

ENERGY AUDIT REPORT

Presented

For

**St. Vincent Pallotti College & Engineering &
Technology**



Contents

ACKNOWLEDGEMENT	2
DISCLAIMER	3
1.0 Introduction	4
1.1 About Institute.....	5
1.2 Details of Programme/ Level	5
1.3 Location of College	6
3.0 Energy Audit	7
3.1 Energy Audit: Types and Methodology	7
3.2 Need for Energy Audit.....	7
3.3 Type of Energy Audit	7
3.3.1 Energy Audit Methodology	7
4.0 Preliminary Audit	9
4.1 About the Unit (College)	9
4.2 Energy Scenario	9
4.3 Detailed Audit	13
4.5 Solar Energy	16
4.6 Requirement of NAAC	17
4.7 Conclusion	17

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- Dr.Fr.Paul M.Chandrankunnel- Director SVP CET.
- Dr.Vijay M.Wadhai-Principal SVP CET.
- Dr. Nitin Dhote, Dean-IQAC SVP CET
- Dr. Ghanshyam Boob, Co-ordinator- IQAC SVP CET

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

Audit Team has prepared this report for St. Vincent Pallotti College of Engineering and Technology, Nagpur based on input data submitted by the representatives of College 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 calculations 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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Certificate of Energy Audit

Academic Year 2025-26

This is to certified that NSVK ENGINEERS conducted Energy Audit of St. Vincent Pallotti College of Engineering and Technology, Nagpur. The initiatives taken by the institute for energy saving and conservations are satisfactory.



For NSVK ENGINEERS

Mr.Pramod Daspute (EA-6453)

Date: -17/09/2025

Place: - SOLAPUR

1.0 Introduction

Energy, Environmental & green audit is one of major parameters for institute development. These parameters covered under criteria 7 of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India which declares the institutions as Grade A, B or C according to the scores assigned during the accreditation

Definition & Objectives of Energy Management

The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Energy Audit defines as "The strategy of adjusting and optimizing energy, using systems and procedures so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems" The objective of Energy Management is to achieve and maintain optimum energy procurement and utilization, throughout the organization and:

- To minimize energy costs / waste without affecting production & quality
- To minimize environmental effects.

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.” Green audit is a valuable means for a college to determine how and where they are using the most energy or water or other resources; the college can then consider how to implement changes and make savings. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. If self-inquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus, it is imperative that the college evaluate its own contributions towards a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

1.1 About Institute

St. Vincent Pallotti was a Catholic priest who founded the Society of the Catholic Apostolate (SCA), commonly known as the Pallottines, around 150 years ago. Born on April 21, 1795, Pallotti was canonized in 1963. His commitment to his apostolate led him to start orphanages, night schools and technical institutions that exist even today. Besides, he had special compassion for prisoners, soldiers and the sick. He was also the spiritual director of several Roman Colleges. The society founded by Pallotti has numerous institutions in 46 countries across the globe. In India, the Pallottines have premier educational as well as institutions of higher learning in Maharashtra, Goa, Chhattisgarh, Madhya Pradesh, Delhi, Jharkhand, Bihar, Tamil Nadu, Karnataka and Kerala. The Nagpur Pallottine Society Nagpur, which manages St. Vincent Pallotti College of Engineering & Technology, is a part of this International Society.

St. Vincent Pallotti College of Engineering & Technology established in 2004, is one of the premier institutes in central India. The college, managed by the Pallottine Fathers, aims to provide quality technical education to the students of the region and nation. The college offers undergraduate programs in Mechanical Engineering, Electrical Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information Technology, Civil Engineering and two Post Graduate programs in CAD/CAM and CSE. Two undergraduate programs viz, Electrical Engineering. And Computer Engineering are accredited by National Board of Accreditation. The institute is also a centre for higher learning & research in Mechanical Engineering approved by RTM, Nagpur university.

1.2 Details of Programme/ Level

The programmes offered by the college at different levels are U.G., P.G. and Certified courses. Details of programmes offered by the college is as below

Sr.no.	Course / Program	Intake per Year
01	Mechanical Engineering	60
02	Electrical Engineering	60
03	Computer Science & Engineering	120
04	Electronics & Telecommunication Engineering	60
05	Information Technology	60
06	Civil Engineering	60
07	Computer Science & Engineering (Data Science)	60
08	Artificial Intelligence	60
09	Computer Science and Business Systems	60
10	Computer Science & Engineering (Cyber Security)	60
11	Industrial IOT	60
12	Robotics and Artificial Intelligence	60
13	PG- M Tech (Big Data Analytics)	12
14	PG- M Tech (Automotive Technology)	12
15	PG- M Tech (Power Electronics and Power Systems)	12
16	PG- M Tech (Embedded Systems and VLSI Design)	12
17	PG -M Tech (AI-ML)	12
18	B-Voc	120

The college has organized national conference and International conference, seminars and state level workshops. The students are also reciprocating by their high achievements in academic performance.

