Dronacharya Group of Institutions in Greater Noida offers a variety of amenities to help its students' academic, extracurricular, and general growth. These amenities are intended to provide a positive learning environment and to improve the overall college experience. While individual amenities may differ, I will present an outline of common facilities found at educational institutions.

Library: The college has a well-stocked library that acts as a knowledge centre for students. The library has a large collection of books, periodicals, research papers, and digital resources spanning a wide range of subjects. It gives students access to study materials, reference books, and internet databases to help them with their academic endeavours.

Laboratories: Cutting-edge laboratories are provided to meet the practical learning needs of students studying engineering, computer science, electronics, and other subjects. These labs are outfitted with cutting-edge instruments, tools, and software to allow for hands-on study and research.

Computer laboratories: The university has specialised computer laboratories that are outfitted with the most up-to-date gear, software, and high-speed internet access. Students can use these laboratories to improve their computer abilities, participate in programming exercises, perform experiments, and work on projects.

Classrooms: To establish an ideal learning environment, classrooms are spacious and well-designed. To assist successful teaching and learning, these classrooms are outfitted with audio-visual aids, projectors, and other modern teaching tools.

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They are intended to encourage student participation and engagement in interactive sessions.

Auditorium and Seminar Halls: The institution has an auditorium and seminar halls that may be used to organise a variety of events such as guest lectures, seminars, workshops, cultural activities, and academic conferences. These rooms have audio-visual technology and seating layouts that can accommodate a big audience.

Sporting and Recreation: The organisation values physical fitness and provides sporting facilities to encourage a healthy lifestyle. It has a playground, indoor sports facilities, and a fully equipped gymnasium. Students can engage in a variety of sports including cricket, football, basketball, badminton, table tennis, and others.

Hostel & Accommodation: The institution provides on-campus or adjacent hostel facilities for outstation students. These hostels offer a safe and comfortable living environment with services such as furnished rooms, study areas, common rooms, mess facilities, and 24-hour security. The hostels encourage a sense of community while also providing an environment suitable to study and personal growth.

Cafeteria & Food Services: The university features a large and clean cafeteria or food court where students may eat, snack, and drink. The cafeteria provides a variety of meal alternatives to accommodate a wide range of tastes and dietary needs.

Wi-Fi Internet connection: The campus has high-speed internet connection, allowing students to access online resources, research materials, and educational portals. Wi-Fi is offered in classrooms, libraries, dorms, and social spaces, allowing for seamless connectivity across the campus.

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Medical Facilities: Basic medical facilities are offered on campus to meet students' healthcare requirements. A medical centre with certified medical experts who provide first aid, basic medical consultations, and emergency services may be available at the institution. Furthermore, collaborations with adjacent hospitals or clinics guarantee access to specialised medical treatment as needed.

Transportation: The university may provide transportation to students and employees to make commuting easier.

Placement and Career Development: The university provides specialised placement and career development cells to help students advance in their careers. These cells organise placement drives, invite industry experts to provide guest lectures, hold resume and interview skills seminars, and enable internships and industrial partnerships.

Extracurricular Activities: It may include cultural event spaces, music and dance practise rooms, art studios, and clubs for a variety of hobbies such as robotics, coding, entrepreneurship, photography, and more.

Counselling and Support Services: Because the university recognises the value of mental health and well-being, it offers counselling and support services to students. Students having academic, personal, or emotional issues can seek guidance, assistance, and support from qualified counsellors.

Security and Safety: Security and safety are top priorities for the college, which maintains a watchful security system on campus. To guarantee a safe and secure workplace, security officers are employed, and CCTV cameras may be put in critical spots.

Alumni Network: The university has an active alumni network that allows current students and successful alumni to engage. The network offers mentorship, assistance, and networking opportunities, allowing students to make crucial contacts for their future jobs.

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Table03: - College Details

College Details		
No	**Particulars**	**Details**
1	Name of the College	Dronacharya Group of Institutions
2	Address	B -27 Knowledge Park -III , Greater Noida
3	Contact Person	Dr.S.K.Srivastava
4	Contact Phone number&	9910380113
5	E-mail	sk.srivastava@gnindia.dronacharya.info
6	Web site	www.dronacharya.info
7	Type of Building	Educational Institute
8	Annual Working Days	220
9	No: of Shifts	Morning
10	No: of students enrolled	1922
11	No: of teaching staff	118
12	No: of non-teaching staff	84
13	No: of departments	9
14	No of UG courses	B.Tech
15	No: of PG courses	MBA
16	Total campus area	51125 sq. meter
17	Total Built Up area	4084 sq. meter
18	No: of hostel students	Nil
19	No: of plants in college	1000
20	No: of various species	500
21	Carbon Sequestration (ton) per anum	nil
22	Grounds and stadiums	Ground

Table04: - Building Area Details

Building Area			
Sl.No:	**Floor /Block**	**No Of Floors**	**Total Built Up Area(M2)**
1	05 Block	G+3F	21325 sq. meter
2	03 Block	Ist + IInd F	13000 sq. meter
3	03 Block	IInd F	5500 sq. meter

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2.2 Annual Energy Consumption

Electricity

Dronacharya Group of Institutions is receiving electricity from NPCL (Noida Power Company Limited) Contract demand with NPCL is 50 KW.

3. Energy Scenario

3.1 Electrical Systems

3.1.1 Electrical bill analysis

Dronacharya Group of Institutions is getting electricity supply from NPCL (Noida Power Company Limited) Major portion of the energy consumption is used for academics and hostel.

The observations made during the study are given in the following sections.

The Tariff Structure at the college

Tariff structure of the facility is given below

- Tariff Category LMV-4(Institution)
- Supply voltage 440 V
- Contracted demand 50 kW
- Demand charges INR 310/kW/month
- Unit charge INR 8.1/kVAh

1. Power factor (PF)

In an ideal scenario, power factor should be maintained unity, FY 22-23 power factor is almost unity, although it's not unity but its approximately unity. Details are as follows:

