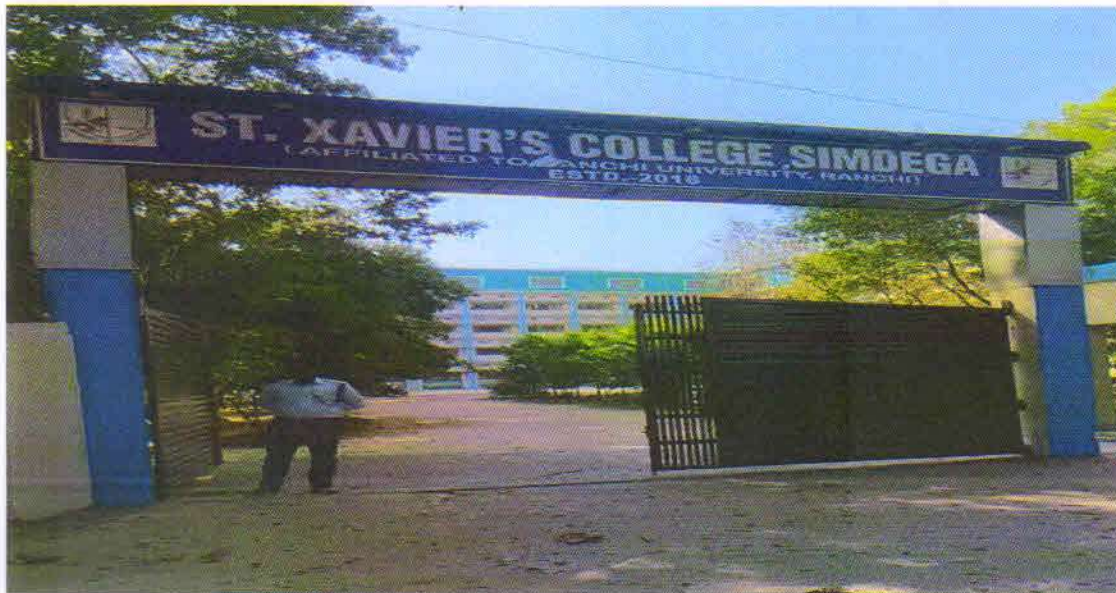


Energy Audit Report For St. Xavier's College, Simdega, Jharkhand



Submitted To



St. Xavier's College, Simdega

Environmental Laboratories & Engineering Services Pvt. Ltd.

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ISO 9001:2015 Certified, OHSAS: 2007 Certified

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Monitoring & Analysis].

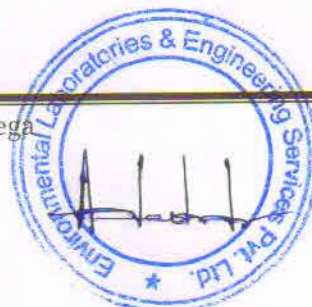
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(December 2023)



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ACKNOWLEDGEMENT

The energy audit of the St. Xavier's College, Simdega campus was entrusted to Environmental Laboratories & Engineering Services Pvt. Ltd. (ELESPL), Ranchi, as part of the institution's commitment to sustainability and environmental responsibility.

ELESPL extends its sincere gratitude to the following officials of St. Xavier's College, Simdega for their invaluable support, cooperation, and hospitality extended to the audit team during the field study:

- Dr. Fr. Ephrem Gerald Baa (Acting Principal)
- Dr. Deependra Kumar Sinha – Assistant Professor
- Dr. Jayant Kashyap – IQAC In-Charge
- Miss Kausilya Kumari – Office Assistant In-Charge
- Mr. Sandeep Kerketta – Senior Electrical & Generator In-Charge
- Mr. Alexander Dungdung – Office Assistant & Operator

Their proactive assistance played a crucial role in the successful completion of the audit.



Authorized Signatory
AKASH KUMAR
Quality Manager
ELES PVT. LTD.

1. About the College

1.1 Introduction

St. Xavier's College, Simdega, is a Catholic Minority Institution of Higher Education, established by the Ranchi Jesuit Society. Dedicated to providing quality education, particularly to tribal students and marginalized communities, the college fosters intellectual, social, and spiritual growth. It is a part of the "Xaviers Ranchi" society, registered under the Society's Registration Act XXI of 1860 (No. 198/2005-2006 Jharkhand, No. 13/1958-59 Bihar). The college operates on the premises of St. John Berchmans Apostolic School, Samtoli.

Named in honor of St. Francis Xavier, one of the founding members of the Society of Jesus, the college commenced its academic journey on August 1, 2016, with 454 students enrolled in undergraduate programs in Arts and Commerce. Affiliated with Ranchi University, Jharkhand, the institution awards degrees recognized by the university.

As a premier center for higher education in the region, St. Xavier's College, Simdega, upholds a strong commitment to academic excellence and holistic student development. The college offers undergraduate and postgraduate programs in Arts and Commerce, fostering a research-oriented learning environment. Equipped with modern infrastructure, a highly qualified faculty, and a dynamic campus life, the institution promotes both academic and extracurricular achievements.

Rooted in Jesuit educational traditions, the college nurtures responsible citizens who contribute positively to society. Through its focus on discipline, ethical values, and social service, St. Xavier's College, Simdega, continues to be a beacon of knowledge and leadership development in Jharkhand.

1.2 Geographical Position

St. Xavier's College, Simdega, is located in a serene, pollution-free environment in Samtoli, approximately 2 kilometers west of the Simdega Bus Stand, in Simdega district, Jharkhand, India. The college is geographically positioned at 22°37'08" N latitude and 84°28'49" E longitude. The campus spans approximately 5 acres, encompassing academic buildings, playgrounds, parking facilities, and lush greenery. The built-up area within the campus covers around 0.25 acres, providing a well-structured space for education and student activities.