1.3 Location of College

The college is located at Gavsi Manapur, Wardha Road, Nagpur, Maharashtra India. The college is located with urban area community.



3.0 Energy Audit

3.1 Energy Audit: Types and Methodology

Energy Audit is the key to a systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with its use, and serves to identify all the energy streams in a facility. It quantifies energy usage according to its discrete functions. Industrial energy audit is an effective tool in defining and pursuing comprehensive energy management programme. As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption"

3.2 Need for Energy Audit

In any institution, the three top operating expenses often found to be energy (both electrical and thermal), staff and materials. If one were to relate to the manageability of the cost or potential cost savings in each of the above components, energy would invariably emerge as a top ranker, and thus energy management function constitutes a strategic area for cost reduction. Energy Audit will help to understand more about the ways energy and fuel are used in any industry, and help in identifying the areas where waste can occur and where scope for improvement exists. The Energy Audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programme which are vital for production and utility activities. Such an audit programme will help to keep focus on variations which occur in the energy costs, availability and reliability of supply of energy, decide on appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation equipment etc. In general, Energy Audit is the translation of conservation ideas into realities, by lending technically feasible solutions with economic and other organizational considerations within a specified time frame.

The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs. Energy Audit provides a " bench-mark" (Reference point) for managing energy in the organization and also provides the basis for planning a more effective use of energy throughout the organization.

3.3 Type of Energy Audit

The type of Energy Audit to be performed depends on: - Function and type of industry - Depth to which final audit is needed and - Potential and magnitude of cost reduction desired Thus Energy Audit can be classified into the following two types.

- Preliminary Audit
- Detailed Audit

3.3.1 Energy Audit Methodology

3.3.1.1 Preliminary energy audit is a relatively quick exercise to:

- Establish energy consumption in the organization
- Estimate the scope for saving
- Identify the most likely and the easiest areas for attention

- Identify immediate (especially no-/low-cost) improvements/ savings
- Set a 'reference point'
- Identify areas for more detailed study/measurement
- Preliminary energy audit uses existing, or easily obtained data

3.3.1.2 Detailed Energy Audit Methodology

A comprehensive audit provides a detailed energy project implementation plan for a facility, since it evaluates all major energy using systems. This type of audit offers the most accurate estimate of energy savings and cost. It considers the interactive effects of all projects, accounts for the energy use of all major equipment, and includes detailed energy cost saving calculations and project cost. In a comprehensive audit, one of the key elements is the energy balance. This is based on an inventory of energy using systems, assumptions of current operating conditions and calculations of energy use. This estimated use is then compared to utility bill charges.

4.0 Preliminary Audit

4.1 About the Unit (College)

The college offers degree courses in Engineering and technology. This college infrastructure including internet and computer facilities, well equipped laboratories, research Centre, Library, huge premises and playgrounds, and learning resources facilitating to the career building of the students.

LT/ HT Connection

For the institute HT connections observed during the walk-through audit.

Sr. No.	Energy/Power Supplier	Meter No.	Remark
1	Maharashtra State Electricity Distribution Company Limited.	420819008640	146 HT-VIII B

4.2 Energy Scenario

4.2.1 Energy Consumed Per Month

As an academic institute total units consumed by the institute is 2,17,48 units. During summer energy consumption is more. Highest energy consumption in month of April which is 20909 units.

