



**Shobhit
University**

EDUCATION EMPOWERS

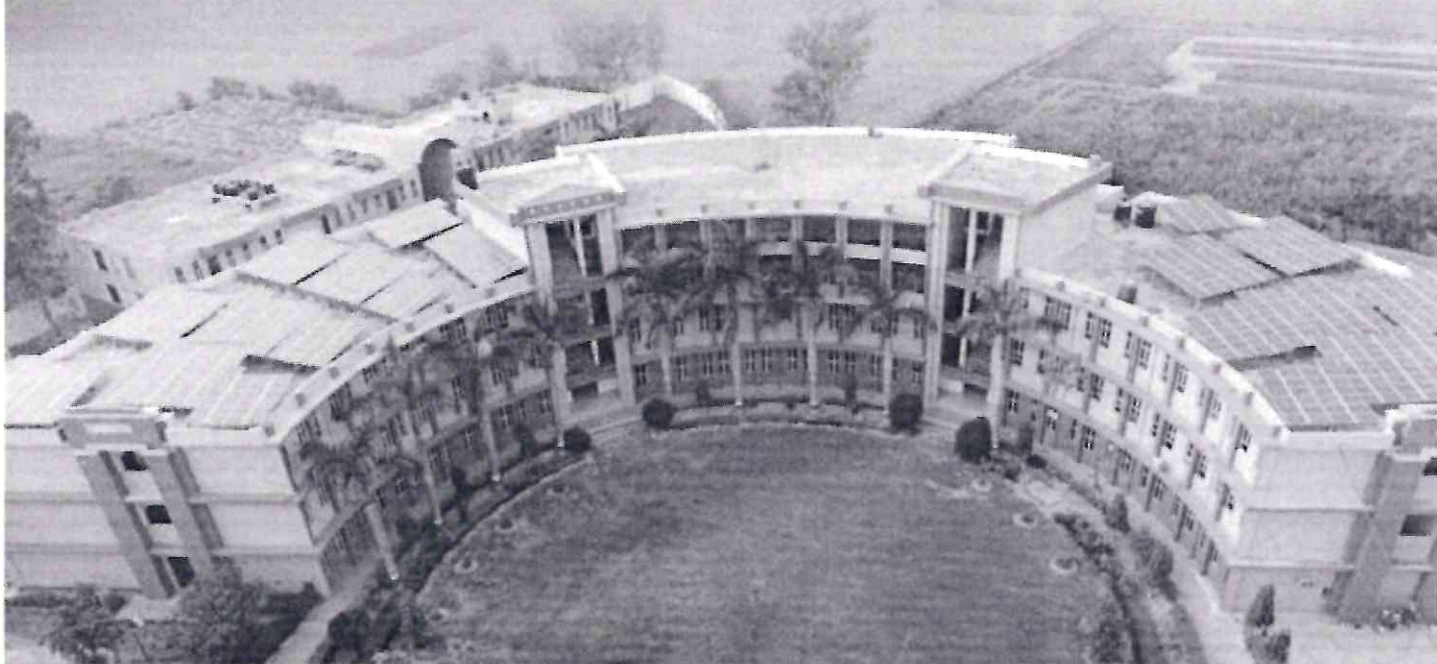


Top 101-125 Band
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CRITERION 7 - INSTITUTIONAL VALUES AND BEST PRACTICES

7.1.6 QUALITY AUDITS ON ENVIRONMENT AND ENERGY REGULARLY UNDERTAKEN BY THE INSTITUTION AND ANY AWARDS RECEIVED FOR SUCH GREEN CAMPUS INITIATIVES: 1. GREEN AUDIT 2. ENERGY AUDIT 3. ENVIRONMENT AUDIT 4. CLEAN AND GREEN CAMPUS RECOGNITIONS / AWARDS 5. BEYOND THE CAMPUS ENVIRONMENTAL PROMOTION ACTIVITIES

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SHOBHIT UNIVERSITY, Gangoh

[Notified by Government of U.P. Act No.3 of 2012, Established u/s 2(f) of UGC Act 1956]

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35
YEARS
OF ACADEMIC
EXCELLENCE