Figure 1: Total Campus Area

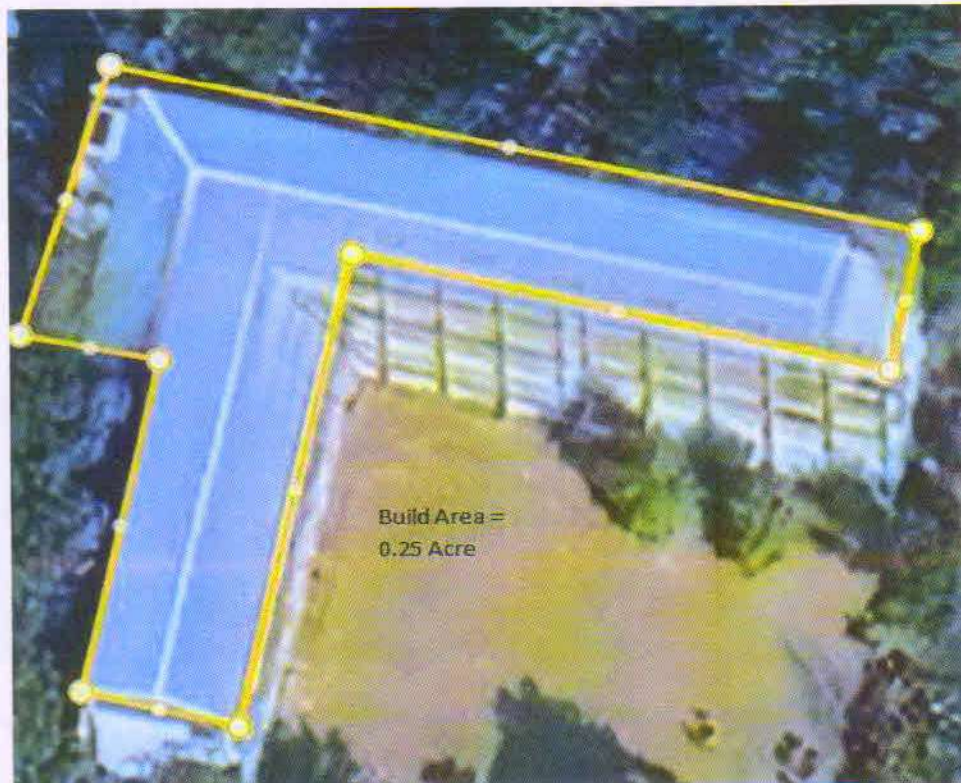


Figure 2: Total Buildup Area

1.3 Undergraduate Programs and Subjects

St. Xavier's College, Simdega, offers undergraduate programs in the Arts and Commerce streams, providing students with a well-rounded education aimed at academic excellence and personal growth.

Bachelor of Arts (B.A.) Subjects:

- English
- Hindi
- Economics
- History
- Political Science
- Geography

These programs are designed to equip students with critical thinking skills, a deep understanding of their chosen disciplines, and a strong foundation for future academic and professional pursuits.

1.4. Student Enrollment and Faculty Strength

As per the latest available data, the college has a total student enrollment of approximately 1,451, supported by a dedicated faculty of 25 members.

St. Xavier's College, Simdega, remains committed to delivering quality education and fostering the holistic development of its students, ensuring they are well-prepared to contribute meaningfully to society.



Figure 3: College Computer Room



Figure 4: Air Sampling Station



Figure 5: College Library



Figure 6: College Library Books



Figure 7: College Meter



Figure 8: Main Campus College



Figure 9: Air Sampling Station

Table 1: Land Use Breakup

Units	Area (Sq. m)	Area (Acres)	Percentage Area
Educational Installments	930.78	0.23	4.60
Hockey Ground	4370.61	1.08	21.60
Football Ground	4653.89	1.15	23.00
College Ground	323.75	0.08	1.60
Protected Area	121.41	0.03	0.60
Canteen/Guard Room	40.52	0.01	0.20
Green Land	5746.536	1.42	28.40
Parking	445.21	0.11	2.20
Road	404.58	0.1	2.00
Open Area	3197.017	0.79	15.80
Total	20234.303	5.00	100.00

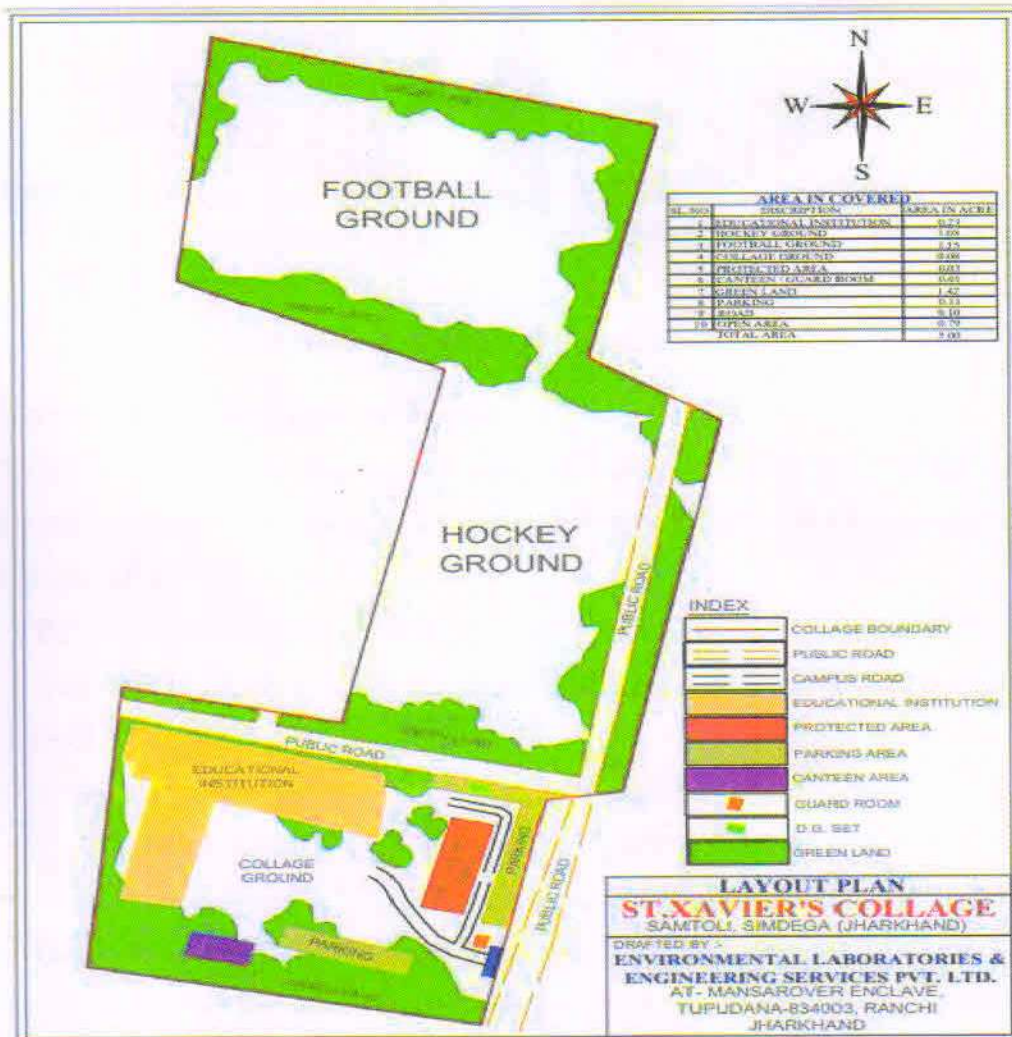
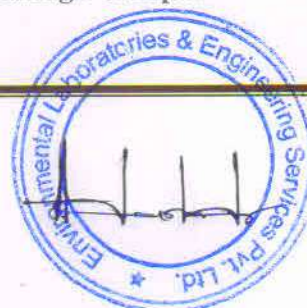