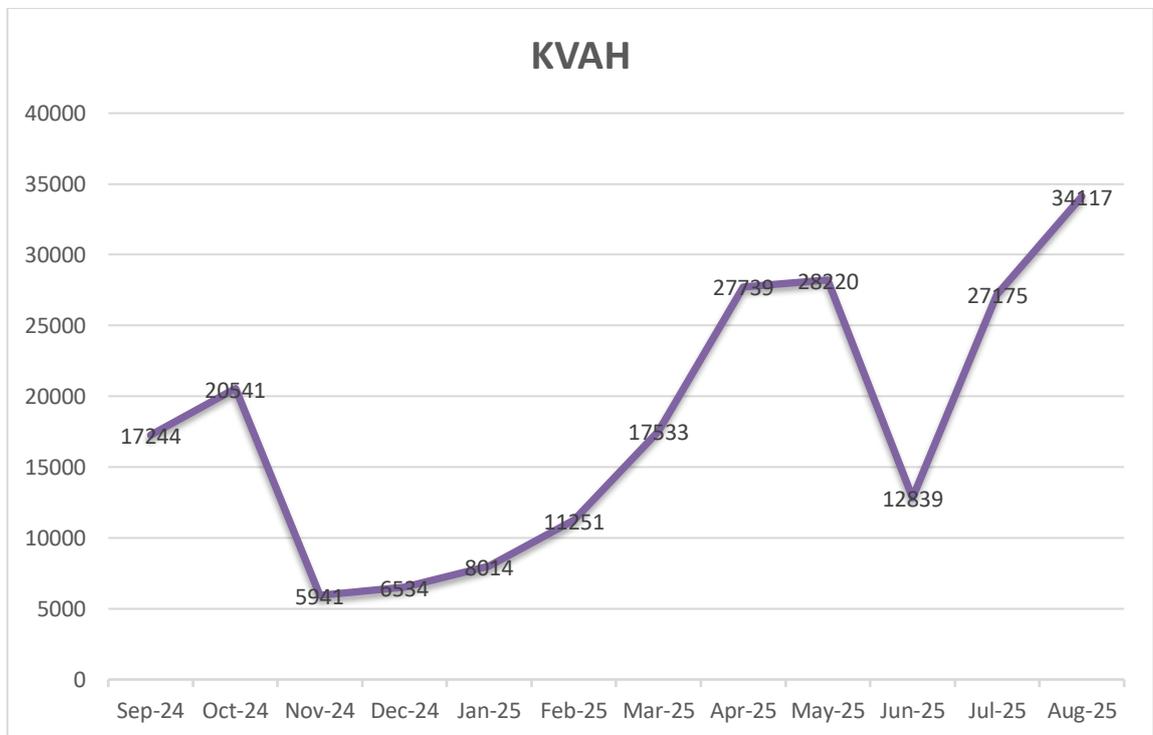


Fig. 1. Institute energy consumption details.

4.2.1 Energy cost Per Month

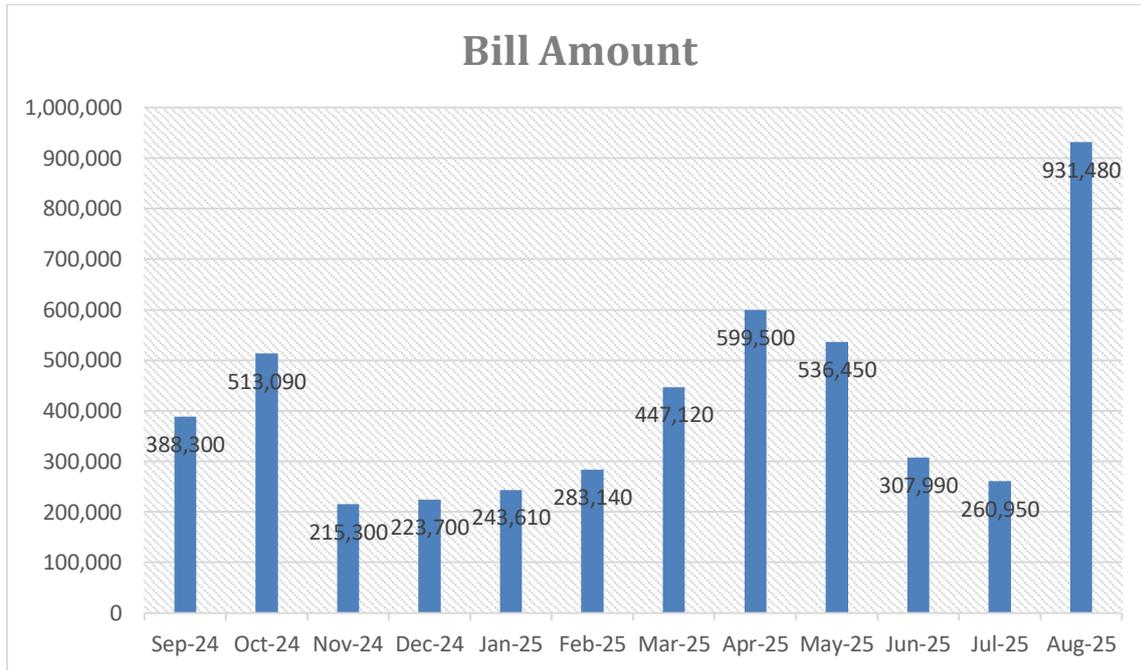


Fig. 2. Electricity bill amount.