Maximum power factor = 0.98

Minimum power factor = 0.96

Average power factor = 0.97

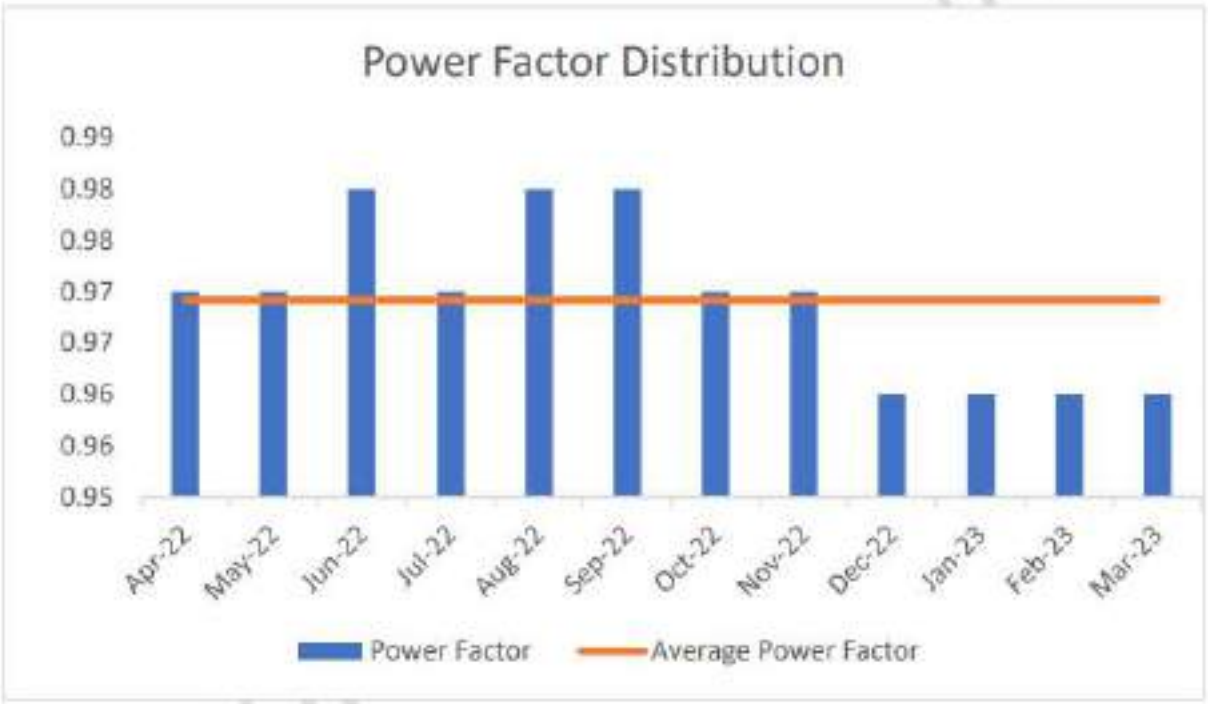

Figure 3 Power Factor

TABLE 05: - Electrical Bill analysis

Month	Contractual Load (kW)	Contract Demand (KVA)	Billable Demand (KVA)	Power Factor	Billable Demand Charges	Energy Charges	Penal Dema-nd Charges	Electricity Duty Charges	Rebate @ 1.00%	Regulation Discount @ 10%	Delay Payment Surcharge	Prev. Adj.	Int. on SD	TDS on Int. on SD	Total Units	Total Amount
Apr-22	50	52	70	0.97	26474	131783	10866	11869	927				13314	1331	132709	168082
May-22	50	52	105	0.97	37346	184801	35240	16661	1583						186383	272466
Jun-22	50	51	92	0.98	32489	191722	25525	16816	2221						193944	264331
Jul-22	50	52	100	0.97	35620	204910	31789	18040			441	3305			204910	287495
Aug-22	50	51	111	0.98	38365	237542	38264	20693	2405	12149					239948	320310
Sep-22	50	51	125	0.98	40182	245002	44692	21389	2759	28518					247761	319987
Oct-22	50	52	101	0.97	33345	206667	29868	18001	2852	24001					209518	261028
Nov-22	50	52	74	0.97	22110	132830	10851	11621	2400	15494					135230	159517
Dec-22	50	52	51	0.96	15864	112087		9596	1549	12795					113637	123203
Jan-23	50	52	48	0.96	15526	108024		9266	1280	12355					109304	119182
Feb-23	50	52	47	0.96	15450	109230		9351	1236	12468					110465	120327
Mar-23	50	52	56	0.96	15787	83907	506	7477	1247	9969					85153	96461
Average	**50.00**	**52.00**	**81.64**	**0.97**	**27380**	**162375**	**25289**	**14232**	**1860**	**15969**	**441**	**3305**	**13314**	**1331**	**164080**	**209366**

Observation:

1) Maximum Energy charges INR 320310 in month of Aug-2023 and minimum INR 96461 in month of Mar-2023.

2) The average Power factor is 0.97.

3) The average Energy charges is INR 209366

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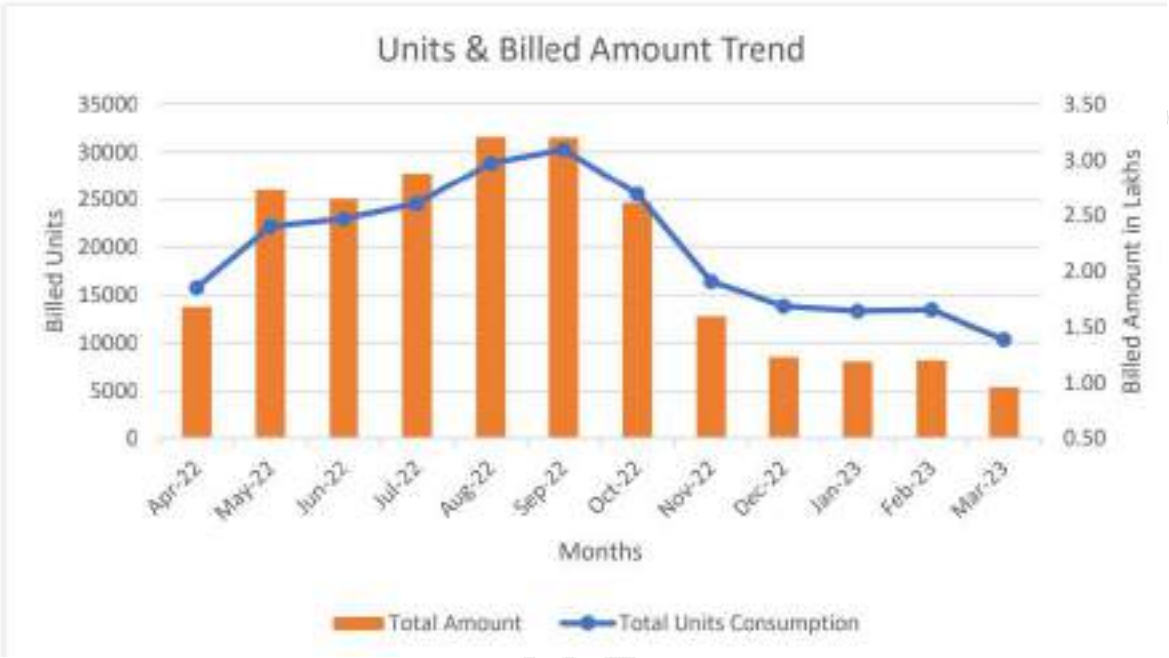

Figure 4 Units & Billed Amount Trend

Observation:

1) In Sep-22 Billed amount & Unit is maximum.

2) In Mar-23 Billed amount & Unit is minimum.

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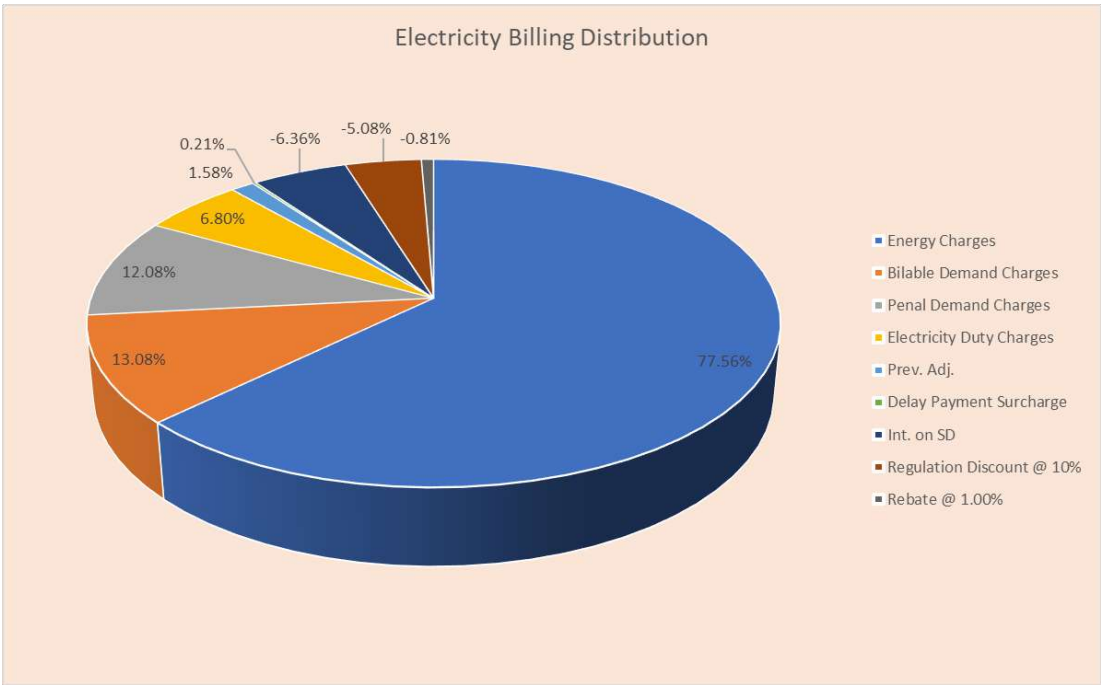

Figure 5 Billing Distribution

Observation:

1) Energy Charges are 77.56% of total bill.