Figure 10: Land Use map of College Campus



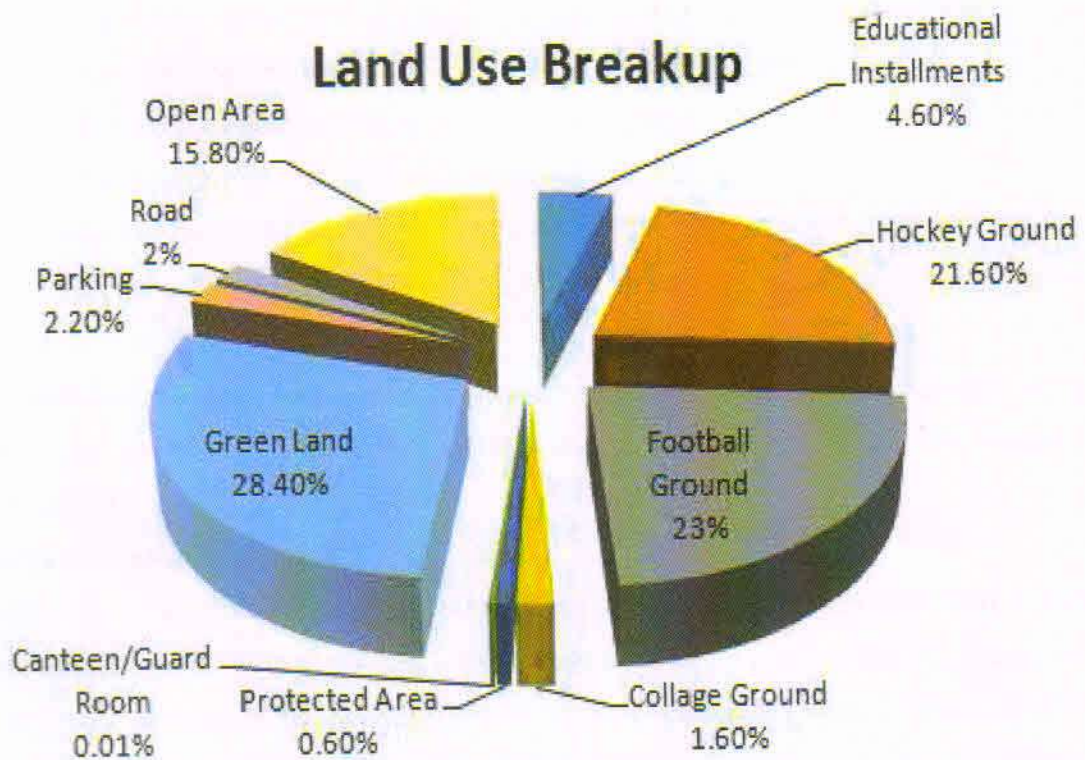


Figure 11: Land Use Breakup

1.5 Land Distribution and Utilization

St. Xavier's College, Simdega, spans a total land area of 5 acres (20,234.303 sq. m.), strategically allocated for various academic, sports, and infrastructural purposes. The distribution of land is as follows:

- **Educational Facilities** – 930.78 sq. m. (0.23 acres, 4.60%)
Dedicated to classrooms, administrative buildings, and academic infrastructure.
- **Sports Facilities**
 - **Hockey Ground** – 4,370.61 sq. m. (1.08 acres, 21.60%)
 - **Football Ground** – 4,653.89 sq. m. (1.15 acres, 23.00%)
 - **College Ground** – 323.75 sq. m. (0.08 acres, 1.60%)
- **Green Spaces** – 5,746.536 sq. m. (1.42 acres, 28.40%)

The largest portion of the land is dedicated to maintaining an eco-friendly and sustainable campus environment.

- **Infrastructure & Facilities**

- **Protected Area** – 121.41 sq. m. (0.03 acres, 0.60%)
- **Canteen/Guard Room** – 40.52 sq. m. (0.01 acres, 0.20%)
- **Parking Area** – 445.21 sq. m. (0.11 acres, 2.20%)
- **Internal Roads** – 404.58 sq. m. (0.10 acres, 2.00%)

- **Open Spaces** – 3,197.017 sq. m. (0.79 acres, 15.80%)

These areas provide flexibility for various academic, recreational, and community activities.

The well-planned land distribution ensures a harmonious balance between education, sports, greenery, and infrastructure, fostering a vibrant and conducive learning environment.

2. Energy Scenario:

St. Xavier's College in Simdega receives its power supply from Jharkhand Bijli Vitran Nigam Limited (JBVNL) at a single location under customer number 49879. The power is delivered through a 05 KV distribution system via underground cables. JBVNL provides both three-phase 440V and single-phase 220V connections, catering primarily to single-phase loads.