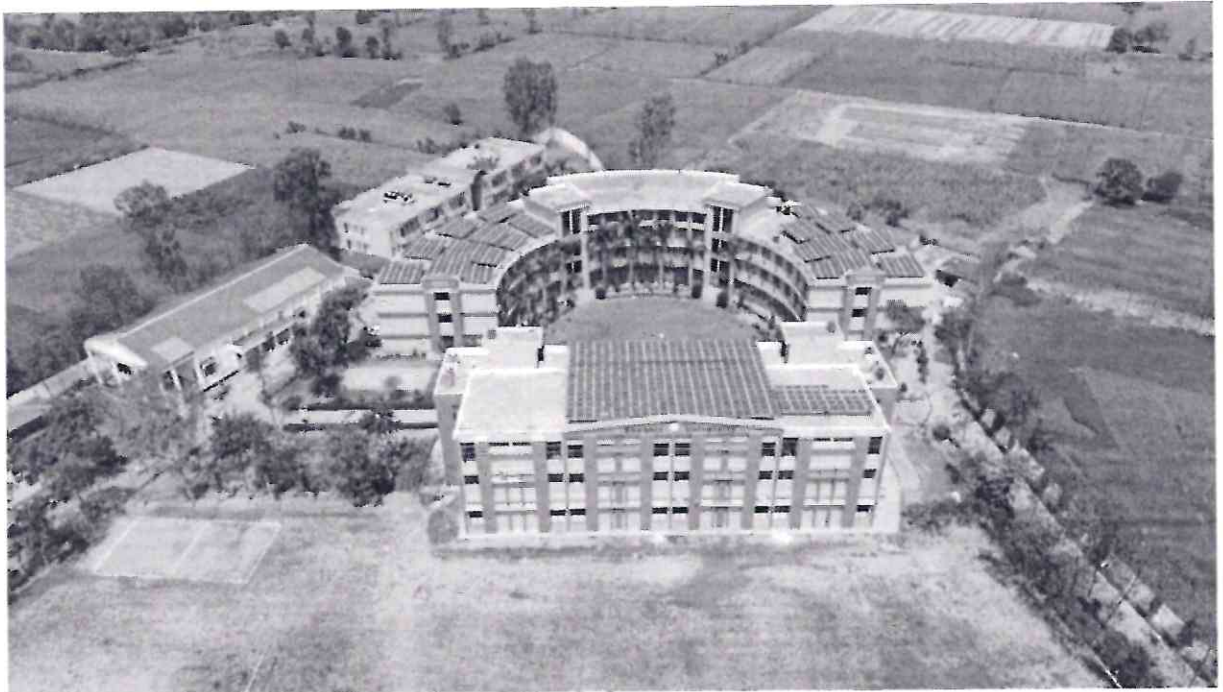


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Energy Audit Report

ENERGY AUDIT REPORT

2023-2024



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We acknowledge the contribution of all the faculty members and administrative team for providing us with essential information and support, enabling us to successfully conduct this critical Energy Audit. Your collective efforts have made this endeavour a meaningful and productive experience.

Thank you.

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Table of Contents

Chapter 1	
Abstract.....	5
Chapter 1	
Introduction	7
Background of energy Audit	8
Objectives of Energy Audit:.....	9
Process of Energy Audit	11
Chapter 2	
Audit preparation	12
Pre-Audit Stage.....	18
The Audit	20
Chapter 3	
Assessment	15
Evaluation	16
Energy Audit Report.....	17
Energy Consumption.....	18
Energy Consumption in Campus	18
Energy Savings Opportunities	19
The Carbon Foot Print.....	19
Chapter 4	
Recommendations.....	20
Conclusion.....	21
Annexures	
Questionnaire for Energy Audit	22
Questionnaire for Carbon Footprint Identification.....	24
Photographs and sample bills.....	25

Energy Audit 2023-24**Abstract**

Shobhit University, Gangoh was established by the legislative bill of Uttar Pradesh Government vide Shobhit University Uttar Pradesh Act, 3 in 2012. It has since emerged as one of the very few universities that are rural-based in the sense they are deeply entrenched in the rural ambience of culture, environment, market and aspirations while technologically resting on the great shift on the continuum of Tradition and Modernity. Shobhit University has developed phenomenally since its inception to be recognized as a premier University in the country today. It offers Bachelor, Master and Doctoral programmes in one of the widest ranges of disciplines, Ayurveda, Engineering, Management, Pharmacy, Law, Education, Agriculture, Bio-technology, Bio-medical Engineering, Arts and Humanities, Naturopathy and Yoga, Paramedical Studies, and many other Short duration Skill Development Programs. Our goal for every student is enlightenment — the systematic development of full potential from within. This is the key to true fulfillment in daily life and any career.