2) Penal demand charges are 12.1% of total bill. which is a concern and it can be resolved by increasing contract demand or by proper utilization of electricity.

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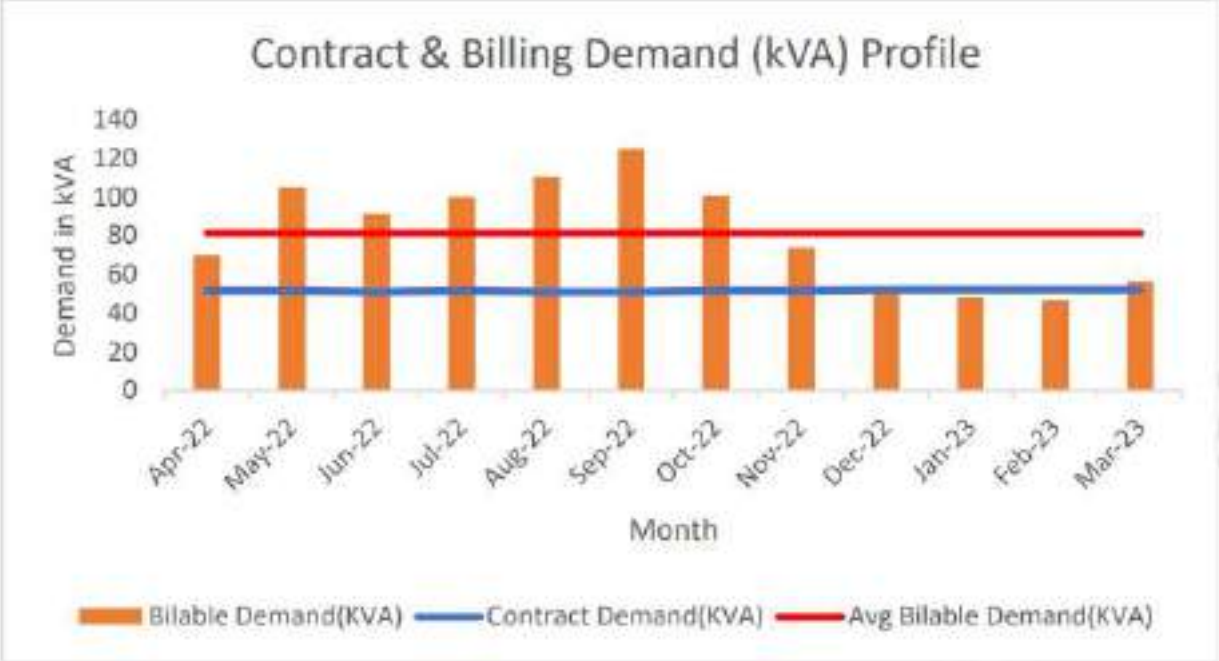

Figure 6 Contract & Billing Demand (kVA) Profile

Observation:

1) Demand is Maximum for Sep-22 i.e. 125 kVA.

2) Demand is Minimum for Feb-23 i.e. 47kVA

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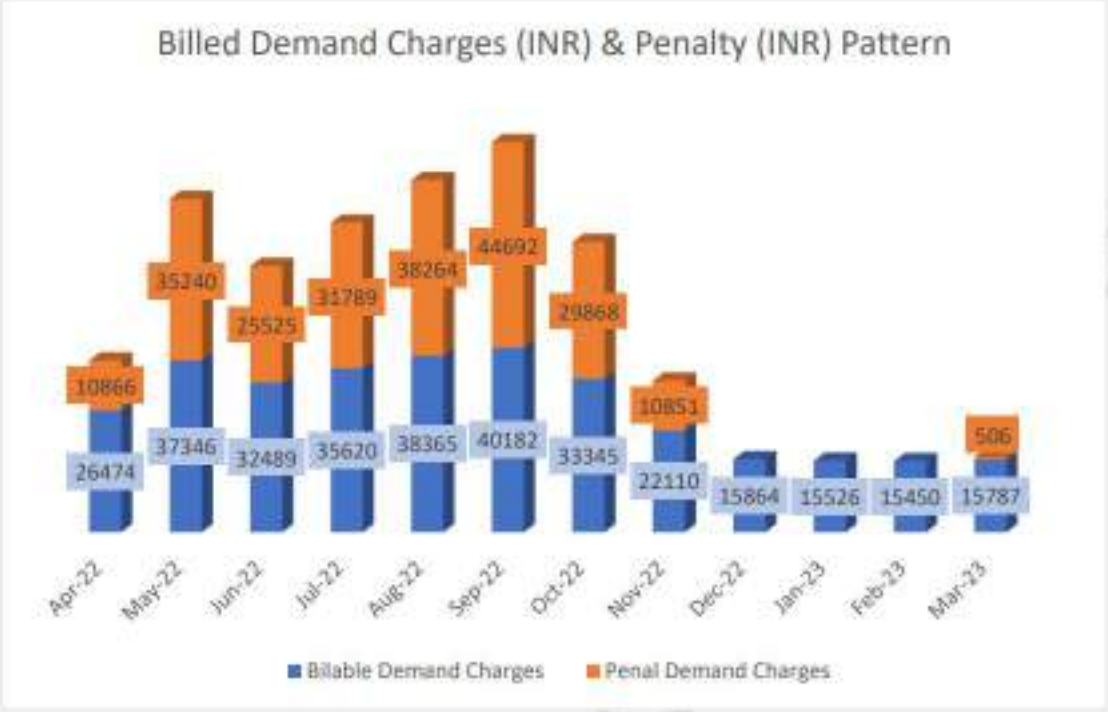

Figure 7 Billed Demand Charges (INR) & Penalty (INR) Pattern

Observation:

1) Penalty is Maximum for Sep-22 i.e. INR 41689

2) Among billable penalty months, March-2023 was penalized least i.e., INR 506

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3.1.2 Diesel Generator

Following table shows the details of DG set.

Table06: - DG Set Details

Sl. No	Make	Capacity in KVA	Average Running Duration/hrs in day	kW	kWh	Diesel/hr in ltrs	Cost of Diesel/Ltr in Rs	Total Cost/day
1	Jakson	125	10	100	1000	11	86	9460
2	Kirloskar	15	6	12	72	3.25	86	1677

Recommendations:

1. Conversion of DG sets to Dual Fuel System
2. Use of Natural Gas with Diesel will reduce the diesel cost by at least 30%
3. GHG emissions will reduce by a minimum of 20%

After Implementing Dual Fuel System:

Table07: - DG Set Dual Fuel System

Sl. No	Make	Capacity in KVA	Average Running Duration/hrs in day	kW	kWh	Diesel/hr in ltrs	Cost of Diesel/Ltr in Rs	Total Cost/day
1	Jakson	125	10	100	1000	7.7	86	6622
2	Kirloskar	15	6	12	72	2.3	86	1174

3.2 Water Pump

The performance analysis of the pumps used for water required for the institute is done based on the present operating parameters like water flow, head and power. Pumps of different capacities are installed based on the water flow requirement at different sections of the college. The water supply of the institute is met by bore well. There are number of pumps are running mainly in the institute campus.

Table08: - Pump Table

Pump Table				
Description	**Units**	**At Generator Side**	**At Bartaman Side**	**At Bartaman Side**
Design parameter				
Rated output	hp	3	7.5	3
	kW	2	5	2
Pump Efficiency	%	52	61	58
Motor Efficiency	%	78	88	88
Measured Parameter				
Voltage	Volts	415	412	195
Current	Amps	8.11	8.17	18
Flow Rate	m^3/hrs	33.49	63.89	59.77
Diff Pressure	kg/cm^2	1.27	1.37	1.36
Calculated Parameter				
Power	kW	4.96	5.01	5.17
System Efficiency	%	23.39%	47.57%	42.86%
Age	Years	~15	~6	~7

Observation:

1) Pump at the Generator side has less efficiency than other pumps, which is about 23%.

2) Pump at generator side is about 15 years old and more than 3 windings has already happened so recommendation is to replace the pump, while Bartaman side pump is 6-7 years old and efficiency is in the range of 45%, recommendation is check for windings, impeller etc.