The college complex utilizes digital energy meters (220V) to monitor consumption, with most loads comprising single-phase connections, including interior and exterior lighting for classrooms, laboratories, and corridors. All electrical loads are supplied through underground cables, eliminating the risk of power outages caused by weather-related disruptions often associated with overhead lines.

To ensure an uninterrupted power supply, the college has a diesel generator (DG) set as a backup in case of failures in JBVNL's supply. The distribution system has been thoroughly studied, revealing a contract demand of 7 KVA and an average daily energy consumption of approximately 28.06 units. The monthly energy usage is around 852 units, with an average electricity bill of ₹5,963.42. The campus operates with an average power factor of 0.85, which is relatively low. The peak operating hours are about 8 hours per day.



The transformer output is fed into LT panels equipped with a bus coupling arrangement. Additionally, a 15 KVA DG set is connected to these panels as a standby power source for emergencies.

Location	St. Xavier's College, Simdega
Areas of Utilization of Energy	Classrooms, Labs, Offices, Canteen and Library etc
Sources of supply	11 KVA Grid substation of Jharkhand Bijli Vitran Nigam Limited
Total contract Demand	5 KVA
Major Loads	Lighting, Air conditioning and Smart Board
Usage Hours	7-8 Hrs.
Monthly Energy Consumption	Avg. 852 kWh Per month
Monthly electricity Bill	Avg. Rs. 5964 Per month

St. Xavier's College, Simdega, is committed to maintaining an efficient and reliable power distribution system to support its academic and administrative operations. Electricity is supplied by Jharkhand Bijli Vitran Nigam Limited (JBVNL) and is distributed across the campus through a structured network of underground cables, ensuring uninterrupted supply and minimizing external disruptions.

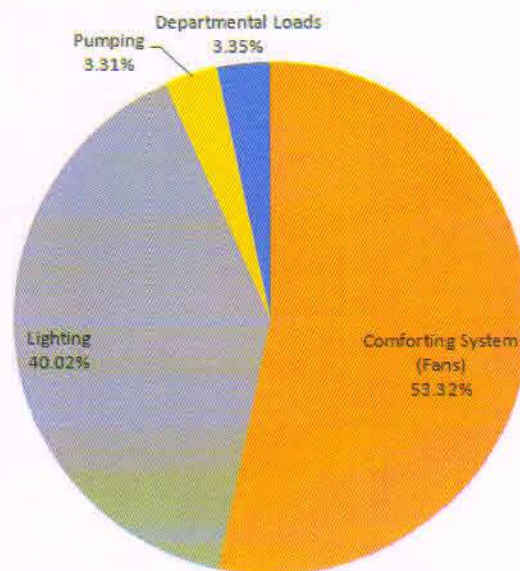
The college's energy consumption is primarily distributed among Comforting Systems (ACs, fans, and smart boards), lighting, water pumping, and departmental loads. Classrooms, laboratories, and administrative offices are equipped with air conditioning units and fans to provide a comfortable learning environment, while smart boards enhance interactive teaching methods. A significant portion of energy is also utilized for lighting systems, both indoors and outdoors, ensuring safety and functionality across the campus. Additionally, water pumps support daily operational needs, and departmental equipment contributes to the overall power demand.

To ensure reliability, the college has a backup power system in place, including a diesel generator, which activates in case of grid power failure. With structured energy management and efficient distribution strategies, St. Xavier's College aims to optimize power usage while maintaining a sustainable and cost-effective approach to energy consumption.



Area	Unit Consumption kWh	Percentage (%)
Comforting System (Fans)	702	53.32
Lighting (T.L + LED + CFL)	526.92	40.02
Pumping	43.641	3.31
Departmental Loads	44.044	3.35

Figure 12: Energy Distribution of ST. Xavier's College Simdega



3. Review of Preset Data & Analysis:

The energy bills details of St. Xavier's College, Simdega, Jharkhand having consumer number 49879 are furnished below:

Consumer Name and Address	St. Xavier's College, Simdega
Consumer No.	49879
Tariff	CS Urban (DS)
Supply Voltage	11 KV

The energy consumption of the facility is studied to understand and implement the energy saving measures and progress ahead in becoming an energy efficient facility and reduce the carbon footprints of premises. ELESPL studied the total price paid by St. Xavier's College; is shown below:



Months	Unit Consumption	Amount in Rs.
Jan-23	862	6035
Feb-23	1006	7042
Mar-23	1006	7042
Apr-23	691	4839
May-23	691	4839
Jun-23	691	4839
Jul-23	691	4839
Aug-23	916	6413
Sep-23	916	6413
Oct-23	920	6442
Nov-23	916	6409
Dec-23	916	6409

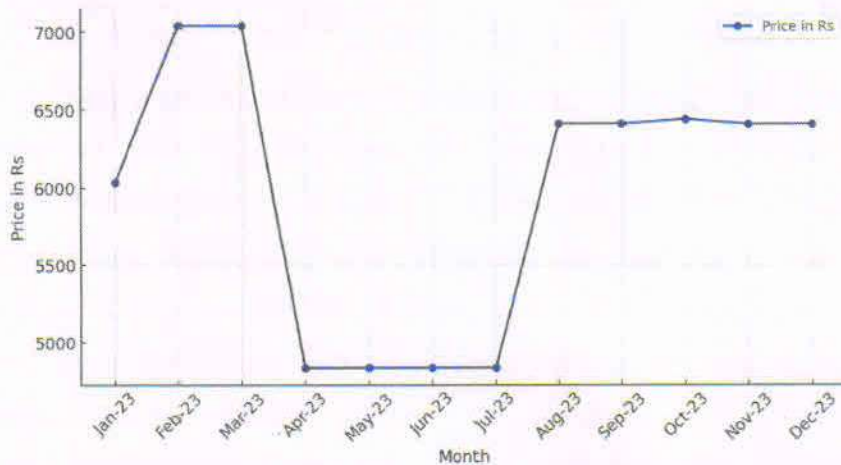


Figure 13: Month wise energy bill of Jan. - Dec. 2023

4. Lighting Inventory and Major Electrical Loads and consumption

Adequate and efficient lighting plays a crucial role in enhancing productivity, safety, and overall work atmosphere. These factors are interconnected and contribute collectively to a better working environment. Several elements influence proper lighting, and while it is challenging to address all of them in large-area illumination, careful consideration was given to these aspects during the energy audit of St. Xavier's College, Simdega, particularly for lighting loads.