**About Shobhit University**

This was the first ever Higher Technical Education institution in the Saharanpur Commissionary. The Trust focused on education for local village girls and minority youth, and has supported them with special scholarships and facilities. The trust's focus on its rural base was further encouraged when in 2003, the Prime Minister Shri Atal Bihari Vajpayee ji, and in the later years the then Deputy Prime Minister Shri L.K.Advani ji and the then Vice President Shri Bhairon Singh Shekhawat ji presided over different scholarship award ceremonies of the Trust. In 2004, Shri L.K.Advani ji inaugurated a 100-bed hospital in the Gangoh campus. A Pharmacy College was established in 2005.

Seeing the transformational effect of different colleges in the aspiration-fulfillment of the local youth, the Trust decided to provide a unifying identity and procedure to all these institutions by establishing Shobhit

University as a self-funded State University through the UP Government Act in 2012. Local population has since perceived the University to be a formidable front of their personal aspirations and achievement.

To fulfill the vision of Hon'ble Prime Minister Shri Narendra Modi ji, in 2014, an Ayurveda Medical college and Research Centre was also established. And in the same series of movement of concerns, 2016 saw the emergence of a Yoga and naturopathy college. To enhance the spiritual environment of the region, the University has also established a Centre for Spirituality Research. This may be the only research center which is chaired by a Mahamandaleshwar.

Today, the University has become a people's own institution, and offers programs that are based on local needs in the areas of Ayurveda, Engineering, Management, Pharmacy, Law, Education, Agriculture, Biotechnology, Bio-medical Engineering, Arts and Humanities, Naturopathy and Yoga, Paramedical Studies, and many other Short duration Skill Development Programs.

The University is proud of its alumni working on the national- international setting of professional excellence. **"Empowering Nation through Education"**- the University slogan- has not only stemmed the migration flow from the village to the city, but has also improved the socio-economic condition of the region.

The Shobhit University, Gangoh today presents not only its geographical rural character with immensely green surroundings, and pollution-free environment and simplicity of life, but also the rural-ness of its various courses and course additions. Youth and the population aspire for the University and the latter works for them in this sylvan part of North-western Uttar Pradesh where the villages see higher education face to face with open buds of swaying crops.

The Energy Audit Team carried out the audit at Shobhit University campus Gangoh, Saharanpur. The team comprises interdisciplinary experts in various aspects of environment and energy management. The audit took place over two days, from January 3rd to January 4th, 2024, during which the team assessed the energy usage and sustainability practices of the campus to provide recommendations for enhancing energy efficiency and promoting green initiatives.

The audit process at Shobhit University was conducted using participatory methods that involved collaboration with various stakeholders within the Institute. This inclusive approach allowed for comprehensive data collection and in-depth assessments of energy usage and sustainability practices. By actively engaging students, faculty, and administrative staff, the audit team ensured that the process was thorough and reflective of the Institute's actual practices. This method also facilitated a shared understanding of the energy audit's goals and fostered a sense of ownership among participants, ultimately contributing to more effective implementation of recommendations and future energy efficiency measures.

Chapter 1 Energy Audit

Introduction

An energy audit is a systematic evaluation of energy use within a facility, building, or organization, conducted by trained professionals or energy consultants. It involves gathering data about energy consumption, conducting a physical inspection of the facility to assess energy-consuming equipment and systems, analyzing historical energy usage data, evaluating the performance of lighting, HVAC, and other systems, and identifying opportunities for improving energy efficiency. The audit includes assessing the building envelope, lighting systems, HVAC systems, and renewable energy potential. Based on the findings, energy conservation measures (ECMs) are identified and prioritized to optimize energy efficiency and reduce energy costs. A comprehensive energy audit report is prepared, outlining recommendations for implementing ECMs, estimated energy savings, implementation costs, and payback periods. This report serves as a roadmap for achieving sustainable energy management goals and environmental stewardship. Overall, an energy audit provides valuable insights into energy usage patterns, identifies areas for improvement, and helps develop strategies for optimizing energy efficiency and reducing environmental impact.

Background of energy Audit

The background of energy audits lies in the growing recognition of the importance of energy efficiency and sustainability in modern society. As concerns about climate change, resource depletion, and energy security have escalated, organizations and governments alike have sought ways to reduce energy consumption and mitigate environmental impact. Energy audits emerged as a valuable tool to help address these challenges by systematically assessing energy usage and identifying opportunities for improvement.

