CH. SUGHAR SINGH EDUCATIONAL ACADEMY, JASWANTNAGAR

AUDIT REPORT 2024-2025

ENVIRONMENTAL & CIVIL ENGINEERING SOLUTIONS
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Editorial

In the Era of global warming and climate change every citizen must reduce their own carbon footprints to tackle with the adverse impacts of climate change. A green audit of any academic institution revels ways in which we can reduce energy consumption, water use and reduction in emission of carbon dioxide in the environment. It is a process to look into and ask us whether we are also contributing to the degradation of the environment and if so, in what manner and how we can minimize this contribution and bring down to zero and preserve our environment for future generation.

Ch. Sughar Singh Educational Academy, Jaswantnagar, Etawah administration has already taken a step towards the green approach and conducted green audit of campus in the year 2024-2025. As an outcome of this institute has taken green steps to reduce its carbon footprints by several means in campus viz. sustainable fittings, tree plantation and green computing in the administration and examination. The responsibility of carrying out the scientific green audit was given to Environmental and Civil Engineering Solutions. The organization has followed the rules and regulation of Ministry of Environment and Forest, Govt. of India and Central Pollution Control Board, New Delhi.

A questionnaire was prepared based on the guidelines and format of CPCB, New Delhi to conduct green audit. The information related to consumption of resources like water, electricity and handling of solid and hazardous waste was collected in the formats from main building support services and departments. The data collected was grouped and was tabulated in Excel sheets and analysed. The graphs of the analysed data were prepared for getting quick idea of the status. Interpretation of the overall outcomes was made which incorporates primary and secondary data, references and interrelations within. Final report preparation was carried out using this interpretation to prepare environment management plan of institute for next two years.

During the preparation of the Audit Report Audit Report Hon. Principal and Vice principal, Dean IQAC encouraged us with their full support. IQAC and other officers of the institute also gave support to carry out this work. We also thank all Heads of the departments, and the Co-ordinators gave full co-operation.

Environmental & Civil Engineering Solutions ECS Sangli.

Dr. N. N. Kamble
(Lead Auditor)
Environmental and Civil Engineering Solutions

Acknowledgement

We express our gratitude for calling upon us for this audit, mainly the principal and all other staff members, who were ever helpful and supported us with all the inputs needed for this audit. We thank all the teaching, non-teaching and students for helping us in conducting this audit. The green audit team along with the Ch. Sughar Singh Educational Academy internal audit team is mentioned below.

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Contents

1. Introduction:

The modernization and industrialization are the two important outputs of twentieth century which have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change etc. Now, it is considered as a final call by Mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for sustainable environment.

Considering the present environmental problems of pollution and excess use of natural resources, Hon. Prime Minister, Shri. Narendra Modiji has declared the Mission of Swachch Bharat Abhiyan. Also, University Grants Commission has mentioned “Green Campus, Clean Campus” mission mandatory for all higher educational institutes. 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.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiatives for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

1.1 Need of audit:

Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period excess use of resources like energy, water, chemicals are become habitual for everyone especially, in common areas. Now, it is necessary to check whether our processes

are consuming more than required resources? Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it into green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

1.2 Goals of audit:

Institute has conducted an audit with specific goals as:

1. Identification and documentation of green practices followed by college.
2. Identify strength and weakness in green practices.
3. Conduct a survey to know the ground reality about green practices.
4. Analyse and suggest solution for problems identified from survey.
5. Assess facility of different types of waste management.
6. Increase environmental awareness throughout campus.
7. Identify and assess environmental risk.
8. Motivates staff for optimized sustainable use of available resources.
9. The long-term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

1.3 Objectives of Audit:

1. To examine the current practices which can impact on environment such as of resource utilization, waste management etc.
2. To identify and analyse significant environmental issues.
3. Setup goal, vision and mission for green practices in campus.
4. Establish and implement Environmental Management in various departments.
5. Continuous assessment for betterment in performance in green practices and its evaluation.
6. To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.

1.4 NAAC criteria VII Environmental Consciousness:

Institutes are playing a key role in development of human resources worldwide. Higher education institutes campus run various activities with aim to percolate the knowledge along

with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solution for issues related to environment. Different types of evolutionary methods are used to assess the problem concerning environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green audit etc

National Assessment and Accreditation Council (NAAC) which is a self-governing organization that declares the institutions as Grade according to the scores assigned at the time of accreditation of the institution. The intention of green audit is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring etc. for making the institution eco-friendlier.

Students are the major strength of any academic institution. Practicing green actions in any educational institution will inculcate the good habit of caring natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, no vehicle day, Rainwater harvesting, etc. will make the students good citizen of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of Global warming through Carbon Footprint reduction measures.

1.5 **Benefits of Green Audit to an Educational Institute:**

There are many advantages of green audit to an Educational Institute:

1. It would help to protect the environment in and around the campus.
2. Recognize the cost saving methods through waste minimization and energy conservation.
3. Find out the prevailing and forthcoming complications
4. Empower the organization to frame a better environmental performance.
5. It portrays good image of institution through its clean and green campus.

2. Overview of Institute:

Ch. Sughar Singh Educational Academy has huge area of 2.50 acres and has been serving the mankind in the field of science and technology.

Figure: Ch. Sughar Singh Educational Academy Campus

The landscaped grounds of the College are renowned for their aesthetic appeal, further enriched by dedicated cricket and football fields. The institution firmly upholds the belief that its most valuable investment is in nurturing future leaders. In view of the growing expectations surrounding leadership standards, the College has embraced the responsibility of preparing the next generation of leaders with a vision to bridge the prevailing skill gap. In its unwavering pursuit of academic excellence, the College has established Centres of Excellence, state-of-the-art computer laboratories, and robust industry academia partnerships with leading organizations. These initiatives serve as platforms for innovation, research, and holistic student development. Recognizing students as its foremost stakeholders, the College is committed to an educational approach founded on its core values contributing to national development while cultivating global competencies. Students from diverse social and cultural backgrounds are welcomed, supported, and empowered through structured mentoring and counselling programmes, enabling them to meet life's challenges with resilience and integrity. Through these concerted efforts, the College aspires to produce responsible, sensitized citizens who are

prepared to contribute meaningfully to national progress while engaging effectively in an increasingly interconnected world.