To assess the lighting load, a physical count of light fixtures across the institute was conducted. Additionally, inputs from officials and maintenance logbooks were reviewed to ensure an accurate inventory of all lighting installations on campus. The summarized



indoor lighting installations for the main building and auxiliary structures are detailed below.

Furthermore, the total installed electrical load within the campus has been documented, providing a comprehensive overview of energy consumption.

Table 6: Details of all Energy fixtures installed in the College

Building	Description of items	Number of Items	watt	KW	kWh Daily	kWh Monthly
Main Building	Ceiling Fans	191	60	11.46	22.92	687.6
	Pedestal Fans	4	60	0.24	0.48	14.4
	Tube lights	204	36	7.344	14.69	440.7
	CFL Bulb	19	24	0.456	0.91	27.36
	LED Bulb	121	10	1.21	2.42	72.36
	Other electric consumption	--	--	--	1.468	44.044
Total					42.906	1,285.86

The table provides a detailed breakdown of the energy consumption of various electrical fixtures installed in the Main Building of St. Xavier's College, Simdega. It records the number of installed fixtures, their wattage, power consumption in kilowatts (kW), and their energy usage in kilowatt-hours (kWh) per day and per month, assuming an operation time of 2 hours daily for 30 days. This analysis helps in understanding the electricity demand for lighting and ventilation in the college and offers insights into potential energy-saving measures.

Among the listed electrical fixtures, ceiling fans contribute the highest energy consumption, with 191 fans consuming 687.6 kWh per month due to their higher wattage and widespread use. Similarly, tube lights, which are installed in large numbers (204 units), consume 440.7 kWh per month, making them another significant contributor to electricity usage. On the other hand, LED bulbs, which are known for their energy efficiency, consume only 72.36 kWh per month, even though 121 units are installed. In comparison, CFL bulbs, with only 19 units, consume 27.36 kWh per month, which suggests that LED lights are a more energy-efficient option. Pedestal fans, which are fewer in number, consume only 14.4 kWh per month, while other electrical appliances, categorized under "Other electric consumption," account for 44.044 kWh per month.

The total electricity consumption for all the listed fixtures amounts to approximately 1,285.86 kWh per month. This consumption pattern indicates that fans and tube lights are



the primary sources of energy usage in the building. Since lighting and ventilation are essential for maintaining a comfortable and productive environment, reducing energy consumption in these areas can lead to significant cost savings and sustainability benefits. One possible approach is to replace CFL bulbs with LED lights, which consume less power and have a longer lifespan. Additionally, using energy-efficient fans or reducing their operating hours when not in use can also contribute to reducing energy costs.

This data provides valuable insights into energy optimization strategies that the college can adopt to improve energy efficiency and reduce electricity bills. By transitioning to more efficient lighting solutions, optimizing fan usage, and implementing awareness programs on energy conservation, the institution can significantly lower its overall energy consumption. Conducting regular energy audits and maintaining proper records of energy usage can further help in identifying areas for improvement and ensuring long-term energy efficiency in the college campus.

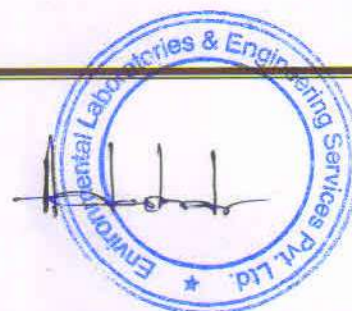
4.1 DG Set:

The campus has two diesel generator (DG) sets installed to meet emergency power requirements. These generators have different capacities: one with a 10 KVA rating and the other with a 5 KVA rating. The 10 KVA DG set operates as the primary backup power source, running as needed, while the 5 KVA DG set serves as a standby unit for additional support if required.

It has been observed that the campus experiences minimal power disruptions, with no significant power outages. As a result, the DG sets are required for an average of 45 hours per month to supply backup power when necessary.

5. Energy Conservation Measures (ECMs)

Based on the usual operational patterns and electrical load analysis, the estimated total energy savings are summarized in the table below. By implementing the recommended energy conservation measures, St. Xavier's College, Simdega, Jharkhand can significantly reduce power consumption across the campus. Additionally, adopting these measures will help establish a more effective monitoring and management system, enabling the institution to take a proactive approach in evaluating and optimizing energy usage in the future.



5.1 Replacement of installed TLs with LEDs:

ELESPL observed that tube lights (TLs) are installed in certain areas of the campus, leading to higher energy consumption and inadequate illumination. Replacing these tube lights with LEDs would not only reduce energy consumption but also enhance lighting quality by providing better lumen output. Additionally, LEDs have a longer lifespan, making them a more efficient and cost-effective solution. The estimated energy savings from this replacement are detailed in the calculation below.

Table 7: Energy Consumption and Saving estimated by replacement of TLs with LEDs

Building	Quantity	Load KW	Saving	Operating Hrs.	Monitoring Saving
	TL (36 W)	TL (36 W)	LED (12 W)	225 Days X 10 Hrs.	
	Number	KW	KW	Hours/Year	INR
Main Building	204	7.344	4.896	2250	77222.16

The analysis in Table 7 highlights the potential energy savings by replacing 204 tube lights (36W each) with LED lights (12W each) in the Main Building. The existing tube lights consume 7.344 kW, while the LED replacements would consume only 4.896 kW, resulting in a power saving of 2.448 kW. Assuming the lights operate for 10 hours per day over 225 days in a year, the total energy savings amount to 77222.16 INR annually. In addition to reduced energy consumption, switching to LEDs improves lighting efficiency, enhances brightness, and extends the lifespan of the lighting system, leading to long-term cost savings and sustainability benefits.