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3.3) Air Conditioning

Table09: - AC Details

Sl NO	Name of Location	Type of AC	1 Ton	1.5 Ton	1.8 Ton	Star Rating
1	Classroom	Split	2			***
2	Laboratory	Split			16	***
		Window		8		***
3	Offices	Split		18		***
		Window		2		***
4	Library	Split		2		***
5	Guest Room	Window		2		***

ACs Data

Observation:

1). All ACs are 3 star rated.

2). As per BEE guidelines, energy efficient source should be employed across facilities i.e., 5* rated ACs should be used; as a huge capital is involved in it so a phase wise replacement can be done while prioritizing by older ACs replacement first.

3). ACs set temperature should be 24 degree C for human comfort as well as energy consumption point of view.

Although many ACs set temperature was found to be 24 degree C but some were not; so energy conservation visuals should be employed across facility to maintain 24 degree temperature and stating benefits of using set temperature at 24 degree C.

3.4 Lighting System

Lighting is provided in commercial buildings, indoor and outdoor for providing comfortable working environment. The primary objective is to provide the required lighting effect for the lowest installed load i.e. highest lighting at lowest power consumption. There are number of buildings in Campus.

Table10: - Source Details

Sl NO	Name of Location	Type of Source	No of source	Each Wattage
1	Class Room	Tube light	285	20
2	Laboratory	Tube light	340	20
		2*2 LED Panel	157	36
3	Offices	Tube light	79	20
4	Library	Tube light	31	20
5	Canteen	Tube light	12	20
6	Guest Room	Tube light	10	20
7	Guard room	Tube light	4	20
8	IN BUILDING Other places (toilet/veranda /etc)	Tube light	120	20

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3.5 Fan Data

Majority of the fans are traditional type fans that consume more energy. Now in the market advanced BLDC type fans are available which consumes less energy and available advanced feature regulators

Table11: - Fan Details

Sl NO	Name of Location	No of Fan
1	Class Room	292
2	Laboratory	155
3	Offices	67
4	Library	19
5	Canteen	12
6	Guest Room	5
7	Guard room	1

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4. Energy Conservation Measures

4.1 Replacing the Conventional fan with energy efficient fan

Recommendations:

These fans should be replaced with BLDC type fans, ceiling fan ROI is less than 4 years. as for all replacement a huge capital sum is involved so recommendations are to go in a phase wise manner. Other than wall fan, all other have ROI around 5 years, which is a good number so replacement in phase wise manner can be considered for them.

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Saving Potentials:

Table12: - Fan Replacement Savings

Fan Replacement Savings					
Description	**Units**	**Value**	**Value**	**Value**	**Value**
Present system					
Type of fan		**Ceiling fan**	**Wall fan**	**Pedestal fan**	**Exhaust fan**
Number of existing fan	Nos	426	23	9	93
Wattage /fan	Watt	60	45	55	40
Usage of fan per day	Hrs	8	8	8	12
Working days per annum	Days	225	225	225	225
Annual Energy consumption	kWh	45008	1763	831	9044
Proposed system					
Recommended for replacement	%	50%	50%	100%	75%
Recommended Energy Efficient fan	Nos	213	12	9	70
Wattage of Energy Efficient fan	watt	26	26	26	26
Annual Energy consumption	kWh	9968	538	421	4896
Annual Power saving	kWh	12035.6	393.3	459.8	2536.55
Energy tariff	INR	12.3	12.3	12.3	12.3
Monitory saving	INR	150337.9	4837.6	5678.54	31429.565
Investment/fan	INR	2800	3700	2750	2450
Total investment	INR	596400	42550	24750	160887.5
Simple Payback period	Years	3.7	8.8	4.3	5.3

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4.2 Replacing the Old Tube with LED tube

Findings:

Current lighting system is fluorescent type which is not energy efficient, now a days LED type energy efficient lighting system are available in market which should be considered.

Recommendations:

Replace the current tube light with LED tube which consumes less energy. In replacement table 2 scenario has been proposed while replacing all fluorescent light and while replacing 50% and their investment and ROI has also there.

Table13: - Current lighting with LED tube

Current lighting with LED tube			
Description	**Units**	**Value**	**Value**
Present system			
Number of existing tube lights	Nos	881	881
wattage /tube	watt	28	28
Total wattage	Watt	24668	24668
Daily usage	Hrs/day	8	8
Annual working days	days/yr.	275	275
Annual Energy consumption	kWh	54269.6	54269.6
Proposed system			
Recommended for replacement	%	100%	50%
Recommended of LED tube light	Nos	881	441
Wattage of LED tube light	Watt	20	20
Annual Energy consumption	kWh	38764	19382
Annual Power saving	kWh	15505.6	7752.8
Energy tariff	INR	10.8	10.8
Monetary saving	INR	167460	83730
Investment/LED tube light	INR	225	225
Total investment	INR	198225	99113
Simple Payback period	Years	1.2	1.2

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4.3 Water Pumping System

Findings:

The submersible pump is used to supply the water for institute. Pumps are old and one of the pump is of around 15 years old which should be replaced as its efficiency is ~24% & its replacement ROI is around 1-1.25 years.

Other 2 pump is also old but one with an efficiency of 42% is on standby mode and by changing motor winding it can again be used more efficiently.

Recommendations:

Replace the existing pump with Energy Efficient water pump.

Table14: - Pump Replacement

Pump Replacement		
Description	**Units**	**Pump at front gate of admin building**
Design parameter		
Rated output	hp	3
	kW	2
Pump Efficiency	%	52
Type		Submersible
Measured Parameter		
Proposed Power	kW	5
Daily Usage	Hrs/day	4
Annual Working Days		269
Annual Power Savings	kWh	5500
Energy Tarrif	INR/kWh	10.58
Monetary Savings	INR	57392
Total Investment	INR	60000
Simple Payback Period	Years	1

4.4 Replace LCD monitor with LED monitor

Screen Monitors:

Existing Scenarios

Type of monitor (LCD/LED)	Total No of monitors
LCD type	450
LED Type	300

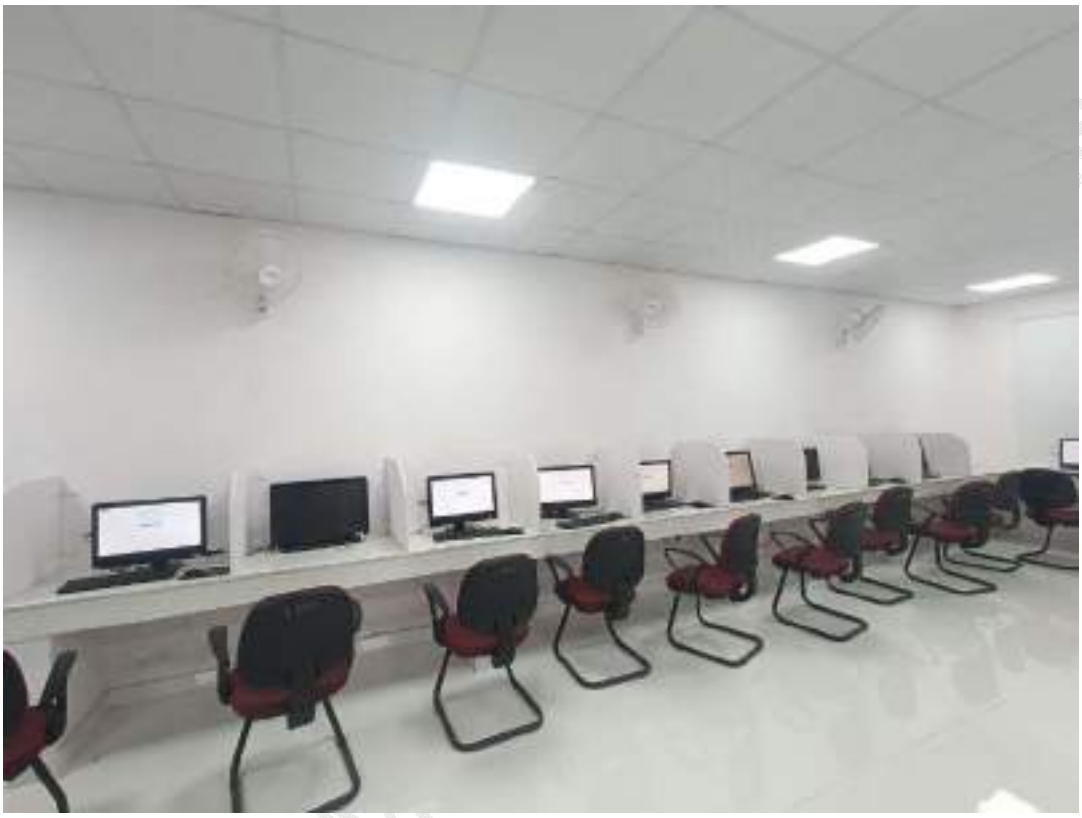
Recommendation:

Replace LCD monitor with LED monitor, although a capital sum is involved in but ROI is less than 3 years and product life cycle is much more than that.