Ch. Sughar Singh Group of Institutions was established under the Trust of CH. SUGHAR SINGH SMRITI NYAS in the year 2002 The group provides an excellent education to undergraduate, graduate and post-graduate students. CSSGI is an attempt to serve the ends of technological excellence which is the desire of mankind CH. SUGHAR SINGH SMRITI NYAS is a registered trust by the Government of U.P. The trust was formed to provide better education in rural and downtrodden areas. CH. SUGHAR SINGH SMRITI NYAS promotes the best educational institutes and is a backbone of education from the Primary level to Post Graduation. The Trust comprises members, with excellent academic backgrounds and every member is experienced and eminent in social services.

Ch. Sughar Singh Educational Academy was established in 2014 at Kachaura Road, Rail Mandi, Jaswantnagar, Etawah to channel the young energy towards self-exploration and self-realization. It is the outcome of a long-cherished dream of many philanthropists. The College is constantly striving towards fulfilling its goal of providing higher educational opportunities to rural students from economically and socially disadvantaged classes and providing value-based education to ignite young minds to become responsible citizens. The College is making all efforts not only to literate but to equip the students with desired technical, conceptual and human skills. The majority of the learners in the region and adjoining regions belong to the most socio-economically backward section of society. To cater to the educational needs of such learners, Dr Brijesh Chandra Yadav initiated the college in Jaswantnagar. The dream of establishing an institute of higher learning did not happen overnight. The indomitable spirit and concerted effort of many other philanthropists were instrumental in the establishment of this College. The College is imparting UG and PG Courses in B.A., B.Com., B.Sc., B.Ed., B. Sc (Agriculture) programs, MA (Hindi, English, Geography, Education, Sociology), M.Sc (Physics, Chemistry, Mathematics, Zoology, Botany), M.Sc (Agriculture) Agronomy, Horticulture, genetics and Plants Breeding.

The vision

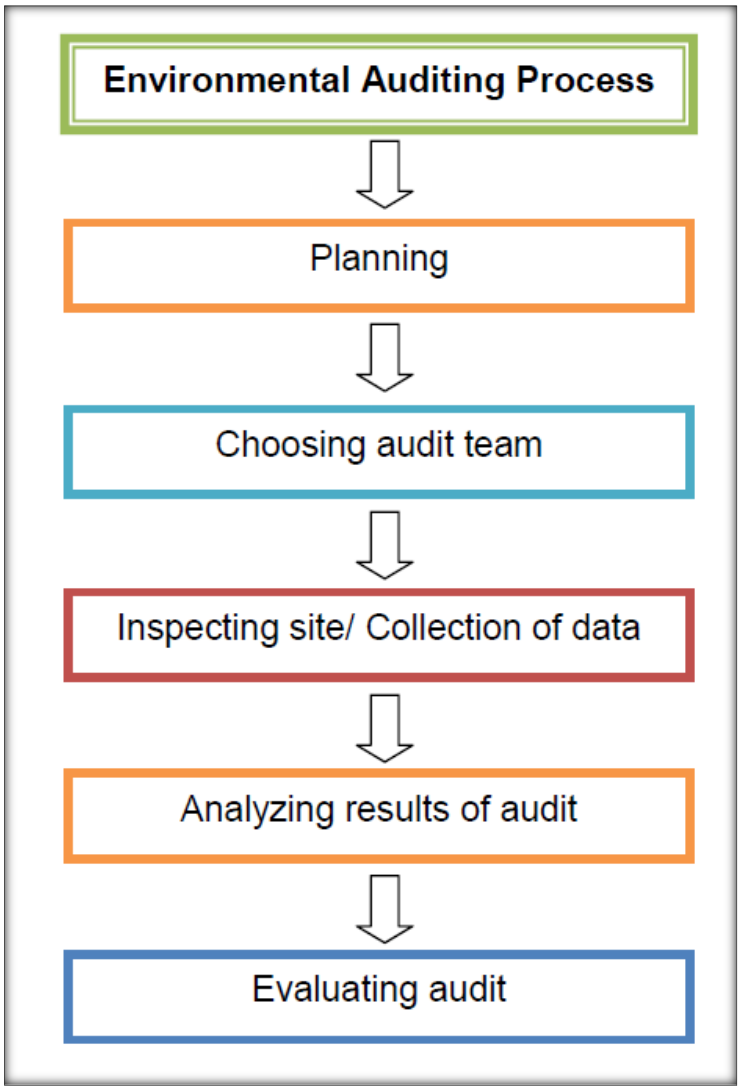
- The four most important necessities of man are food, clothing, shelter and education which convert a man into a human being. Education is a powerful tool through which

we can combat cut-throat competition that we are constantly facing. With India emerging as a soon-to-be superpower, the importance of education is ever-rising.

The mission

- To develop the young generation with active and creative minds, a sense of understanding And compassion for others, and the courage to act on their belief. We stress the total development of each student: spiritual moral, intellectual, social, emotional, and physical