The roots of energy auditing can be traced back to the oil crisis of the 1970s when dramatic increases in energy prices prompted widespread efforts to conserve energy and reduce dependence on fossil fuels. Governments, businesses, and institutions began to realize the economic and environmental benefits of energy efficiency, leading to the development of methodologies and practices for evaluating energy use in buildings, industrial facilities, and other sectors.

Over the years, energy auditing has evolved in response to advances in technology, changes in regulatory requirements, and shifts in societal norms towards sustainability. Today, energy audits are integral to energy management programs, sustainability initiatives, and regulatory compliance efforts in many countries around the world.

The background of energy audits underscores the importance of proactive energy management and the role of data-driven decision-making in optimizing energy efficiency and reducing carbon footprint. By identifying energy-saving opportunities, improving operational practices, and investing in energy-efficient technologies, organizations can not only reduce their energy costs but also contribute to a more sustainable and resilient future.

Objectives of Energy Audit:

1. **Identify Energy Consumption Patterns:** One of the main objectives of an energy audit is to analyze and understand the patterns of energy consumption within a facility or organization. By examining historical energy usage data and conducting on-site assessments, the audit aims to identify when, where, and how energy is being used.
2. **Evaluate Energy Efficiency:** An energy audit seeks to evaluate the efficiency of energy-consuming systems, equipment, and processes. This includes assessing the performance of HVAC systems, lighting systems, industrial machinery, and other energy-consuming assets to identify opportunities for improvement.
3. **Identify Energy Saving Opportunities:** A key objective of an energy audit is to identify potential energy-saving opportunities and energy conservation measures (ECMs). These may include upgrading to energy-efficient equipment, optimizing operating schedules, implementing energy management strategies, and adopting renewable energy technologies.
4. **Quantify Energy Savings Potential:** The energy audit aims to quantify the potential energy savings associated with implementing recommended energy conservation measures. By conducting energy simulations, calculations, and analyses, the audit helps estimate the magnitude of potential energy savings and their impact on overall energy consumption and costs.
5. **Improve Operational Efficiency:** Another objective of an energy audit is to improve operational efficiency by identifying inefficiencies, wastages, and areas of improvement in energy management practices. By optimizing energy usage and reducing energy losses, organizations can enhance operational performance and productivity.
6. **Reduce Environmental Impact:** Energy audits contribute to reducing the environmental impact of organizations by identifying opportunities to reduce greenhouse gas emissions, mitigate climate change, and minimize resource depletion. By improving energy efficiency and transitioning to cleaner energy sources, organizations can promote environmental sustainability and corporate responsibility.
7. **Enhance Financial Performance:** By reducing energy consumption and lowering energy costs, energy audits can lead to significant financial savings for organizations. The audit helps identify cost-effective energy-saving measures with favorable return on investment (ROI) and payback periods, thereby enhancing the organization's financial performance and competitiveness.
8. **Compliance with Regulations and Standards:** Energy audits may also serve the objective of

ensuring compliance with energy regulations, standards, and mandates. Many jurisdictions require certain facilities to conduct periodic energy audits or comply with specific energy efficiency requirements, and the audit helps organizations meet these regulatory obligations.

Process of Energy Audit

1. Preparation and Planning:

- Define the scope and objectives of the energy audit, including the areas to be assessed and the goals to be achieved.
- Gather relevant information, such as utility bills, equipment specifications, operating schedules, and building plans.
- Assemble an audit team with expertise in energy management, engineering, and facility operations.

2. Site Visit and Data Collection:

- Conduct a comprehensive walkthrough of the facility to observe energy-consuming equipment, systems, and processes.
- Collect detailed data on energy consumption, including meter readings, utility bills, and historical energy usage data.
- Document equipment specifications, operating conditions, and occupancy patterns, as well as any observations or issues noted during the site visit.

3. Energy Use Analysis:

- Analyze energy consumption data to identify trends, patterns, and anomalies in energy usage.
- Calculate energy use intensity (EUI) for different building systems and compare it to industry benchmarks or similar facilities.
- Identify high-energy-consuming areas or processes that warrant further investigation.