Table15: - Replacement of LCD monitor with LED monitor

Replacement of LCD monitor with LED monitor		
Total no. LCD monitors	Nos	450
Avg. running hours per day	Hrs	6
Avg. working days per year	Nos	225
Avg. Power consumption of LCD monitor	W	150
Total electricity consumed by LCD monitor	kWh	90115
Avg. Power consumption of LED monitor	W	50
Total electricity consumed by LED monitor	kWh	30375
Total electricity saving per year	kWh	60750
Rate of electricity	INR	12.3
Total monetary saving per year	INR	725225
Investment	INR	2290000
Simple payback period	Yrs	3
Simple payback period	Months	36.1

Annexure



Observation:

1) The computer should be turned off when no one is using it.

2) Motion sensors can be used to automatically switch on the lights in the computer lab when there is movement, and switch them off when there is no movement in the computer lab.

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Observation:

1) Replacing the T12 tube lights by LED which leads to reducing the total annual energy cost and also energy is used effectively.

2) Motion sensors can be used there to automatically switch on the light when there is movement in corridor and switch off when there is no movement in corridor.

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Observation:

1) It has been observed that lights are on, even though there is no person in the Lab. Motion sensors can be used there to automatically switch on the light when there is movement and switch off when there is no movement.

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Observation:

1) Keeping the window open is not advisable for the air conditioner.

2) Here we can use the PVC strip curtains at the Window even though when the window is open there is no wastage of ac breeze.

3) It has been observed that the lights and fan are on, even though there is no person in the room. Therefore, please switch off the lights and fan when no one is in the room.

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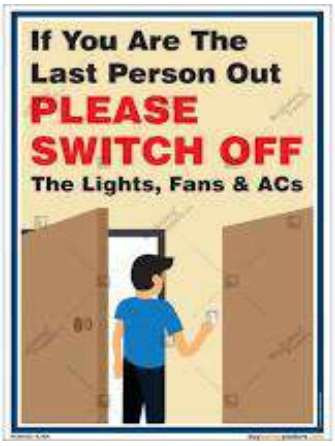
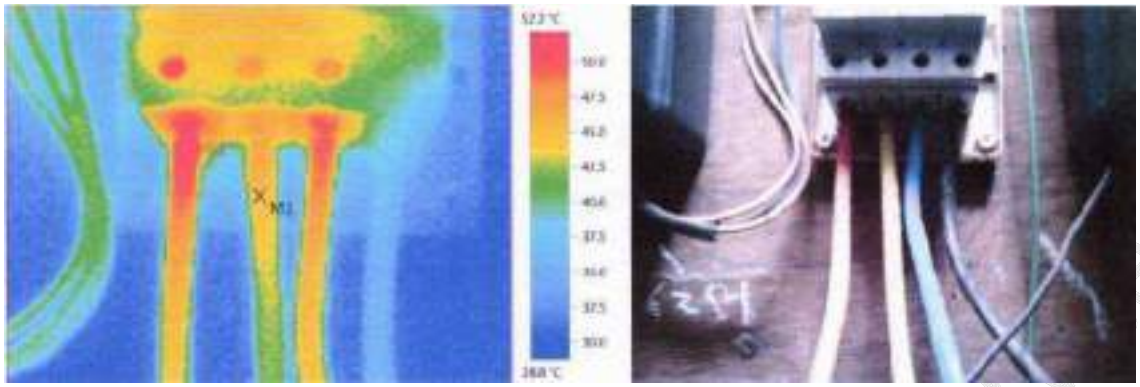
Observation:

1) Fans should be switched off when no one in the classroom.
2) Master switches should be installed outside the classroom

Recommendation: -

Visuals related to energy awareness should be implemented all across the facilities sample are as below: -





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Refl. temp. [°C]:20.0

Picture markings:

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Hot Spot 1	52.2	0.99	20.0	-

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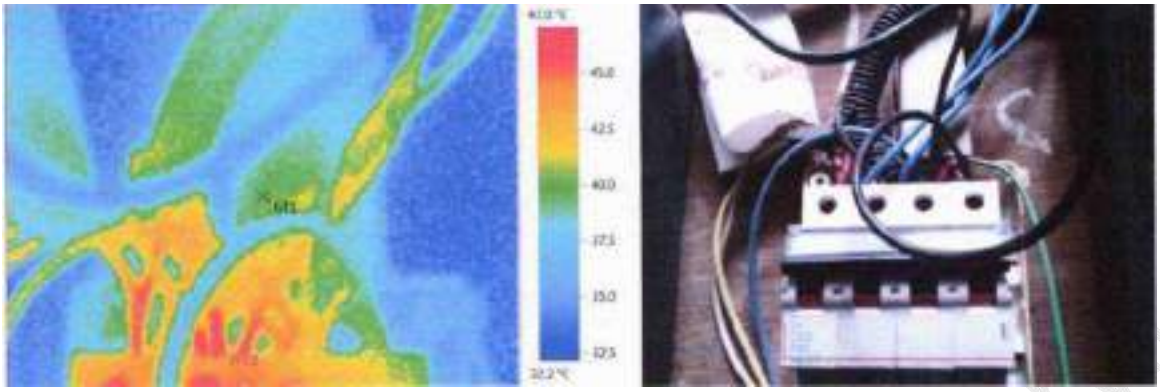

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Refl. temp. [°C]:20.0

Picture markings:

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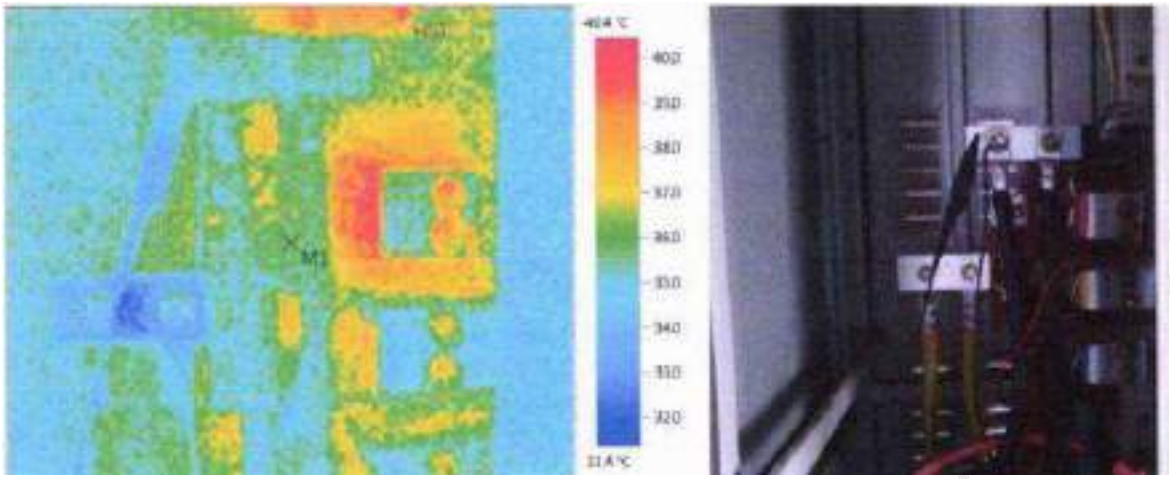

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Hot Spot 1	40.4	0.99	20.0	-

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6.Conclusion

The college's energy consumption is significantly higher than the industry average for similar facilities, indicating significant opportunities for energy savings.