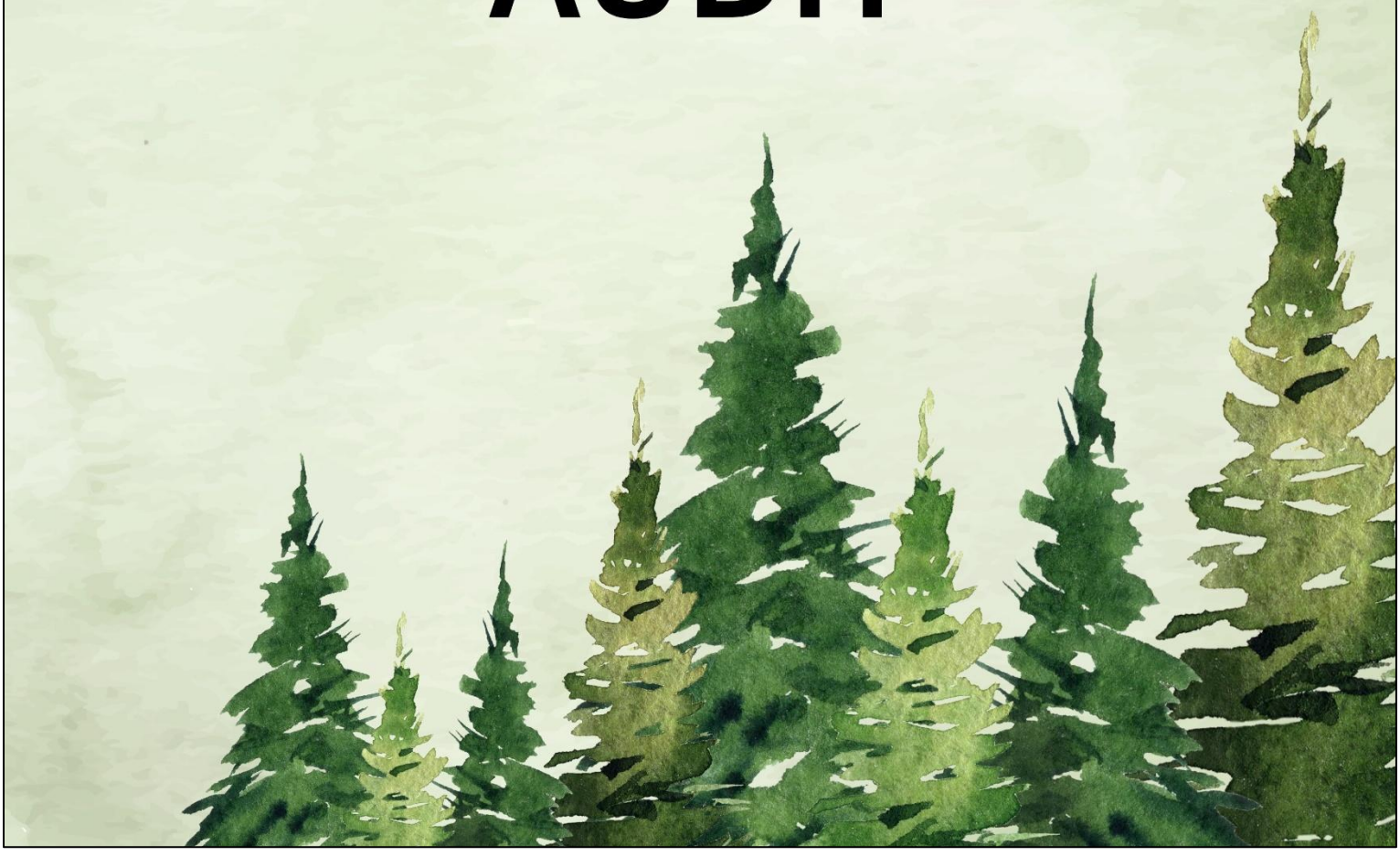
3. Methodology:



3.1 Audits to be carried out:

- Green and Carbon Footprint audit
- Energy audit
- Environmental audit
    - Water audit
    - Wastewater audit
    - Solid waste audit

GREEN & CARBON AUDIT



4. Green and Carbon footprint audit:

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiatives for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

Carbon is the basis of life on Mother Earth. It is incorporated into the plants through photosynthesis, consumed by animal species through the food, presents in the form of carbon dioxide (CO_2) the atmosphere, locked into the rocks as limestone and compressed into the different fossil fuels such as coal and oil. As CO_2 level in the atmosphere continue to increase, most climate designs or project that the oceans of the world and trees will keep soaking up more than half CO_2. The plants on land and in the sea, taken up carbon by over many years increased the percentage discharged during decay, and this increased carbon became locked away as fossil fuels beneath the surface of the planet. The starting of the 21st century brought growing concern about global warming, climate change, food security, poverty and population growth. In the 21st century more carbon has been released into the atmosphere than that has been absorbed. CO_2 is a principal component causing global warming. Atmospheric carbon dioxide levels have increased to 40 % from preindustrial levels to more than 390 parts per million CO_2. On this background it is a need of time to cover the research areas interrelated with climate change.

4.1 Green Cover:

Ch. Sughar Singh Educational Academy has got a huge green cover and has almost 45+ species of vegetation inside the campus. The institute has 1.41 acres of campus and most of this is covered by green area. They have huge plantations along with variation in species Greenery is maintained well by the institute. Carbon footprint was estimated by using SimaPro tool and Eco Invent Database using IPCC Indian available emission factors.

Figure: Ch. Sughar Singh Educational Academy Campus

Institute has taken huge efforts to develop its green cover. The institute has about 1.41 acres of green cover approximately. In the vicinity of the institute there are about approximately 800+ fully grown trees and more than 120+ growing plants. The below table shows some of the common tree species found. Institute has planted about 800+ tress to maintain a healthy and pure natural environment.

Table: Variation of species of trees at institute

Scientific Name	Count	Scientific Name	Count
Almond	15	Hibiscus	27
Mango	10	Coral Jasmine	4
Cashew	8	Cinnamon	2
Coconut	28	Cluster Fig	5
Bamboo	2	Banyan	4
Royal Poinciana Tree	10	Aloe Vera	3
Lemon	4	Black Plum	3
Papaya	2	Cotton	7
Garcinia Indica	2	Banana	17
Betel Nut Palm	230	Guava	5

Rose	14	Amla	4
Palm	8	Passion Vine	1
Jackfruit	4	Marigold	125
Golden Champa	2	Prosopis Cineraria	1
Drumstick	3	Candahar	5
Custard Apple	2	Aster	2
Neem	2	Plumeria	2
Indian Tinospora	5	Breadfruit	1
Creeper	3	Passion Vine	1

Institute has huge planation's and due to this the institute has high carbon sequesterial values. Considering the vicinity some dry plants were observed to approximately about 13. Plants absorb sunlight, 50% is absorbed and 30% reflected so this helps to create a cooler and more pleasant climate through a 3°C temperature reduction in the vicinity. This has also leaded to increase in biodiversity as more than 18 species of birds were observed. Some off the common birds were viz. Sparrow, wild parrots, little stint, black kite etc.