4. Equipment and System Evaluation:

- Assess the performance of energy-consuming equipment and systems, including HVAC systems, lighting, appliances, and industrial machinery.
- Conduct measurements, tests, and inspections to evaluate equipment efficiency, operating conditions, and maintenance practices.
- Identify opportunities for equipment upgrades, retrofits, or replacements to improve energy efficiency and optimize performance.

5. Building Envelope Assessment:

- Evaluate the building envelope, including walls, roofs, windows, doors, and insulation, to

assess thermal performance and air leakage.

- Identify opportunities for improving insulation, sealing gaps or leaks, and enhancing the overall energy efficiency of the building envelope.

6. Lighting Audit:

- Assess the lighting system, including fixture types, lamp technologies, lighting controls, and illumination levels.
- Determine lighting requirements for different areas of the facility and evaluate the adequacy of existing lighting levels.
- Identify opportunities for upgrading to energy-efficient lighting technologies and implementing lighting controls to reduce energy consumption.

7. HVAC System Assessment:

- Evaluate the performance of HVAC systems, including heating, cooling, and ventilation equipment.
- Check for proper maintenance, calibration, and operation of HVAC components, such as boilers, chillers, air handlers, and ductwork.
- Identify opportunities for optimizing temperature and humidity levels, improving air distribution, and implementing energy-saving measures.

8. Renewable Energy Potential:

- Assess the feasibility of incorporating renewable energy sources, such as solar panels, wind turbines, or geothermal systems, to offset energy consumption and reduce reliance on fossil fuels.
- Conduct a site assessment to determine the suitability of renewable energy technologies and estimate the potential energy production and cost savings.

9. Energy Conservation Measures (ECMs):

- Identify and prioritize energy conservation measures based on their potential energy savings, cost-effectiveness, and return on investment.
- Develop a comprehensive list of ECMs, including estimated energy savings, implementation costs, and payback periods.
- Present recommendations to key stakeholders and decision-makers, highlighting potential benefits, costs, and implementation timelines.

10. Reporting and Recommendations:

- Prepare a detailed energy audit report summarizing findings, recommendations, and proposed ECMs.
- Present the report to management, stakeholders, and other relevant parties, and discuss the implications of the findings.
- Develop an action plan for implementing recommended ECMs, monitoring ongoing energy performance, and tracking progress towards energy efficiency goals.

Audit preparation

The Shobhit University places a strong emphasis on energy efficiency across its campus. In the 2023-24 academic years, the institute called upon our team to conduct a comprehensive audit of its energy usage and efficiency. This included examining all units that utilize or produce energy, from lighting and heating to fuel consumption for transportation. The audit was supported by dedicated institutional staff, which provided valuable insights and assistance throughout the process.

The audit involved an in-depth, two-day inspection and survey to gather data on energy use. Our team thoroughly explored every corner of the campus, numbering and assessing all energy-consuming equipment and systems. This included a detailed review of the kitchen and canteen areas to evaluate energy usage in food preparation and storage. Additionally, we conducted real-time surveys with students and staff to understand their transportation habits and estimate the fuel consumption associated with commuting. Through this meticulous approach, we aimed to identify opportunities for enhancing energy efficiency and sustainability at the University.

Pre-Audit Stage

The pre-audit stage is a crucial phase in the energy audit process as it involves laying the groundwork for a successful and effective audit. During this stage, the audit team engages in various planning and preparation activities to establish the scope, objectives, and strategy for the audit. Here's an overview of the tasks involved in the pre-audit stage:

1. Defining Audit Objectives:

- Establish the main goals of the audit, such as identifying energy-saving opportunities, reducing costs, or improving overall energy efficiency.

2. Assembling an Audit Team:

- Select a team of qualified professionals with expertise in energy management, engineering, or related fields.
- Include individuals from different departments for a comprehensive understanding of the institution's energy usage.

3. Gathering Historical Data:

- Collect historical energy usage data, such as utility bills, fuel consumption records, and past audit reports.
- Analyze the data to understand current energy consumption patterns and identify areas with high energy usage.

4. Setting Audit Scope:

- Define the scope of the audit, specifying which areas, buildings, and systems will be audited.
- Determine the depth and breadth of the audit, including which equipment and processes will be examined.

5. Creating an Inventory:

- Compile an inventory of all energy-consuming equipment and systems on campus.
- Include details such as the age, model, and energy efficiency of each item.

6. Identifying Key Performance Indicators (KPIs):

- Determine KPIs to measure and monitor energy usage and efficiency during the audit.
- Set benchmarks to compare current performance with industry standards.