- Institute electricity bill amount is Rs. 4950630/- per year.
- Per unit cost is Rs.22.79 seek reduction in per unit cost as compare to previous year

4.2.2 Power Factor per Month

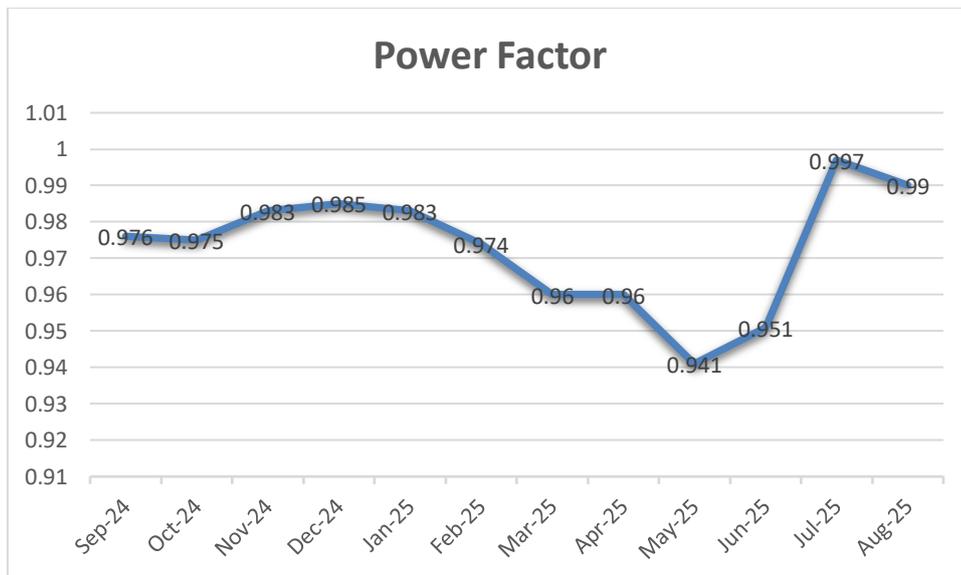


Fig 3. Billing Power Factor

Observation:- Power factor is within MSEDCL limit rules. Yearly average power factor is 0.973. It can save 2.73% of units by improving the PF to unity.