4.2 **Carbon Footprint Audit:**

Institute has estimated its carbon footprint by IPCC 2021 guidelines. Various IPCC factors and Carbon Footprint software developed by ECS was used to estimate the carbon emissions from Consumption of electricity, generation of solid waste, use of vehicles in campus, carbon emissions due to human breathing and emissions from buildings. At last, they have also calculated Carbon sequesterial value i.e. carbon that is absorbed by the plants.

Table: Carbon Footprint Analysis

Sr. No.	Section	Emission (Ton CO_2 eq.)/ year
1	Emission from electricity	41.30
2	Emission from solid waste	13.54
3	Emission from Vehicles	8.31
4	Emission from Buildings	6.01
5	Carbon sequesterial	-6.88
6	Sustainable savings	-3.25

Emission from Electricity – 41.30 Ton CO_2 eq./year

Electricity consumption represents the largest contributor to total emissions, accounting for nearly 68% of the total carbon footprint before offsets. The emission factor considered (approx. 0.72 kg CO_2/kWh for India) indicates that a significant portion of the institute's energy is grid-based and possibly non-renewable. Reducing electricity usage or switching to solar power could substantially lower this category.

Emission from Solid Waste – 13.54 Ton CO_2 eq./year

Solid waste contributes about 22% of total emissions. This includes emissions from decomposition of organic waste and improper disposal in landfills. Composting and waste segregation could minimize this figure by 30–40% and also generate useful compost for campus greenery.

Emission from Vehicles – 8.31 Ton CO_2 eq./year

Transportation (faculty, staff, and student vehicles) contributes roughly 14% of total emissions. Promoting shared transport, cycling, or electric vehicles could significantly reduce this category.

Emission from Buildings – 6.01 Ton CO_2 eq./year

Building-related emissions arise mainly from construction materials (embodied energy), maintenance, and air-conditioning systems. Although smaller compared to electricity, this category still forms about 10% of total emissions. Incorporating energy-efficient lighting, natural ventilation, and green building practices could bring long-term reductions.

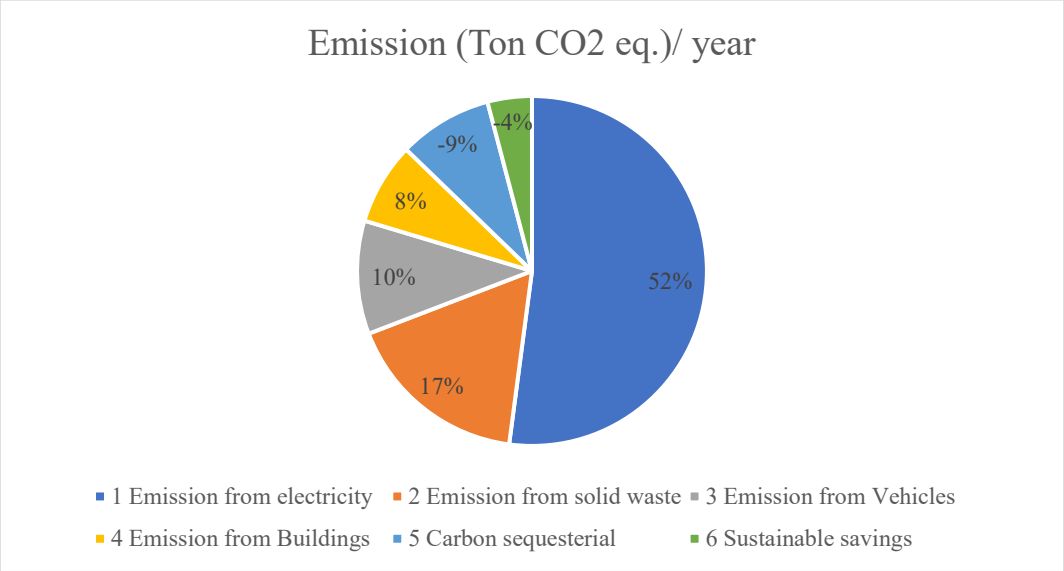
Carbon Sequestration – (-6.88 Ton CO_2 eq./year)

The trees and green cover within the campus act as natural carbon sinks, absorbing approximately 6.88 tons of CO_2 annually. This offsets about 11.6% of the total gross emissions. Increasing the number of trees or expanding green areas can further improve the campus carbon balance.

Sustainable Savings – (-3.25 Ton CO_2 eq./year)

This reflects emission reductions achieved through sustainable initiatives, such as energy-efficient appliances, rainwater harvesting, waste recycling, or renewable energy adoption. It offsets about 5.5% of total emissions, contributing positively toward sustainability goals.

The analysis highlights that the institute's primary emission hotspot is electricity consumption, followed by solid waste management. Enhancing renewable energy adoption (solar panels), improving waste segregation, and promoting green mobility can significantly improve the carbon neutrality status. The current green cover and sustainability measures already demonstrate the institution's commitment, but continuous expansion of these initiatives can move the campus toward becoming a low-carbon or carbon-neutral institute.



Strategies to Reduce Carbon Emissions in Educational Institutes with Potential Savings

Energy Efficiency and Renewable Energy

- Installing solar PV systems can reduce electricity-related emissions by 30–50%, depending on campus size and energy demand.
- Replacing conventional lighting with LEDs and smart controls may yield 10–15% savings in electricity use.
- Energy audits and efficient appliances can save an additional 5–10%.

Sustainable Transportation

- Promoting cycling, walking, and electric shuttle buses can cut vehicle-related emissions by 40–60%.

- Implementing carpooling systems can reduce emissions from staff and student commuting by 10–20%.

Waste Management and Circular Practices

- Composting and recycling programs can reduce solid waste emissions by 30–40%.
- Shifting to paperless operations and digital platforms can bring down paper-related waste by 15–25%.

Green Buildings and Infrastructure

- Designing or retrofitting according to green building standards can reduce overall building-related emissions by 20–30%.
- Passive design strategies (natural ventilation, daylighting) may save an additional 10–15% in energy demand.

Carbon Sequestration and Biodiversity

- Expanding tree plantation drives across the campus can offset 10–20% of total institutional emissions over the long term.
- Vertical and rooftop gardens can contribute an additional 5–8% sequestration potential, while also improving microclimate.

Awareness, Policy, and Culture

- Embedding sustainability into campus culture (student clubs, campaigns, eco-friendly events) ensures indirect but sustained 5–10% reduction in emissions through behavioral change.