7. Establishing Safety Protocols:

- Develop safety procedures for the audit team and anyone participating in the audit.
- Ensure compliance with safety standards during site visits and inspections.

8. Preparing Survey Instruments:

- Organize and calibrate tools and equipment for measuring energy usage (e.g., meters, sensors, data loggers).
- Prepare surveys or questionnaires to gather input from staff and students about energy usage patterns.

9. Scheduling and Coordination:

- Develop a timeline and schedule for the audit, coordinating visits to different areas of the campus.
- Minimize disruption to campus activities by choosing appropriate times for site visits.

10. Communicating with Stakeholders:

- Inform campus administrators, staff, and students about the upcoming audit and its objectives.
- Engage stakeholders to gain their support and cooperation during the audit.

11. Reviewing Legal and Regulatory Requirements:

- Familiarize the audit team with applicable legal, regulatory, and institutional policies related to energy usage and conservation.

The Audit

The audit stage is the core part of the energy audit process, where the audit team conducts a comprehensive assessment of energy usage and efficiency within the institution. This involves gathering data, evaluating energy systems, and identifying opportunities for improvement. The following tasks are typically part of the audit stage:

- 1. Site Inspection**
- 2. Data Collection**
- 3. Energy Flow Analysis**
- 4. Interviewing Stakeholders**
- 5. Usage and Behavior Assessment**
- 6. Compliance Verification**

7. Documenting Findings
8. Analysis and Benchmarking
9. Identifying Opportunities
10. Reporting and Recommendations

Chapter 3 The Energy Audit

From 1st December 2023 to 15th December 2023, the In-house team conducted an in-depth assessment of the Campuses. The IQAC Coordinator provided additional context on quality assurance and efficiency initiatives within the campus. In order to understand the practical aspects of energy usage, the team interviewed the campus electrician, canteen staff, and kitchen staff. This enabled the team to gather information on the operational aspects of energy consumption in different areas. Surveys were distributed to students, faculty, and non-teaching staff to capture their perspectives on energy usage and efficiency, while questionnaires provided valuable qualitative data to complement the quantitative measurements. Through these engagements, the team gained a comprehensive understanding of the energy consumption patterns and potential areas for improvement across the campus.

Evaluation

The audit team conducted a thorough evaluation of the documents and reports to assess the energy usage and efficiency across the both campus. Data collected with the assistance of students and staff was meticulously compiled and quantified using specialized software tools. The use of AI tools ensured a high level of accuracy, objectivity, and freedom from error or bias in the analysis and results. The findings were compared against the management's stated claims and objectives regarding energy optimization and environmental stewardship, enabling a robust assessment of the campus's alignment with its stated sustainability goals. This evaluation provided clear insights into the current state of energy usage and efficiency, highlighting potential areas for improvement and alignment with the institution's vision for sustainable practices.

Energy Audit Report

The 51.2 Acre campus of Shobhit University Campus is strategically located, offering convenient accessibility.

The university boasts a total built-up area of 32080 Sq m campus, which encompasses the academic and administrative buildings, computer labs, classrooms, common rooms, canteen, toilets, roads, parking spaces, and playgrounds. The well-designed campus also features thoughtfully allocated green spaces, including parks and gardens, plantation areas, and forested regions. These green zones not only enhance the aesthetic appeal of the campus but also contribute to biodiversity and ecological sustainability, providing a peaceful and enriching environment for students, faculty, and visitors alike.

The audit team conducted a comprehensive assessment of energy consumption across the Shobhit University campus. This included a thorough evaluation of energy sources utilized, energy management practices, lighting devices, and other appliances used by the campus community. The team carefully verified and quantified the usage of various electrical appliances and systems, including their respective consumption patterns and efficiency levels. This meticulous examination provided insight into the institution's current state of energy management, highlighting areas where energy efficiency could be improved and cost savings realized. Based on the findings from the assessment, the audit team formulated a series of tailored suggestions and recommendations for the institute. These included opportunities to upgrade to more energy-efficient appliances and lighting systems, optimize the use of renewable energy sources, and implement best practices in energy conservation. The team also recommended strategies to enhance campus-wide awareness and participation in energy-saving initiatives.

By adopting these recommendations, the institute can not only reduce its energy footprint but also achieve greater alignment with its sustainability goals and contribute positively to the broader community and environment.