4.2.3 TOD Charges

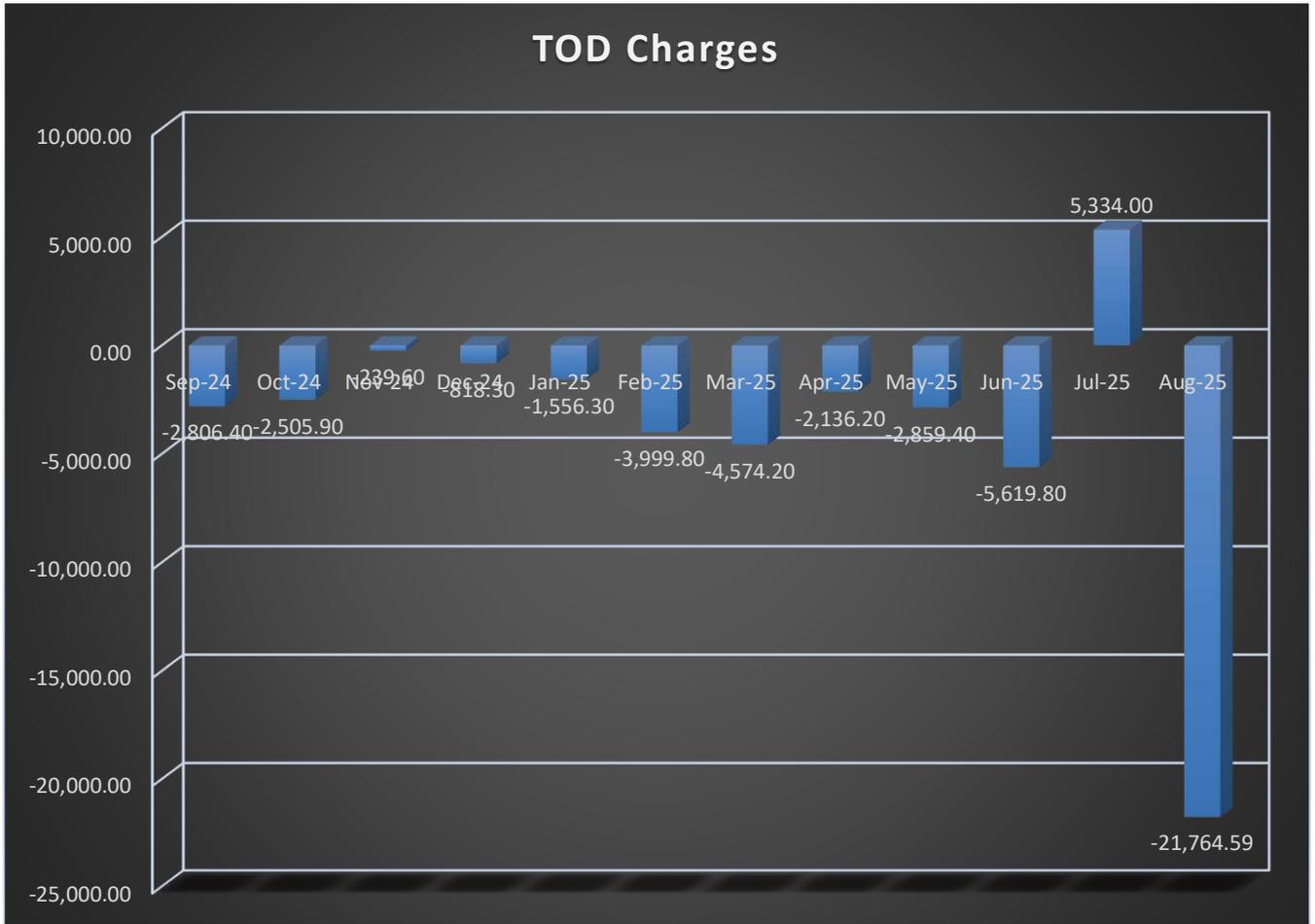
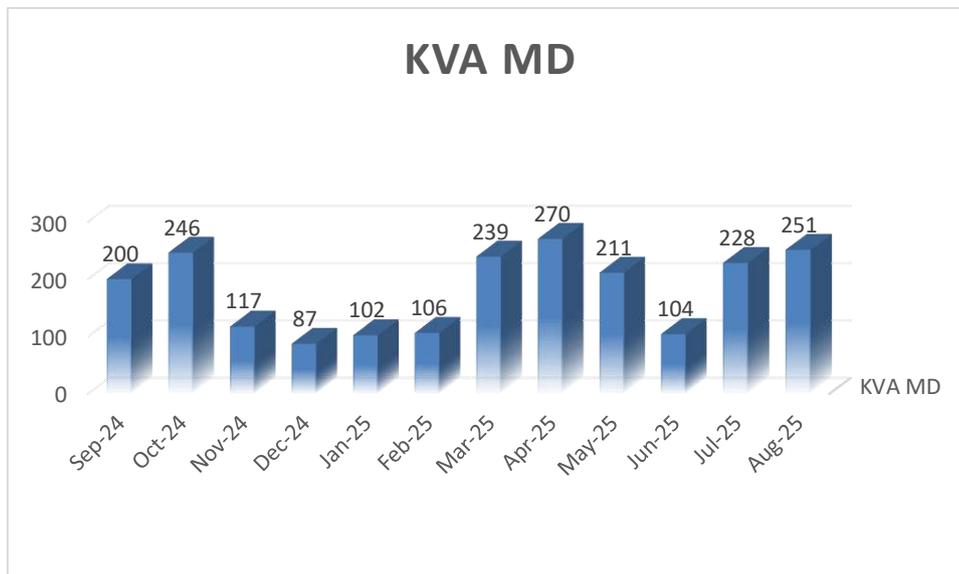


Fig. 4 TOD Charges

Observation:- Annual TOD charges is 43546 (Incentive from MSEDCL). Compared to previous year 2023-24 21% more saving in TOD charges