Monitoring and Reporting

- Continuous carbon footprint monitoring and policy adjustments can sustain 10–15% efficiency gains by ensuring accountability and improvement year after year.

Figure: Green Campus at institute

ENVIRONMENT AUDIT

5. Environmental Audit:

An Environmental audit is a type of evaluation intended to identify environmental compliance and management system implementation gaps, along with related corrective actions. ISO 14001 is a voluntary international standard for environmental management systems ("EMS"). ISO 14001:2004 provides the requirements for an EMS and ISO 14004 gives general EMS guidelines. An EMS meeting the requirements of ISO 14001:2004 is a management tool enabling an organization of any size or type to:

- Identify and control the environmental impact of its activities, products or services.
- Improve its environmental performance continually, and
- Implement a systematic approach to setting environmental objectives and targets, to achieving these and to demonstrating that they have been achieved.

The audit examines the potential hazards or risks posed by the institutes. Areas examined may include environmental policies and procedures, energy use practices, recycling, waste, conservation, and pollution. Then, the institute can use the results to determine what changes need to be made for compliance. In a broad sense, environmental auditing aims to help protect the environment and minimize the risks of business activities to the environment and human safety and health.

5.1 Water Audit and Wastewater audit:

Water auditing is a method of quantifying water flows and quality in systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. Water audit is an effective management tool for minimizing losses, optimizing various uses and thus enabling considerable conservation of water. Water audits trace water uses from its point of entry into the facility/system to its discharge into the sewer/river/canal etc. Wastewater audit deals with effective management of wastewater in the system. It deals with proper generation, management, treatment, transfer and disposal of wastewater.

ECS has carried out water and wastewater audit for Ch. Sughar Singh Educational Academy and has suggested many more ways for water conservation, reuse and recycle. These audits evaluate the entire waste stream of a facility or organization, including recyclable, compostable, hazardous, and landfill-bound waste. The goal is to provide a detailed overview of waste generation and management practices. The detail water and wastewater audit report is mentioned below.

5.2 Water Audit report:

Water audit for the "Ch. Sughar Singh Educational Academy" was carried out. The purpose of the water audit is to provide a thorough understanding of the water uses by identifying and measuring all water using fixtures, appliances, and practices in order to recommend potential water saving efficiencies.

PRIMARY DATA

Sr. No.	Title	Information
1	**Name of Institute**	Ch. Sughar Singh Educational Academy
2	**Address**	Jaswantnagar, Etawah
3	**Name of company under which water audit is carried out**	Environmental and Civil Engineering Solutions, Sangli
4	**Number of floors**	G + 2 (Variable)
5	**Category of building**	Educational Institute
6	**Nearest ESR location**	NA
7	**Water supply hours**	3 hrs. daily
8	**Water meter present**	Yes

POPULATION DETAILS

Title	Section	Count
Fixed population (Students)	**Male**	5443
	Female	2277
Fixed population (Staff)	**Male**	88
	Female	17

SOURCE INFORMATION

Title	Information
Sources of water	Municipal Corporation and bore-well
Connection details	1” PVC pipe inlet and 1” outlet distribution pipe

STORAGE DETAILS

Title	Information
Overhead tank type	Overhead PVC Tanks
Location	On terrace
Number of tanks	1000 lit PVC X 4 and 1500 lit PVC X 4
Pumping period	3 hours daily
Underground sump	Yes 20000 lit X 1 and 18000 lit X 2

ESTIMATED WATER USAGE

Section	Water consumption in Liters (Approx.)
Gents’ toilet	55310.00
Washbasin	5790.00
Ladies’ toilet	32116.00
Toilet cleaning	5000.00
Floor cleaning	5000.00
Gardening	10000.00
Laboratories	1000.00
TOTAL (Liters)	**11,4216.00**

5.3 Waste water audit:

Ch. Sughar Singh Educational Academy campus generates huge amount of wastewater. The source for wastewater in the campus is restrooms, institute, mess and the washrooms and urinals inside the campus. To estimate the amount of wastewater generated all the water that is used in the washrooms, restrooms and lab sections is considered as wastewater.

Table: Wastewater generation scenario at Ch. Sughar Singh Educational Academy

Sr. No.	Section	Wastewater generated in litres
1	Wastewater generated in Campus	91372.80
2	Wastewater generated at Hostel Sections	00.00

Ch. Sughar Singh Educational Academy has established a sustainable and efficient wastewater treatment system that integrates septic tanks, constructed wetlands, and enzyme-based treatment to ensure effective and eco-friendly water management on campus. This multi-stage approach minimizes environmental impact and supports the institute's goal of achieving a circular water system. The wastewater generated from hostels, academic blocks, and canteens first undergoes primary treatment in septic tanks, where solid waste settles at the bottom as sludge and lighter materials like oil and grease rise to the surface. This process reduces the organic load and prepares the effluent for further treatment. The partially treated water is then passed through a constructed wetland system, which replicates the natural purification process of marshes.

The system consists of gravel beds planted with aquatic species such as Canna indica and Typha. As the water flows through the root zone, pollutants are removed through filtration, adsorption, and microbial degradation. The plants and soil microorganisms together help eliminate organic matter, nitrogen, and phosphorus, significantly improving water quality. For secondary polishing and disinfection, Ch. Sughar Singh Educational Academy employs an enzyme-based treatment. Enzymes act as biological catalysts that enhance the breakdown of residual contaminants and control Odor while reducing pathogens. The treated water is then safely reused for gardening, landscaping, and toilet flushing, promoting resource efficiency.

This integrated system operates with low energy consumption, minimal maintenance, and no chemical usage, making it a model of green wastewater management. Regular monitoring ensures compliance with environmental standards and optimal system performance. Through this initiative, Ch. Sughar Singh Educational Academy showcases its commitment to sustainability, environmental stewardship, and practical learning, providing a live demonstration of nature-based wastewater treatment for students and visitors alike.

5.4 **RO plant at institute**

Ch. Sughar Singh Educational Academy have dedicated RO water treatment plant installed in the campus. The plant supplies water to all the sections. The water quality analysis is presented below.