5.2 Replacement of installed Fans with LED Fans:

Table 8: Energy Consumption and Saving estimated by replacement of Fan with LED Fans

Building	Quantity	Load KW	Saving	Operating Hrs.	Monitoring Saving
	Fan (60 W)	Fan (60 W)	LED Fan (25 W)	225 Days X 10 Hrs.	
	Number	KW	KW	Hours/Year	INR
Main Building	194	11.64	6.79	2250	107095.28

As shown in Table 8, replacing 194 conventional fans (60W each) with energy-efficient LED fans (25W each) in the Main Building can lead to significant power savings. The



existing fans consume 11.64 kW, whereas the new LED fans would reduce consumption to 6.79 kW, resulting in a power saving of 4.85 kW. Given that the fans operate for 10 hours daily over 225 days, the estimated annual savings amount to 1,07,095.28 INR. Besides reducing electricity usage, LED fans offer improved efficiency and longevity, contributing to an overall reduction in energy costs and environmental impact.

5.3 Replacement of installed CFLs with LEDs:

Table 9: Energy Consumption and Saving estimated by replacement of CFLs with LEDs

Building	Quantity	Load KW	Saving	Operating Hrs.	Monitoring Saving
	CFL (24 W)	CFL (24 W)	LED (12 W)	225 Days X 10 Hrs.	
	Number	KW	KW	Hours/Year	INR
Main Building	19	0.456	0.228	2250	3596.13

Table 9 presents the estimated energy savings from replacing 19 CFL bulbs (24W each) with LED bulbs (12W each) in the Main Building. The current CFL setup consumes 0.456 kW, whereas LED replacements would bring the consumption down to 0.228 kW, achieving a power saving of 0.228 kW. With an operation time of 10 hours per day over 225 days, this transition would lead to annual savings of 3596.13 INR. Apart from lowering power consumption, LED bulbs are more durable, have a longer lifespan, and provide better lighting quality, making them a cost-effective and energy-efficient alternative to CFLs.

5.4. Combined Impact of Energy Efficiency Upgrades

The implementation of energy-efficient upgrades, including the replacement of tube lights with LEDs, conventional fans with LED fans, and CFL bulbs with LED bulbs, leads to significant reductions in energy consumption and cost savings for the Main Building of St. Xavier's College, Simdega. These changes collectively contribute to an overall decrease in power usage while improving the efficiency and performance of electrical installations.

The total power savings from all replacements amount to 7.526 kW, with individual contributions of 2.448 kW from tube lights, 4.85 kW from fans, and 0.228 kW from CFLs. This substantial reduction in power demand not only lowers the **electricity load** on the campus but also enhances sustainability efforts by promoting energy conservation.

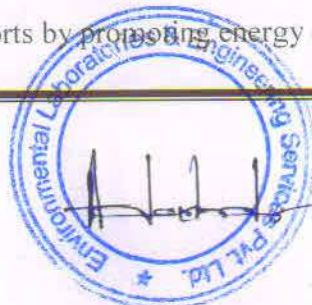


Table 10: Energy Savings and Monetary Benefits

Category	Quality Replaced	Power saving (KW)	Operating Hours (2250 hrs/yr)	Annual Monetary Saving (INR)
Tube lights (36W to LED 12W)	204	4.896	2250	77222.16
Fans (60W to LED 25W)	194	6.790		107075.28
CFLs (24W to LED 12W)	19	0.228		3596.13
Total Savings		11.914	2250	1,87,893.57

From a financial perspective, these changes yield significant annual savings of ₹1,87,913.57. The replacement of tube lights alone saves ₹77,222.16 per year, while fan replacements contribute the highest savings at ₹1,07,095.28 per year. Additionally, replacing CFL bulbs with LEDs saves ₹3,596.13 annually. These cost reductions reflect the long-term benefits of energy-efficient solutions, lowering electricity bills and maintenance costs.

Beyond financial savings, these energy conservation measures contribute to a more sustainable and eco-friendly campus environment. The improved lighting quality from LED installations enhances visibility and productivity, while energy-efficient fans provide better ventilation with lower energy usage. These upgrades represent a strategic investment in energy efficiency, ensuring long-term sustainability and operational cost reductions for the institution.

6. Conclusion:

The energy audit conducted at St. Xavier's College, Simdega reveals substantial potential for energy savings through strategic upgrades in the campus's electrical infrastructure. The primary focus areas include replacing conventional tube lights with LED lights, standard fans with LED fans, and CFL bulbs with LED bulbs, all of which contribute to a significant reduction in power consumption and electricity costs. The total estimated power savings amount to 7.526 kW, which translates into annual financial savings of ₹1,87,913.57. These cost reductions are driven by more energy-efficient technologies that consume less power while maintaining or even enhancing performance.



The transition to LED lighting not only reduces energy consumption but also improves illumination quality, visibility, and operational lifespan, thereby minimizing maintenance costs. Similarly, replacing traditional fans with LED fans provides a more energy-efficient ventilation system, reducing the overall electrical load. The shift from CFL to LED bulbs further contributes to sustainability by lowering energy use while ensuring better lighting efficiency. These changes help the college move toward an eco-friendly and energy-efficient campus, aligning with modern sustainability practices.

Beyond financial and energy savings, these measures also create a more comfortable and productive learning environment. Improved lighting reduces eye strain and enhances focus, while energy-efficient fans provide better air circulation with reduced power consumption. Additionally, adopting these energy-saving solutions will help the institution establish a structured energy monitoring and management system, ensuring continuous evaluation and optimization of energy usage in the future.

In conclusion, implementing these energy conservation measures will lead to long-term benefits for the college, including lower electricity bills, reduced carbon footprint, enhanced sustainability, and improved infrastructure efficiency. By adopting a proactive approach to energy management, St. Xavier's College can serve as a model for other institutions, demonstrating how simple yet effective energy-efficient solutions can contribute to both financial savings and environmental responsibility.