The lighting and HVAC systems are the two major energy consumers in the college, accounting for more than 70% of the total energy consumption.

The college can achieve significant energy savings by implementing a range of energy conservation measures (ECMs), such as installing LED lighting, upgrading HVAC systems, and improving building insulation.

The recommended ECMs have a high potential for energy savings and are financially viable with a reasonable ROI period.

The implementation of recommended ECMs can help the college to reduce its energy consumption, lower operating costs, and reduce its carbon footprint, contributing to its sustainability goals.

Overall, the energy audit report provides a comprehensive roadmap for the college to improve its energy efficiency and sustainability. The implementation of recommended ECMs can help the college to achieve significant energy savings and reduce its environmental impact while improving the learning and working environment for students, faculty, and staff.

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ENVIRONMENT AUDIT REPORT

DRONACHARYA
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CONTENTS

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ACKNOWLEDGEMENT

Skwheelz Resource Management Private Limited thanks the management of **Dronacharya Group of Institutions,** for assigning this important work of Green Audit (Environmental Audit). We appreciate the co-operation to our team for completion of study.

Our special thanks are due to:

- Director of the Institute – Prof. (Dr.) Arpita Gupta
- Teaching & Supporting Staff of College

For giving us necessary inputs to carry out this very vital exercise of Green Audit. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

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DISCLAIMER

Skwheelz Resource Management Green Audit Team has prepared this report for **Dronacharya Group of Institutions** based on input data submitted by the representatives of institute complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the conclusions are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

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Report by: (Sharad Prateek Singh) Lead Auditor

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CONTEXT

The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory from the academic year 2016–17 onwards that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

In view of the NAAC circular regarding Green Auditing, the College Management decided to conduct an external Green Evaluation by a competent Green Auditor along with a Green Audit Assessment Team headed Prof. (Dr.) Arpita Gupta , Director, Dronacharya Group of Institutions, Greater Noida**.**

Green Audit or Environment Audit focuses on the Green Campus, Waste Management, Water Management, Air Pollution, Energy Management & Carbon Footprint etc. being implemented by the College Management.

The concept, structure, objectives, methodology, tools of analysis, objectives of the audit are mentioned below.

CONCEPT

The term 'Environmental audit' or 'Green audit' means differently to different people. Terms like 'assessment', 'survey' and 'review' are also used to describe similar activities. Furthermore, some organizations believe that an 'environmental audit' addresses only environmental matters, whereas others use the term to mean an audit of health, safety and environment-related matters. Although there is no universal definition of Green Audit, many leading companies/institutions follow the basic philosophy and approach summarized by the broad definition adopted by the International Chambers of Commerce (ICC) in its publication of Environmental Auditing (1989).

The ICC defines Environmental Auditing as:

"A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of safeguarding the environment and natural resources in its operations/projects."

The European Commission, in its proposed regulation on environmental auditing, has also adopted the ICC definition of Environmental Audit. However, the outcome of Green Audit should be established with concrete evidence that the measures undertaken and facilities in the institution under green auditing.

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INTRODUCTION

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues.
Environmental Management Systems (EMS) is very popular in the industrial sector, but the general belief is that EMS is something pertaining to industries only. Other parts of the world have started adopting compatible environmental management systems either voluntarily or for promoting standards by external certification. International environmental standards do not suit the existing Indian educational system. Hence Skwheelz Resource Management has developed a compatible system by developing locally-applicable techniques.

A very simple indigenized system has been devised to monitor the environmental performance of educational institutions. It comes with a series of questions to be answered on a regular basis. Environmental conditions may be monitored from angles that are relevant to Indian requirements, without stress on legal issues or compliance. This innovative scheme is user- friendly and totally voluntary. The environmental monitoring system helps the institution to set environmental examples for the community and to educate young learners. It can be adapted to urban and / or rural situations.

Center for Sustainability

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OVERVIEW OF INSTITUTE

Dronacharya Group of Institutions, Greater Noida is affiliated to Dr. A.P.J. Abdul Kalam Technical University, Lucknow Uttar Pradesh (AKTU, Lucknow) and approved by All India Council of Technical Education, New Delhi (AICTE, New Delhi). College offer B.Tech and MBA programme.

Dronacharya Group of Institutions, Greater Noida is accredited by NAAC in 2023 and received an appreciation from Governor of UP. College has hosted AKTU Zonal Sports Fest twice (2019, 2023).

Institutions Innovation Council, Ministry of Education Cell is established in the college and received 4 star rating for 2022-23. DGI is recognized in the band "EXCELLENT" under the category" Colleges/Institutes (Private / Self-Financed) (Technical)"in Atal Ranking of Institutions on Innovation Achievement (ARIIA) 2021. DGI is awarded as “Best Performing Institute Award” by NCAT. Students of college were the winners of Hardware edition of “Smart India Hackathon” and won a cash prize of Rs. 1 Lakh. Student won Best Pitcher award in IDE Bootcamp at NITTTR Chandigarh. Student Project got selected for Kavach 2023 College also ranked in Platinum Category in AICTE – CII Survey of Industry-linked Technical Institutes 2016 with a score band of >30. 20 patents have been filed by college. College having Five Star Rating T10KT Remote Centre of IIT Bombay and IIT Kharagpur for the STTPs. College established the NPTEL Local Chapter. This has also earned us appreciation from IIT Madras. E-Yantra Robotics Lab of IIT Bombay have also been set up and also have the Nodal Centre for Virtual Labs, IIT-Delhi. College has the STC Centre of NITTTR Chandigarh.

At DGI, the holistic education experience is complemented by the grooming of the students’ personality through imparting soft skills, inquisitiveness through research, confidence building through live projects and several extracurricular students managed cultural events.

DGI has setup multiple facilities for students in partnership with multiple industry leaders such as Apple, Janatics and MTAB in the field of automation, robotics, I4.0, iOS, 3D Printing and CNC Manufacturing. Apart from technical facilities DGI has focus on all-round learning and development of students and have a dedicated incubation center for idea and start-up development in association with Atal Incubation Center.

DGI imparts education in Engineering & Technology and Management.

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27, KP-III, Greater Noida-201306

OBJECTIVES

The broad aims/benefits of the eco-auditing system would be

- Environmental education through systematic environmental management approach
- Improving environmental standards
- Benchmarking for environmental protection initiatives
- Reduction in resource use
- Financial savings through a reduction in resource use
- Curriculum enrichment through practical experience
- Development of ownership, personal and social responsibility for the university campus and its environment
- Enhancement of university profile
- Developing an environmental ethic and value systems in young people

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AUDIT PARTICIPANTS

On behalf of Institute:

Name	Position/Department
Prof. (Dr.) Arpita Gupta	Director, DGI
Dr. S K Srivastava	Registrar, DGI
Dr. Neelam Bhardwaj	IQAC Head, DGI

Audit was conducted on behalf of EHS Alliance Services:

Name	Position	Qualification
Sharad Prateek Singh	Lead Auditor	B. Tech. (Mechanical Engineering)
Vishal Kumar Singh	Co-Auditor	B. Tech. (Mechanical Engineering)
Shlok Tripathi	Co- Auditor	B. Tech. (Mechanical Engineering)

EXECUTIVE SUMMARY

An environmental audit is a snapshot in time, in which one assesses campus performance in complying with applicable environmental laws and regulations. Though a helpful benchmark, the audit almost immediately becomes outdated unless there is some mechanism in place to continue the effort of monitoring environmental compliance.

This is very first environmental audit of institute for doing their bid towards environmental protection and environmental awareness at local and global front. Audit criterion is environmental cognizance, waste minimization and management, biodiversity conservation, water conservation, energy conservation and environmental legislative compliance by the campus. A questionnaire is used during audit. This audit report contains observations and recommendations for improvement of environmental consciousness.