Supply water analysis

Sr. No.	Test	Results	Limit
1	pH	**6.1-7.5**	6.5-8.5
2	TDS	**102**	-
3	E.C	**111**	-
4	Hardness	**126**	200
5	Chlorides	**100**	200
6	MPN	**Ab**	1.0
7	Odor and Color	**Ab**	-

Treated RO water analysis

Sr. No.	Test	Results	Limit
1	pH	**6.8-7.0**	6.5-8.5
2	TDS	**58**	-
3	E.C	**112**	-
4	Hardness	**19**	200
5	Chlorides	**11**	200
6	MPN	**Ab**	1.0
7	Odor and Color	**Ab**	-

Ch. Sughar Singh Educational Academy operates a dedicated RO water treatment plant that ensures safe and high-quality water across the campus. The supply water analysis showed acceptable parameters but with moderate hardness (126 mg/L) and chlorides (100 mg/L). After RO treatment, the water quality improved significantly — hardness reduced to 19 mg/L and chlorides to 11 mg/L, while the pH stabilized between 6.8–7.0. The TDS level also dropped

from 102 mg/L to 58 mg/L, indicating effective removal of dissolved solids. Microbial and aesthetic parameters remained absent or within permissible limits, confirming that the RO system provides clean, safe, and palatable water for all institutional needs.

Figure: RO plant at institute

5.5 **Solid waste Audit:**

A waste audit is a physical analysis of waste composition to provide a detailed understanding of problems, identify potential opportunities, and give you a detailed analysis of your waste composition. A waste audit will help you clearly identify your waste generation to establish baseline or benchmark data, Characterize and quantify waste stream, verify waste pathways, identify waste diversion opportunities and identify source reduction opportunities.

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduce or eliminates the adverse impact on the environment and human health. Solid waste audit for Ch. Sughar Singh Educational Academy was carried out. The entire premise was analysed for solid waste generation and waste characterization. Overall waste was observed, and characterization was

done. The below table shows the components of solid `waste at institute campus. Quartering method was used, and 1 Kg of waste was selected.

The table below shows the composition of segregated waste at college.

Table: Solid waste composition at Ch. Sughar Singh Educational Academy College.

Sr. No.	Type of waste	Composition %
1	Plastic	32
2	Paper	26
3	Rubber	1
4	Food	15
5	Glass	1
6	Metals	1
7	Garden trimmings	23
8	Cloth and fibre	1

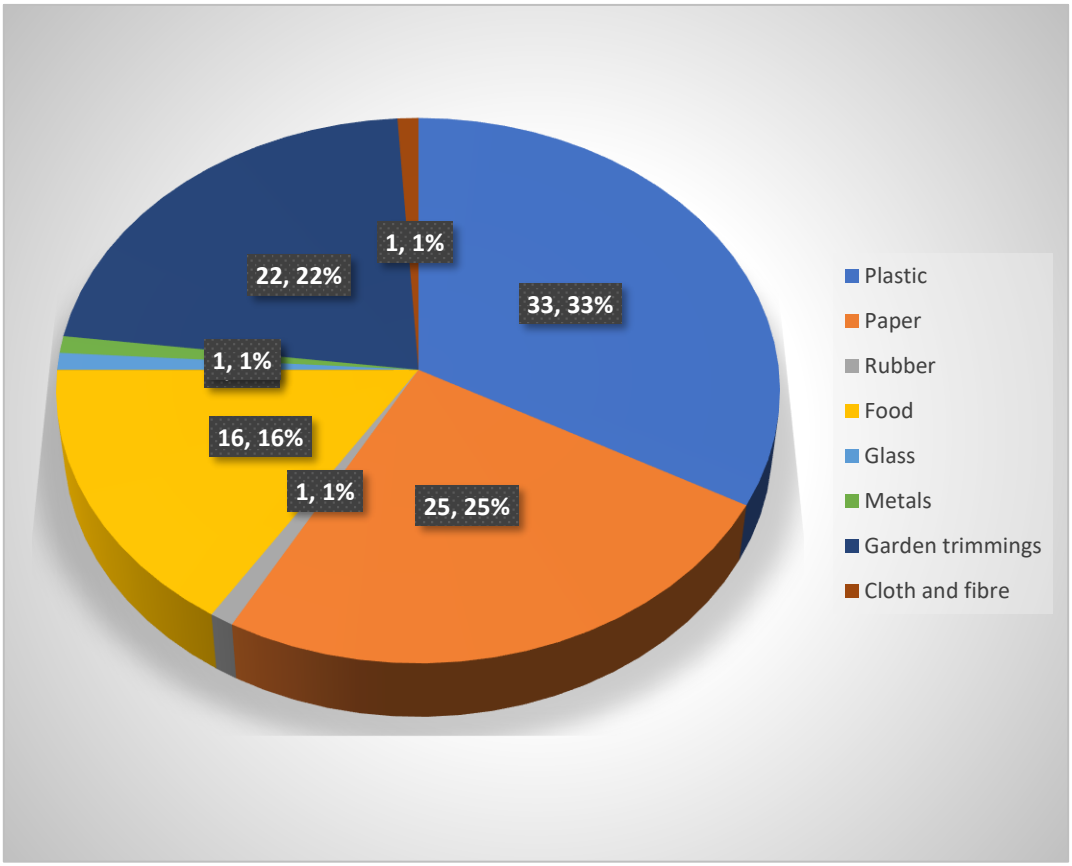


Figure: Generated waste distribution at Ch. Sughar Singh Educational Academy

After analysing all the bins, it was observed that plastic had highest contribution viz. 32% followed by the paper waste i.e. 26%. Mostly common observed plastic items were plastic wrappers of chips, soft drinks bottles and chocolate wrappers. The paper waste included paper wrappers, notebook pages, pamphlets and some pieces of cardboard. The third highest waste included garden trimmings. It included small grass, minute branches etc. The least contribution was of cloth, fibre, glass and metals.

5.6 **Observations and Conclusion:**

- There are separate bins for wet waste and dry waste. Hence, source segregation takes place.
- Institute has taken steps towards paper recycling. The paper waste collected from the bins is send to vendors.
- Plastic ban in campus is implemented but due to lack of seriousness in the student's plastic is used in campus. Institute should conduct plastic awareness seminars for both the staff and students.