7. Recommendations & Future Scope

Implementing energy-saving measures at St. Xavier's College, Simdega can lead to a significant reduction in operational costs while promoting environmental sustainability. The following strategies are tailored to enhance energy efficiency and sustainable practices within educational institutions:

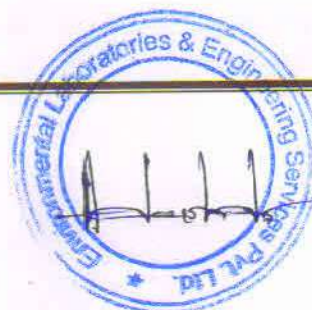
- **Conduct Regular Energy Audits:** Begin with a comprehensive energy audit to assess current energy consumption, identify inefficiencies, and pinpoint areas for improvement. Regular audits help in tracking progress, optimizing energy use, and making informed decisions to enhance efficiency.
- **Upgrade to Energy-Efficient Lighting:** Transitioning to LED lighting solutions can substantially reduce power consumption while providing better illumination and a longer lifespan compared to traditional lights. Additionally, integrating smart



lighting controls such as motion sensors and daylight sensors can automatically adjust lighting based on occupancy and natural light availability, leading to further energy savings and an improved learning environment.

- **Adopt Renewable Energy Solutions:** Installing solar panels can help offset a portion of the college's energy demand, reducing dependence on conventional power sources. This initiative supports sustainability goals, minimizes the institution's carbon footprint, and offers long-term cost savings.
- **Promote Awareness and Behavioral Changes:** Educating students, faculty, and staff about the importance of energy conservation is essential. Encouraging simple yet impactful actions such as turning off unused lights and electronic devices, utilizing natural daylight, and maintaining optimal thermostat settings can lead to substantial energy savings. Additionally, organizing awareness programs, sustainability workshops, and friendly competitions can foster a culture of energy-conscious behavior on campus.
- **Implement Energy Monitoring and Maintenance Systems:** Establishing a routine maintenance schedule for all electrical and mechanical systems ensures that they operate at peak efficiency. Utilizing energy management systems can help monitor real-time energy usage, detect inefficiencies, and identify anomalies, enabling the institution to make data-driven decisions for energy optimization.

By implementing these energy conservation measures, St. Xavier's College, Simdega can achieve substantial energy savings, lower operational expenses, and contribute towards a greener and more sustainable future. These initiatives will not only enhance campus infrastructure and energy efficiency but also serve as an inspiring model for other educational institutions looking to adopt sustainable energy solutions.



8. Analysis of Commercial Waste Composition

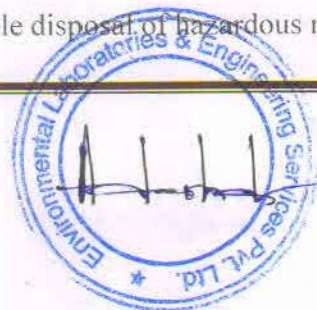
A waste audit was conducted to assess the physical composition of commercial waste at the facility. The total waste collected during the assessment was 10 kg, which was then categorized into different waste types based on their nature and composition. The findings of this study provide valuable insights into the waste management practices and highlight areas where improvements can be made to enhance sustainability and waste reduction efforts.

The largest proportion of the waste generated comprises biodegradable waste, which accounts for 47.83% of the total waste. This category includes organic materials such as food waste, plant matter, and other decomposable substances, which, if properly managed, can be utilized for composting or biogas generation, contributing to sustainable waste disposal solutions. Soil and inert waste make up 27.46% of the total waste, which may include dust, sand, and other non-decomposable materials, often resulting from regular cleaning and maintenance activities.

A significant portion of the waste, 18.13%, falls under demolition waste, which typically includes construction debris such as concrete, bricks, and wood scraps. Proper disposal or recycling of these materials can reduce environmental impact and promote resource conservation. Plastic waste constitutes only 1.18% of the total waste, which is relatively low, yet it remains an important category requiring effective segregation and recycling efforts to prevent environmental pollution.

Other waste categories include electrical and electronic waste (0.45%), which consists of discarded electronic components and devices, requiring special handling and recycling to prevent toxic contamination. Bio-medical waste is minimal, at just 0.01%, indicating that hazardous waste generation is not a significant concern but still requires proper disposal methods to ensure safety and regulatory compliance. Additionally, miscellaneous waste (4.94%) includes various unclassified materials, highlighting the need for further sorting and categorization to improve waste management efficiency.

These findings emphasize the importance of implementing effective waste segregation, recycling, and disposal methods to minimize environmental impact. By adopting sustainable waste management strategies, such as composting biodegradable waste, promoting plastic recycling, and ensuring responsible disposal of hazardous materials, the



institution can work towards a more environmentally friendly and efficient waste management system.

Table 11: Breakdown of Waste Types at St. Xavier's College, Simdega

Physical Composition of commercial waste		Total waste collected	10 Kg
Sl. No.	Type of waste	Unit	Result
1	Biodegradable waste	%	47.83
2	Plastic waste	%	1.18
3	Soil & waste	%	27.46
4	Demolition	%	18.13
5	Electrical & Electrical waste	%	0.45
6	Bio-medical Waste	%	0.01
7	Other	%	4.94