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AREA OF IMPROVEMENTS

- Internal inspection system should be developed for various equipments available in campus.
- Environmental drills for response against spillage and leakage of chemicals in thecampus.
- Plastic usage can be reduced in college campus.
- The monthly inventory of e-waste is required to be maintained in formats on a regular basis.

ENVIRONMENTAL AUDIT - QUESTIONARE

The areas of eco/environmental/green auditing to be followed/practiced by participating institutions:

I. Waste Minimization and Recycling
II. Greening
III. Energy Conservation
IV. Water Conservation
V. Clean Air
VI. Animal Welfare
VII. Environmental Legislative
VIII. General Practices

Dose any Environmental Audit conducted earlier?

No, this is first time a systematic way of monitoring their environmental eminence initiative taken by university for environment protection.

What is the total permanent population of the Institute?

	Year				Total
	First	**Second**	**Third**	**Fourth**	
Students	**617**	**619**	**476**	**456**	**2168**

	Male	Female	Total
Teachers	57	68	**125**
Non-Teaching Staff	75	5	**80**
Sub Total	132	73	**205**
Approximate Number of Visitors (Per day)			**20**

Where is the campus located?

The campus is Located in Knowledge Park III, Greater Noida.

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Which of the following are available in your institute?

1	Garden area	Available
2	Play ground	Available
3	Kitchen	Available
4	Toilets	Available
5	Garbage Or Waste Store Yard	Available
6	Laboratory	Available
7	Canteen	Available
8	Guest House	Available

Which of the following are found near your institute?

1	Municipal dump yard	Not in vicinity of institute
2	Garbage heap	No Garbage heaps
3	Public convenience	No Public Convenience
4	Sewer line	Yes there is a sewer line within campus
5	Stagnant water	No stagnant water
6	Open drainage	No
7	Industry – (Mention the type)	No
8	Bus / Railway station	Faraway from campus
9	Market / Shopping complex / Public halls	Yes

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I – WASTE MINIMIZATION AND RECYCLING

<table>
<tr><td>1.</td><td>Does your institute generate any waste?
If so, what are they?</td><td colspan="4">Yes, Solid waste Canteen waste, paper, plastic, Horticulture Waste etc.</td></tr>
<tr><td>2.</td><td>What is the approximate amount of waste generated per day? (in Kilograms/month) (approx.)</td><td>Bio Degradable</td><td>Non-Biodegradable</td><td>Hazardous</td><td>others</td></tr>
<tr><td></td><td></td><td>125kg</td><td>25kg</td><td>Yes</td><td><1kg</td></tr>
<tr><td>3.</td><td>How is the waste generated in the institute managed? By
1 Composting
2 Recycling
3 Reusing
4 Others (specify)</td><td colspan="4">Reuse of one side printed Paper for internal communication. Sewage water is discharged to public Sewer. Domestic Waste is given to Municipal Corporation. Two types of Waste bins are provided at campus for biodegradable and non-biodegradable waste. Horticulture waste is also given to Municipal Corporation.</td></tr>
<tr><td>4.</td><td>Do you use recycled paper in institute?</td><td colspan="4">Yes</td></tr>
<tr><td>5.</td><td>Do you use reused paper in institute?</td><td colspan="4">Yes</td></tr>
<tr><td>6.</td><td>How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.</td><td colspan="4">Not done in locality for awareness of resource crunches.</td></tr>
<tr><td>7.</td><td>Can you achieve zero garbage in your institute? If yes, how?</td><td colspan="4">Yes, it is achieved. Implementation of total waste management (segregation and processing) for Bio-Degradable, Paper Waste, E-Waste and Plastic Waste Management initiatives has been done.</td></tr>
</table>

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II – GREENING THE CAMPUS

8.	**Is there a garden in your institute?**	**Yes, areas have been developed as Gardens.**	
9.	Do students spend time in the garden?	1-2 Hours	
10.	Total number of Plants in Campus	Plant type	Approx. number
		Trees	250
		Ornamental	600
11.	Suggest plants for your campus. (Trees, vegetables, herbs, etc.)	Ashoka, Ficus, and many smaller plants planted in pots.	
12.	Is the College campus gardeners for maintain the garden	Yes, Tree Gardeners and Services of External Experts are also taken	
13.	Number of Tree Plantation Drives organized by School per annum. (If Any)	Yes, tree plantation drives are organized twice in a year in the campus.	
14.	Number of Trees Planted in Last FY.	60-70 Plants	
	Survival Rate	70 %	
15.	Plant Distribution Program for Students and Community	Yes, Saplings are distributed to Students and visitors at various Occasions.	
16	Plant Ownership Program	Various Trees are Planted and owned by Visitors as well as students.	

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III – ENERGY

17.	Listen ways that you use energy in your institute	Electricity saves by use of CFL/LED bulbs for illumination, Alternate source of energy i.e. Solar Panels Installed.
18.	Are there any energy saving methods employed in your institute? If yes, please specify. If no, suggest some	Yes, Renewable source of energy through solar panels is being used. Use of Natural Lights and Natural Ventilation are promoted.
19.	How many CFL/LED bulbs has your institute installed?	93 % of Total Conventional bulbs are replaced by LED/CFL Lights.
20.	Are any alternative energy sources employed / installed in your institute? (photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.	Yes, photovoltaic cells for solar energy, energy efficient stoves
21.	Do you run "switch off" drills at institute?	Yes
22.	Are your computers and other equipment's put on power-saving mode?	Yes, In Practice
23.	Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby modes most of the time? If yes, how many hours?	No

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IV – WATER CONSERVATION

24.	List four uses of water in your institute	Basic use of water in campus: 1. Drinking – 2000KL/month 2. Gardening – STP treated water 3. Kitchen and Toilets – 1300KL/month 4. Others – 1500 KL/month
25.	How does your institute store water? Are there any water saving techniques followed in your institute?	01 Overhead Water Tanks. Avoid overflow of water, controlled valves are provided in water supply system. Close supervision for water supply system.
26.	If there is water wastage, specify why and How can the wastage be prevented / stopped?	No
27.	Locate the point of entry of water and point of exit of waste water in your institute. Entry- Exit-	Entry- Water comes from one Submersible Pumps at campus Exit- From Water Drainage System to STP and ETP
28.	Write down four ways that could reduce the amount of water used in your institute	Basic Four ways: 1. Close the taps after usage 2. Maintenance and monitoring of valves in supply system to avoid overflow, leakage and spillage 3. Water Conservation awareness for new students
29.	Record water use from the institute water meter for six months (record at the same time of each day). At the end of the period, compile a table to show how many litres of water have been used.	No, Water Meters available for calculation of usage of total quantity only.
30.	Does your institute harvest rain water?	Six number of rain water harvesting system are available.
31.	Is there any water recycling System.	Yes

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V – CLEAN AIR

32.	**Are the Rooms in Campus are Well Ventilated?**	**Yes**		
33.	Window Floor ratio of the Rooms	**Very Good**		
34.	What is the ownership of the vehicles used by your school? (Please Tick ✓ only one)		Yes	
			Operator-owned vehicles	
		✓	College-owned vehicles	
			A combination of campus-owned and operator-owned vehicles	
35.	Provide details of school-owned motorized vehicles?	Buses	Cars	
	No. of vehicles	17	1	
	No. of vehicles more than five years old	5		
	No. of Air-conditioned vehicles	--		
	PUC done	Yes		
36.	Specify the type of fuel used by your school's vehicles:	**Buses/Cars**		
	Diesel	--		
	Petrol	1		
	CNG	17		
	LPG	--		
	Electric	--		
37.	Air Quality Monitoring Program (If Any)	Yes, Monitoring is being done by approved Laboratory		
38.	Students suffer from respiratory ailments? (If Any)	No		
39.	Details of Genset	Yes, The capacities of generators are combined is 1100KW		

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VI – ANIMAL WELFARE

39	List the animals (wild and domestic) found on the campus (dogs, cats, squirrels, birds, insects, etc.)	Birds, a variety of birds species and Squirrels are commonly found in campus.
40.	How many dogs in your area have undergone Animal Birth Control - Anti Rabies (ABC - AR)?	Not required
41.	Does your institute have a Biodiversity Programme or a KARUNA CLUB?	NO

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VII – ENVIRONMENTAL LEGISLATIVE COMPLIANCE

42.	Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
43.	Does your institute have any rules to protect the environment? List possible rules you could include.	Yes, College has its own Environment Policy
44.	Dose Environmental Ambient Air Quality Monitoring conducted by the Institute?	Yes
45.	Dose Environmental Water and Wastewater Quality monitoring conducted by the Institute?	Yes
46.	Dose stack monitoring of DG sets conducted by the Institute?	Yes
47.	Is any warning notice, letter issued by state government bodies?	No
48.	Dose any Hazardous waste generated by the Institute? If yes explain its category and disposal method	Yes
49.	Dose any Bio medical waste generated by the Institute? If yes explain its category and disposal method	Yes, it is being disposed through incinerators.