4.2.4 KVA MD Charges



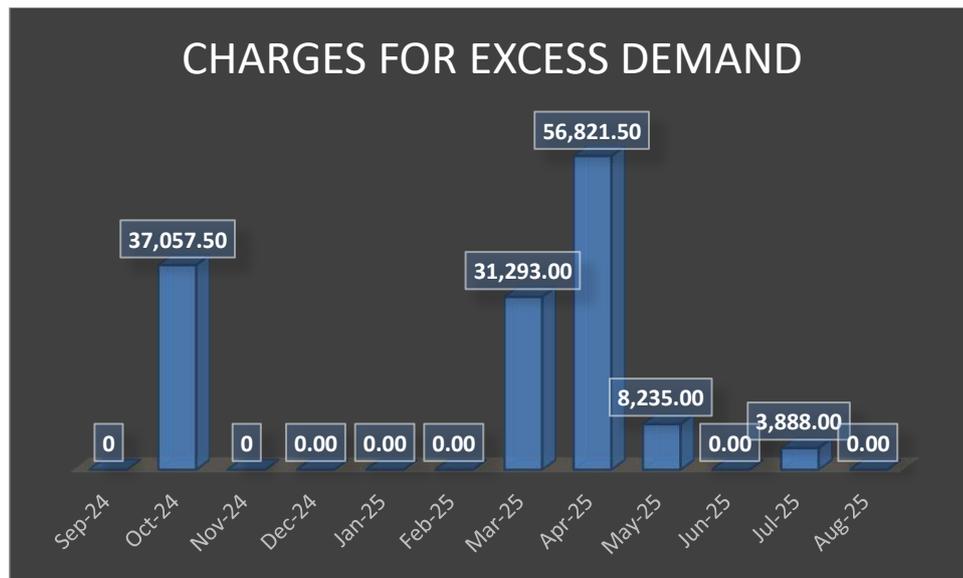


Fig. 5 KVA MD Chart.

Observation:-For the electricity connection Contract Demand (KVA) is 201. But in month of April and May demand is exceeded and penalty is applied which is 1.5 times more. Institute paid Rs. 1,37,495/- for excess demand which is 221% more than previous year charges.

4.3 Detailed Audit

4.3.1 Need for Energy Conservation

Power shortage hampers the economic growth of any State. Energy Conservation is the cheapest, easiest and cleanest way for bridging the gap between demand and supply. It is estimated that energy conservation projects require only one fifth of investment compared to the investment required for installation of new power projects.

4.3.2 Recommended frequency of Energy Audit

The interval time for the conduct and completion of subsequent energy audit shall be three years with effect from date of the report of the first energy audit conducted and completed by Energy Auditor.

4.3.3 Connected Load or Contract Demand

Sr. No.	Load Type →	PC	Tube Light	Fan	AC	UPS	LCD Projector	Touch Screen
	Premises Name ↓							
1	Admission Cell	11	11	6	7	3	1	
2	AI	30	4	4		1		
3	CE	183	101	70	3	9	3	5
4	Civil	80	89	61	6	7	5	
5	CSE DS		86	55	3	9		8
6	CS CSE	60	6	4		1		1
7	DS		25					1
8	DSE AND AI	120	26	15	5	1	2	1
9	Electrical	18	76	65	3	21	3	4
10	ETC	141	62	29	3	4	3	
11	Exam Cell	20	13	15	1	18	1	0
12	Finance	12	6	9	1	12		
13	First Year	115	261	118	12	23	12	9
14	IT	139	93	47	6	16	3	9
15	Library	75	73	38	1	3		
16	ME	80	141	94	7	21	6	4
17	Scrutiny Centre	5	6	1	1	5		
18	Spot Valuation	77	13	10	2	2		
Total		1166	1092	641	61	156	39	42
	Wattage per Equipment	200	20	50	1500	2000	500	500
	Wattage	233200	21840	32050	91500	312000	19500	21000
Total Wattage		731 kW (Connected)						

4.3.4 Total electricity purchased from utilities

In Maharashtra state main supplier of electricity is Maharashtra state Electricity Distribution Company limited. Almost all the electricity has been purchased from same supplier. In emergency college has generator unit for supply of electricity.

4.3.5 Load distribution pattern (total lighting load, air cooling load and other loads)

For the unit major load is air cooling (Fan) and lighting. Lighting and air cooling load is about 7.3% of full load. Computers consumed about 31.89% of total connected load. The detailed load distribution is shown in below chart.