ENERGY AUDIT

6. Energy Audit:

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprint.

A nation is tiring to advance in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development energy management is essential. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for Eco social aspect. Energy requirement of India is growing and incomplete domestic fossil fuel treasury.

The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. Energy conservation means reduction in energy consumption without making any sacrifice of quantity or quality. A successful energy management program begins with energy conservation; it will lead to adequate rating of equipment's, using high efficiency equipment and change of habits which causes enormous wastages of energy. By observing all these study lack of electricity and huge electricity demands. It is necessary to plan to be self-sufficient in electricity requirement.

6.1 **Connection details:**

Institute receives electricity from Dakshinanchal Vidyut Vitran Nigam Limited Distribution. Following are the details about connection.

- **Type of connection:** LT **Contract demand:** 188 KVA
- **Feeder voltage:** 11 KV / 415 **Tariff:** 71 LT – II C

Tariff Structure:

As per Distribution Company, HT and LT consumers have an option to take Time of Day (TOD) tariff instead of the normal tariff. Under TOD tariff electricity consumption and maximum demand in respect of HT consumers for different periods of the day i.e. normal period, peak load period and off-peak load period could be recorded by installing TOD meter. The maximum demand and consumption recorded in different periods could be billed on the following rates of the tariff applicable.

Table: TOD Chart for Billing

TOD Tariffs	Rate % (Rs. /Unit)
0000 Hrs- 0600 Hrs & 2200 Hrs- 2400 Hrs	-1.500
0600 Hrs- 0900 Hrs & 1200 Hrs- 1800 Hrs	0.000
0900 Hrs- 1200 Hrs	0.800
1800 Hrs- 2200 Hrs	1.100

Power Factor:

Power Factor (PF) is an indicator of efficient utilization of power. In an AC (Alternating Current) electrical power system, PF is defined as the ratio of real power flowing to the load, to the apparent power in the circuit and is a dimensionless number.