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VIII – GENERAL

50.	Does housekeeping schedule in your campus?	Yes, Swatch Bharat movement
51.	Are students and faculties aware of environmental cleanliness ways? If Yes Explain	Yes, Periodically pollution reduction, plantation, energy conservation awareness campaigns carried out by institute
52.	Dose Important Days Like World Environment Day, Earth Day, and Ozone Day etc. eminent in Campus?	Yes
53.	Dose Institute participated in National and Local Environmental Protection Movement?	Yes, Swatch Bharat Abhiyan by students at campus.
54.	Dose Institute has any Recognition/certification for environment friendliness?	No
55.	Dose Institute using renewable energy?	Yes
56.	Dose Institution conducts a green/environmental audit of its campus?	No, this is first environmental audit done by institution
57.	Has the institution been audited / accredited by any other agency such as NABL, NABET, TQPM, NAAC etc.?	No

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BEST PRACTICES/INITIATIVES FOR ENVIRONMENT

A	**Renewable Energy** A clean source of energy is utilized at campus. Efforts towards **Carbon Neutrality** The capacity of 450 KW Solar plant on building roofs is commissioned and operating.
B	**Tree Plantation Drives** Two Drives are conducted Annually as well as Every Guest is honored by Tree Plantation at Campus.
C	**Ground Water Recharge** 6 units of Rain Water Harvesting System.
D	**E Waste Management** Regularly discarding waste off to municipal waste collector
E	**Solid Waste Management** Segregation and processing of bio-degradable waste to be turned in compost. Segregation and need based shredding of plastic waste; which is lifted by authorized municipal collector. Segregation of mixed waste which is lifted by authorized municipal collector.

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RECOMENDATIONS

- Environmental Monitoring i.e. (Ambient Air Quality monitoring, Water and wastewater monitoring need to be conducted by UP State Pollution Control Board, approved laboratory with frequency of six month.
- Water Meter should be installed at institute for monitoring of water consumption per capita.
- Increase in Environmental promotional activities for spreading awareness at campus and in the locality.
- Environment/Green committee formation for regulating eco-friendly initiatives at campus premises and periphery.

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CONCLUSION

This audit involved extensive consultation with all the campus team, interactions with key personnel on wide range of issues related to Environmental aspects. Overall, about 40% of university campus is for landscaping. The audit has identified several observations for making the campus premise more environmentally friendly. The recommendations are also mentioned with observations for institute campus team to initiate actions.

The audit team opines that the overall site is maintained well from environmental perspective. There is no major observations but few things are important to initiate urgently are metering of water usage per person, rainwater harvesting recharge; water balance cycle and periodic inspection of buildings; environment policy and initiatives like composting and segregation & processing of plastic waste should be initiated urgently.

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REFERENCE

- The Environment [Protection] Act – 1986 (Amended 1991) & Rules-1986 (Amended 2010)
- The Petroleum Act: 1934 – The Petroleum Rules: 2002
- The Central Motor Vehicle Act: 1988 (Amended 2011) and The Central Motor Vehicle
- Rules:1989 (Amended in 2005)
- Energy Conservation Act 2010.
- The Water [Prevention & Control Of Pollution] Act – 1974 (Amended 1988) & the Water (Prevention & Control of Pollution) Rules – 1975
- The Water [Prevention & Control Of Pollution] Cess Act-1977 (Amended 2003) and Rules-1978
- The Air [Prevention & Control Of Pollution] Act – 1981 (Amended 1987) The Air (Prevention & Control of Pollution) Rules – 1982
- The Gas Cylinders Rules – 2016 (Replaces the Gas Cylinder Rules – 1981
- E-waste management rules 2016
- Electrical Act 2003 (Amended 2001) / Rules 1956 (Amended 2006)
- The Hazardous Waste (Management and Handling and Trans-boundary Movement) Rules, 2008 (Amended 2016)
- The Noise Pollution Regulation & Control rules, 2000 (Amended 2010)
- The Batteries (Management and Handling) rules, 2001 (Amended 2010)
- Relevant Indian Standard Code practice

Director
Dronacharya Group of Institutions
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Certificate of Registration

THIS IS TO CERTIFY THAT THE QUALITY MANAGEMENT SYSTEM OF

Dronacharya Group of Institutions

Site: #27, Knowledge Park-III, Greater Noida
Uttar Pradesh, PIN - 201306

HAS BEEN FOUND TO CONFORM TO THE STANDARD

ISO 10001:2018

(Quality Management- Customer Satisfaction- Guidelines for codes of conduct for organziations)

Approval is hereby granted for registration, provided the certification rules and conditions are observed at all times

THIS CERTIFICATE IS VALID FOR THE FOLLOWING SCOPE:

Provision of Education in the field of Engineering and Management.

Director
Dronacharya Group of Institutions
27, KP-III, Greater Noida-201306

First Date of Issue
22/05/2023

Date of Reissue
21/05/2024

Certificate Validity
3 Years

Reissue Due Date
22/05/2025

Certificate Number
ECA/02/5302024

Technical Manager

EUROPEAN COMPLIANCE ASSESSMENT

This certificate is issued by European Compliance Assessment, Level 20 & 21, Baston Tower, 5 Place Du Champ De Mars, B-1050, Brussels, Belgium. This certificate remains the property of European Compliance Assessment and must be returned on request. It must not be altered ir defaced in any way and deliberate misuse of the certificate will result in cancellation without notification. Please check at www.ecaseuro.net for validity of the certificate.

Certificate of Registration

THIS IS TO CERTIFY THAT EDUCATIONAL ORGANIZATION MANAGEMENT SYSTEMS OF

Dronacharya Group of Institutions

Site: #27, Knowledge Park-III, Greater Noida,
Uttar Pradesh, PIN - 201306

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ISO 21001:2018

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AM GREEN
RECYCLING

Certificate of Appreciation

This certificate is presented to

Dronacharya Group of Institutions

Knowledge Park III, Greater Noida, Uttar Pradesh

for demonstrate commitment paper waste recycling by becoming

A

AM GREEN RECYCLING

GREEN PARTNER (2022-23)

Director
Dronacharya Group of Institutions
27, KP-III, Greater Noida-201306

For AM GREEN RECYCLING

MD AKHTAR
Proprietor

AG/2023/01

Certificate No

Signature

Certificate of Appreciation

AM GREEN RECYCLING

This certificate is presented to

Dronacharya Group of Institutions

Knowledge Park III, Greater Noida, Uttar Pradesh

for demonstrate commitment paper waste recycling by becoming

A

AM GREEN RECYCLING

GREEN PARTNER (2023-24)

AG/2024/03

Certificate No

Director
Dronacharya Group of Institutions
27, KP-III, Greater Noida-201306

For AM GREEN RECYCLING

MD AKHTAR

Proprietor

Signature

Certificate of Appreciation

THIS CERTIFICATE APPRECIATES THAT,

Dronacharya Group of Institutions

has signed the "Not Zero-Net Zero" Pledge to become
Carbon Neutral Educational Institute

We appreciate your efforts in combating Climate Change and
Sustain our Environment for Future Generation

Rajendra Shende
Chairman
TERRE Policy Centre,
Former Director UNEP

Director
Dronacharya Group of Institutions
27, KP-III, Greater Noida-201306