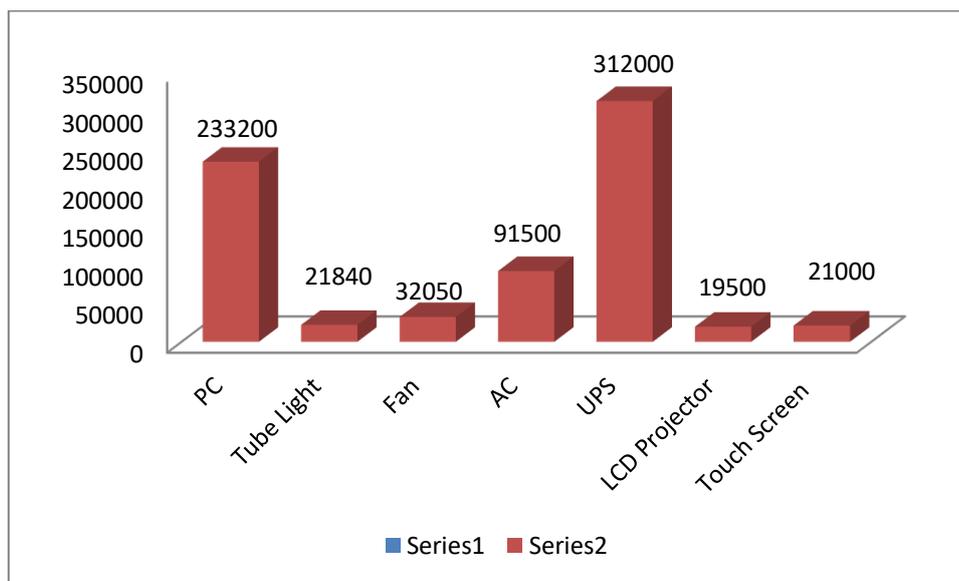


Fig. 6 Load distribution in Watts.

- **Payment of electricity bills**

Supplier i.e., Maharashtra state Electricity distribution company limited took monthly reading and send energy/electricity bill to consumer. Also on web portal of supplier monthly electricity bill and history of payment and last 12 month energy consumption.

- **Authority responsible for payment of electricity bills and payment mechanism**

Head of the institute is responsible for payment of bill assistance with office staff. Monthly received bill has been proceed and paid through bank cheque, NEFT or RTGS. Sometimes bill has been paid at supplier bill collection center.

- **Status of Bill Payments on time/Delay in Bill Payments, percentage paid**

Delayed in payment has been observed since last 12 month. Bill payment has been made time to time to avoid charges and penalty.

4.4 Energy Saving Measures and Payback period calculation

4.4.1 Energy Saving Measures

When our energy engineers visited institute and found out energy saving measures. Our measurement, analysis and study have come up with the following suggestion & recommendations for energy conservation. It is observed that 641 energy consuming fans are operative in college campus. We recommend to replace with energy efficient cooling fans.

4.4.2 Payback period calculation

Payback period calculation has been taken in two different forms. One while considering replacement of equipment and other with all replacement of equipment's. We have considered following parameters for payback period calculations

- Light luminaries working for 8 hr/day
- Fan working for 6 hr/day
- Electricity cost is Rs.4.68 per unit.

Sr. No.	Parameters	Existing Luminaries & Fans	replacement of equipment with energy efficient devices
1.	No of Fans & Luminaries installed	641(Fans)	641 (Fans
2.	Rating in Watts	50 watts (Fan	28 watts (Fan
3.	Operating hours inDay	8 hr/Day	8 hr/Day
4.	Energy Consumption in Day in Units	256 units (Maximum) (50*641*8)	143 units (Maximum) (28*641*8)
5.	Total Energy Consumed in Year (125 days working)	32000 Units	17875 units
6.	Energy price per Unit	Rs.23.62	Rs.23.62
7.	Total cost for energy in year	Rs.7,55,840/-	Rs.4,22,207/-

- Total Investment = 641*3000(Cost of Fan)
= Rs. 19,23,000/-
- Cost Saving per year= Rs.7,55,840 -Rs. 4,22,207/-
=Rs.3,33,633/

Pay Back Period=Rs.1923000/3,33,633 = 5.5 Years

4.5 Solar Energy

Institute has roof top solar of capacity of 184kW with net metering facility.