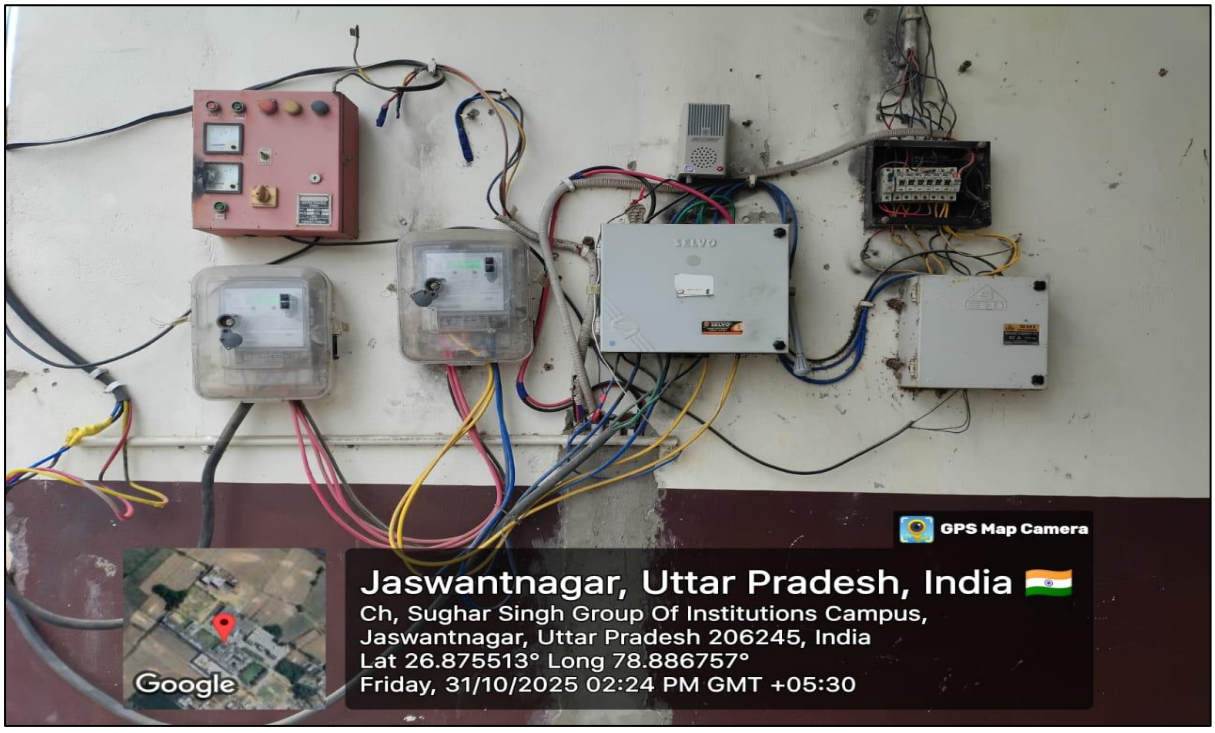


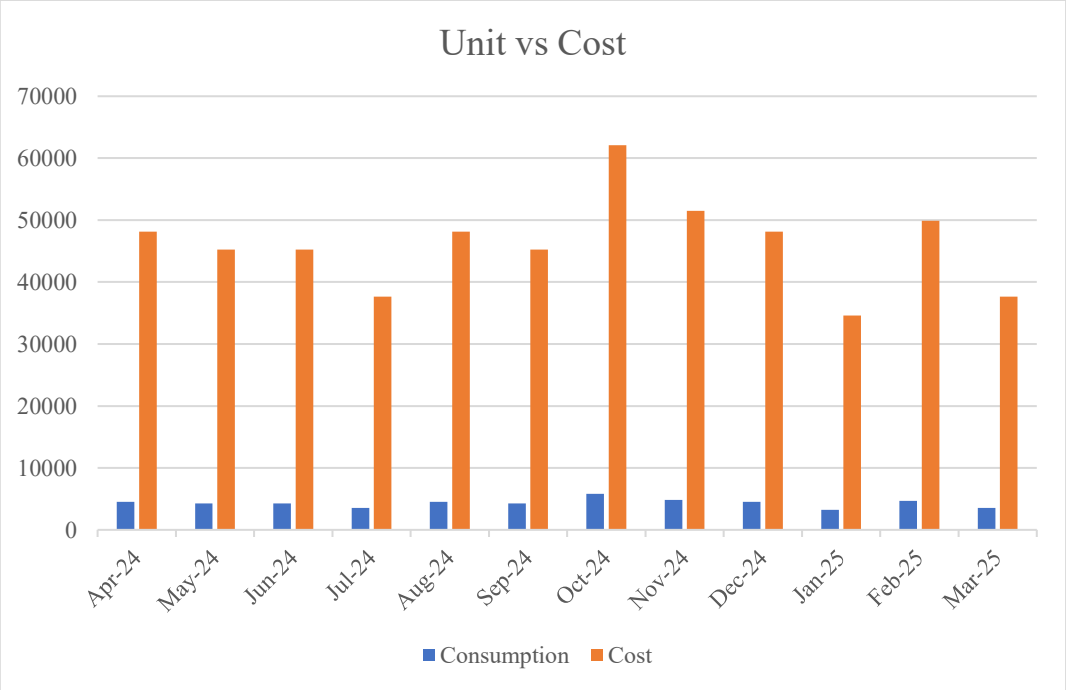
Figure: Energy Meter at Ch. Sughar Singh Educational Academy

6.2 **Bill analysis:**

Bill analysis for Ch. Sughar Singh Educational Academy had been presented for academic year 2024-2025.

Table: Energy Consumption and Bill for 2024-2025

Sr. No.	Month	Units Consumed	Paid Bill Amount
1	**Apr-24**	4526	48156
2	**May-24**	4253	45252
3	**Jun-24**	4253	45252
4	**Jul-24**	3540	37665
5	**Aug-24**	4526	48156
6	**Sep-24**	4253	45252
7	**Oct-24**	5838	62116
8	**Nov-24**	4838	51476
9	**Dec-24**	4526	48156
10	**Jan-25**	3250	34580
11	**Feb-25**	4690	49901
12	**Mar-25**	3540	37665



Graphs: Variation in Units consumed and cost paid.

6.3 ILER analysis:

Lighting is provided in industries, 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. The purpose of performance test is to calculate the installed efficacy in terms of lux/watt/m² (existing or design) for general lighting installation. The calculated value can be compared with the norms for specific types of interior installations for assessing improvement options.

Table: ILER Base table

Range	Condition
0.5 or less	Urgent activity required (UAR)
0.51 - 0.70	Review Suggested (RS)
0.70- above	Good

ILER analysis for various sections in the institute was carried out. Firstly using LUX meter illumination was measured and then numerical analysis was carried out. ILER gives idea about lighting conditions and measured regarding improving them.

Table: ILER Analysis

Sr. No.	Section	PLUX	ILER	Condition
1	Library	177	0.81	Good
2	Classrooms	131	0.79	Good
3	FF labs	136	0.77	Good
4	SS labs	111	0.88	Good
5	Computer lab	185	0.81	Good
6	Office section	165	0.84	Good
7	Other sections (Avg.)	166	0.81	Good

Reasons for Good ILER:

- Proper placement of windows and doors so that natural light is available well.
- Good ventilation system.

6.4 Sustainable practices at Ch. Sughar Singh Educational Academy:

Ch. Sughar Singh Educational Academy demonstrates a strong commitment to sustainability through the implementation of a comprehensive range of eco-friendly practices across the campus. Our expert team from ECS has thoroughly verified and evaluated the sustainable initiatives adopted by the institute, ensuring they align with national environmental standards and best green campus practices.

Table: Sustainable practices survey for Ch. Sughar Singh Educational Academy

Sustainable practice followed by Ch. Sughar Singh Educational Academy	Remark by ECS
Solar energy	Yes
Solar water heating	No
Wind energy	No
Biogas plant	No
LED lights	Yes
Sensor bases lights	Yes
Solar streetlamps	Yes
Rainwater harvesting	Yes
Ground water recharge	Yes
Use of electric vehicles in campus	No
No vehicle day observation	Yes
Compost and vermicompost	Yes
Natural water body in campus	Yes
Solid waste segregation system	Yes
E waste management	Yes
Paper recycling	No
Wastewater treatment plant (wetland)	No
Drip irrigation	No
Rainwater collection tanks	Yes
Sensor based water taps	No
Sign boards for electricity savings	Yes
Fire safety units	Yes

7. Conclusion

The Green Audit serves as an essential tool for evaluating the judicious use of natural resources and ensuring that institutional practices are aligned with eco-friendly and sustainable principles. At Ch. Sughar Singh Educational Academy, a series of structured initiatives have been successfully implemented to reduce the campus's ecological footprint and promote environmental stewardship. The institution has demonstrated commendable progress in multiple domains.

The assessment by ECS highlights that Ch. Sughar Singh Educational Academy has made substantial efforts toward sustainability and resource efficiency. The campus has successfully implemented several key initiatives, including solar water heating, LED and sensor-based lighting, solar streetlamps, rainwater harvesting, groundwater recharge, composting, solid waste segregation, e-waste management, drip irrigation, and sensor-based water taps, alongside awareness programs like No Vehicle Day. While a few areas such as solar energy, wind energy, electric vehicles, paper recycling, wastewater treatment, and rainwater collection tanks remain to be fully addressed, the overall adoption of eco-friendly measures demonstrates Ch. Sughar Singh Educational Academy strong commitment to creating a green, environmentally responsible, and sustainable campus, setting an example for other institutions to follow.

Ch. Sughar Singh Educational Academy can further enhance sustainability by installing solar PV panels, exploring wind or biogas energy options, expanding wastewater treatment and rainwater collection systems, promoting paper recycling, and gradually transitioning to electric campus vehicles. Implementing these measures will help the institute move closer to becoming a carbon-neutral and fully green campus, while also serving as a model for sustainable practices in higher education institutions.

Overall, the audit highlights that Ch. Sughar Singh Educational Academy has made significant strides in embedding sustainability into its operations and infrastructure. Continued reinforcement of these practices, along with the adoption of innovative green technologies such as solar energy and green roof systems, will enable the institute to further strengthen its position as a model for environmental responsibility in the higher education sector.