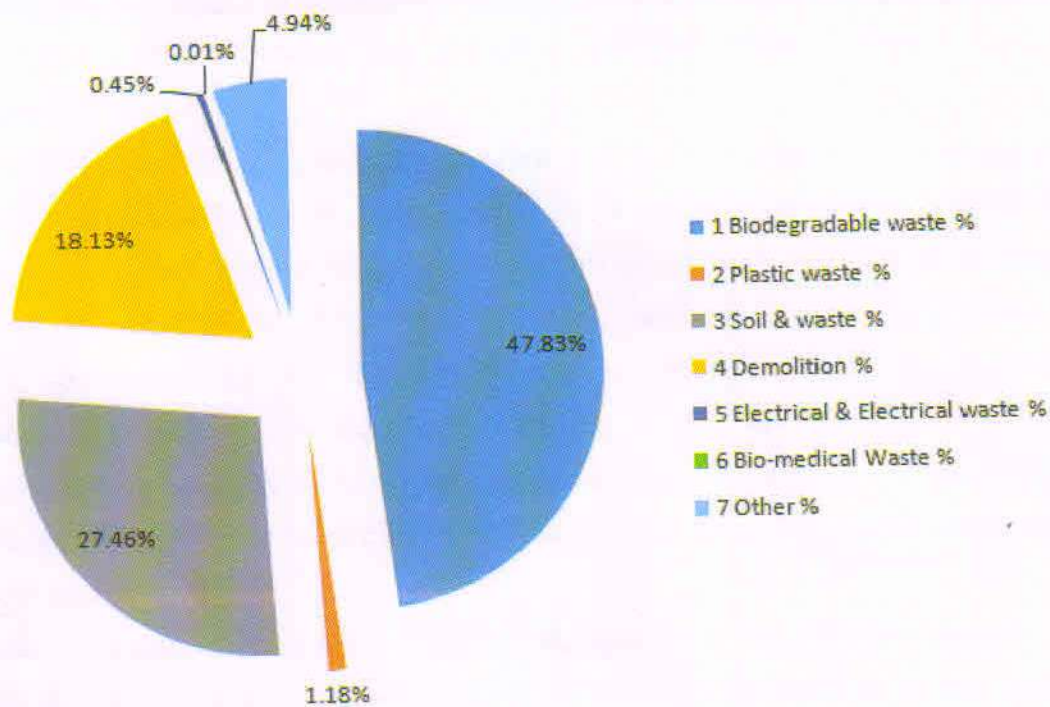


Figure 14: % Waste Types at St. Xavier's College





Figure 15: Waste collection point of St. Xavier's College, Simdega.

9. Conclusion

The waste audit findings highlight key opportunities for enhancing waste management practices at the facility. With biodegradable waste forming the largest proportion, implementing composting or biogas generation can significantly reduce landfill waste and promote sustainability. The presence of soil and inert waste, along with demolition debris, underscores the need for improved waste sorting and potential recycling initiatives. While plastic waste accounts for a small percentage, its proper segregation and recycling remain crucial to prevent environmental pollution. Additionally, the responsible handling of electronic and biomedical waste is essential to ensure regulatory compliance and environmental safety.

By adopting comprehensive waste reduction strategies, including effective segregation, recycling, and sustainable disposal methods, the facility can minimize its ecological footprint. Enhancing awareness and encouraging responsible waste disposal among stakeholders will further contribute to an environmentally conscious and efficient waste management system.



SERVICE INVOICE

(ORIGINAL FOR RECIPIENT)



Environmental Lab. & Eng. Services Pvt. Ltd (from 1-Apr-24)
 Block -A, Flat No- 1-109, Tapovan Residential Estat
 Hawal Nagar, Road No-2, Birsachowk Ranchi-834003
 Office Add-Plot No-30, Mansarovar Enclave, Hatia,
 Tupudana-Ranchi
 UDYAM : UDYAM-JH-20-0006735 (Micro/Services)
 GSTIN/UIN: 20AAECE9713D1Z4
 State Name : Jharkhand, Code : 20
 CIN: U74999JH2018PTC011125
 E-Mail : eles.ranchi@gmail.com

Invoice No. **ELESPL/24-25/535** Dated **28-Mar-25**
 Mode/Terms of Payment

Reference No. & Date. Other References

Buyer's Order No. Dated

Terms of Delivery

Buyer (Bill to)
M/S St. Xavier's College (Simdega)
 PO-Gotra, PS-Simdega
 Dist-Simdega, Jharkhand
 State Name : Jharkhand, Code : 20

Sl No.	Description of Goods and Services	HSN/SAC	Quantity	Rate	per	Disc. %	Amount
1	Ambient Air Quality Monitoring	998346	3 Point	6,765.00	Point		20,295.00
2	NOISE MONITORING	998346	3 Point	1,155.00	Point		3,465.00
3	Driking Water Analysis	998346	1 nos	8,085.00	nos		8,085.00
4	Waste Water Analysis	998346	1 nos	6,765.00	nos		6,765.00
5	Light Intensity Measurement	999490	4 nos	990.00	nos		3,960.00
6	Bio-Diversity	999490	1 nos	11,550.00	nos		11,550.00
7	Energy Audit	998346	1 nos	11,550.00	nos		11,550.00
8	Waste Disposal and Waste Analysis	998346	1 nos	6,600.00	nos		6,600.00
							72,270.00
					OUTPUT CGST@9%	9 %	6,504.30
					OUTPUT SGST@9%	9 %	6,504.30
					ROUND OFF		0.40
<p><i>verified and training the present. forwarded to Sir for the</i></p> <p><i>S. Koushey</i></p> <p>Principal St. Xavier's College Simdega</p>							
Total							₹ 85,279.00

Amount Chargeable (in words) **INR Eighty Five Thousand Two Hundred Seventy Nine Only** E. & O.E

HSN/SAC	Taxable Value	CGST		SGST/UTGST		Total
		Rate	Amount	Rate	Amount	
998346	56,760.00	9%	5,108.40	9%	5,108.40	10,216.80
999490	15,510.00	9%	1,395.90	9%	1,395.90	2,791.80
Total	72,270.00		6,504.30		6,504.30	13,008.60

Tax Amount (in words) : **INR Thirteen Thousand Eight and Sixty paise Only**

Company's PAN : **AAECE9713D**
 Declaration
 1. WE DECLARE THAT THIS INVOICE SHOWS THE ACTUAL PRICE OF THE SERVICE DESCRIBED AND THAT ALL PARTICULARS ARE TRUE AND CORRECT.
 2. ADVANCE PAYMENT 100% ALONG WITH WORK ORDER IS REQUIRED

Company's Bank Details
 A/c Holder's Name: **ENVIRONMENTAL LAB And ENG SERVICES PVT LTD**
 Bank Name : **HDFC BANK**
 A/c No. : **50200032166360**
 Branch & IFS Code : **Singh More, Hatia, Ranchi & HDFC0005770**
for Environmental Lab. & Eng. Services Pvt. Ltd (from 1-Apr-24)
Niranjan Kumar Singh
 Authorised Signatory