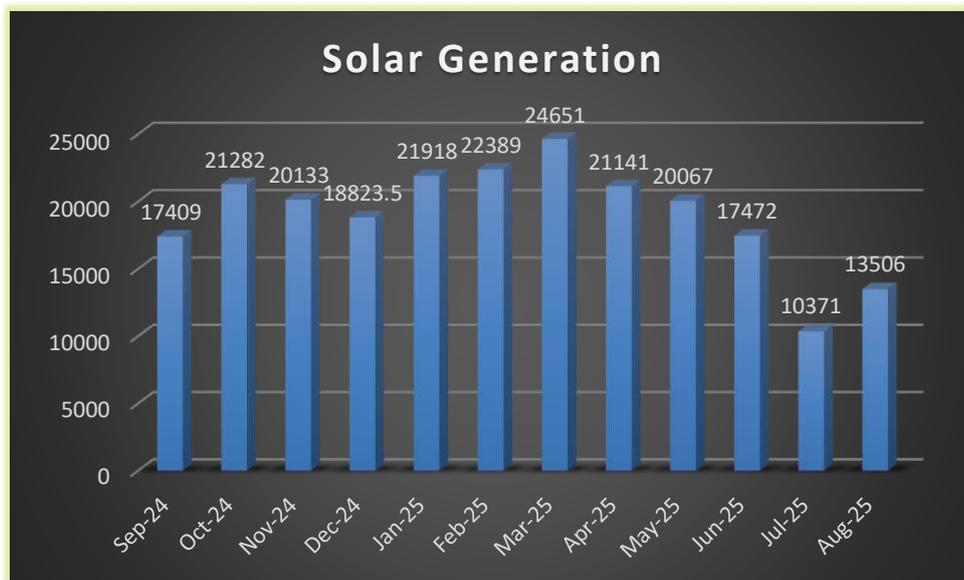


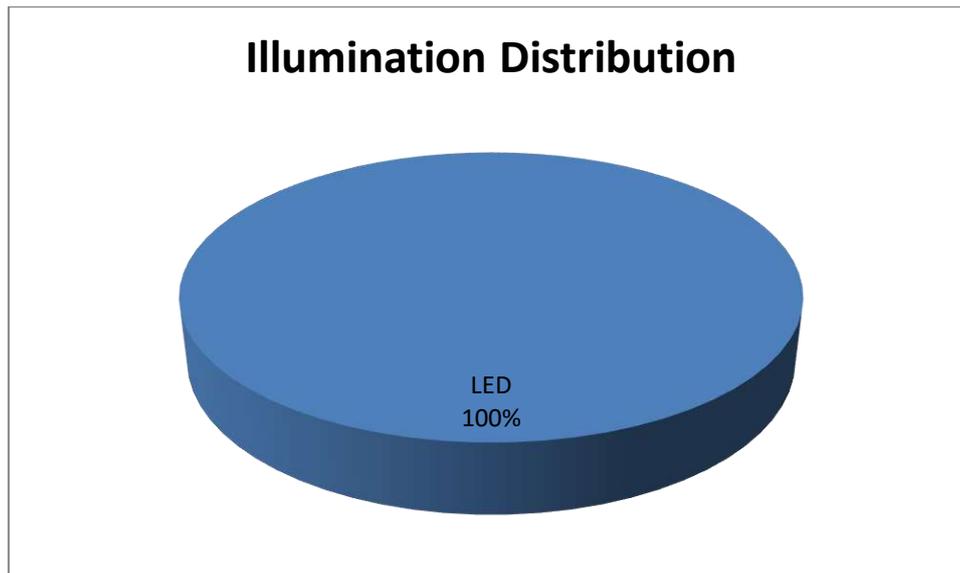
Fig. 7 Solar Roof top generation,export and import.

Observation:-Total units generated by solar unit is 2,29,162,total export units 66944 and import units 398010.

4.6 Requirement of NAAC

Percentage of lighting power requirement met through LED bulbs

Type	Quantity	Load in Watts	% Load
LED	1092	20	100%
Total	1092	21840	100%



4.7 Conclusion

- TOD charges are reduced by 21% as compare to year 2023-24.
- Solar generation is increased by 4553 units as compare to last year.
- Excess demand cahrges (penalty)is paid 221% moe than last year.It is ecommendation for instllation of maximum demand controller.
- Conventional fan which consumes 50 to 70 kW should be replaced with new energy saving BLDC fans which conserveres energy near about 50%.
- Establish a Facility Management System, exclusively for energy efficiency activities like Green Classroom Pledge, Energy Slogan Banners, Energy Charades, Make Energy Board Games.
- It is suggested to install new roof top solar plant of 50kW which generates 200–300 kWh per day and annually 75000 units per year.
- Average Kwh/Kwp/day is 3.54 however it is expected to be in the range of 4.3 to 4.5.This is to be addressed to solar vendor.
- Power factor is within MSEDCL limit rules. Yearly average power factor is 0.973. It can save 2.73% of units by improving the PF to unity