List of Particulars

SN	Particulars	Quantity
1	Refrigerator	6
2	Air Conditioners	26
3	Computers	460
4	LED Street Light	55
5	Inverters	2
6	Televisions	5
7	LCD Projectors	20
8	Water Filters	6
9	Electric Motor	5
10	Sound Systems	10
11	Printers	40
12	Xerox Machine	02
13	Fans	1232
14	LED Bulbs	43
15	CFL Bulbs	47
16	Tube Lights	221
17	Freezer	-
18	Mixer Grinder	1
19	Lab Equipment	As per norms.

Energy Consumption:

- Fridges, Air Conditioners, and Freezer:** These cooling appliances consume significant amounts of energy to maintain low temperatures. Proper maintenance and usage can help minimize energy consumption.
- Computers, Printers, and Xerox Machine:** The campus operates a high number of computers and printing devices, which can lead to high energy consumption, especially when not used efficiently.
- LED Bulbs, CFL Bulbs, and Tube Lights:** The use of energy-efficient LED and CFL bulbs is commendable as it leads to reduced energy consumption compared to traditional incandescent bulbs. The quantity of lights indicates significant energy usage, making it crucial to ensure that lights are switched off when not in use.

- **Sound Systems, Televisions, and LCD Projectors:** Audio-visual equipment can be energy-intensive, particularly when in continuous use. Encouraging staff and students to turn off devices when not needed can save energy.
- **Electric Motor Pumps:** These pumps likely serve essential functions, such as water supply. Their energy consumption can be significant, so efficient usage and maintenance are essential.

Energy Consumption in Campus

Based on the electricity bill for the last six months from April to December 2023, the Shobhit University experienced an average monthly energy consumption ranging from 3714 units - 11141 (kWh) of electricity. The electricity bills during this period varied, with the lowest bill amounting to Rs. 153815 in October and the highest reaching Rs. 239214 in December. The meter number 8528797 indicates the monitoring and recording system in place for the institute's electricity consumption. This range of energy consumption and billing can provide insights into the energy efficiency and potential cost savings for the institute.

Energy Savings Opportunities

- Ensuring that appliances are used efficiently and turned off when not in use can lead to substantial energy savings.
- Replacing older, less efficient appliances with newer models can result in immediate energy savings. The electricity supply should be updated with latest methods and equipment to save use of energy.
- Regular maintenance and monitoring of equipment can help maintain optimal performance and energy efficiency.
- Implementing smart power management tools such as timers and automatic shut-offs can minimize unnecessary energy usage. Use Air Conditioners, Fans and other electric and electronic appliances only 5-star rated by EEC
- Educating students, faculty, and staff about responsible energy usage can create a culture of conservation throughout the campus.
- Expand renewable and carbon-neutral electricity options like solar power.
- Cleaning of tube-lights/bulbs to be done periodically, to remove dust over it enhance running efficiency and use less electricity.
- Proper awareness programs can be conducted through the use of Information, Education and Communication materials or Behaviour Change Communication Materials.

The Carbon Foot Print

Energy consumption and carbon footprints are closely related because the production and use of energy often result in the release of greenhouse gases (GHGs), primarily carbon dioxide (CO₂), into the atmosphere. These emissions contribute to climate change and have significant environmental impacts. Hence it is very important to understand the usage on these carbon foot prints to have a clear idea about energy

usage. The relationship between energy consumption and carbon footprints can be understood in the following ways:

- **Fossil Fuels:** When energy is derived from fossil fuels such as coal, oil, or natural gas, the combustion process releases large amounts of CO₂ and other pollutants, significantly contributing to carbon footprints.
- **Renewable Energy:** Renewable energy sources like solar, wind, and hydropower produce little to no direct GHG emissions. Shifting to these sources can significantly reduce carbon footprints.
- **Energy Efficiency:** Efficient use of energy, such as through the use of LED lighting, efficient appliances, and well-insulated buildings, reduces overall energy consumption and, in turn, lowers carbon footprints.
- **Energy Waste:** Inefficient use of energy, such as leaving lights on unnecessarily or using outdated, energy-intensive equipment, increases energy consumption and carbon emissions.
- **Large-scale energy Consumption:** The more energy consumed, the higher the potential carbon emissions, especially if the energy comes from fossil fuels.
- **Small-scale energy Consumption:** By reducing energy usage, such as through conservation efforts and efficient practices, carbon footprints can be minimized.
- **Individual and Collective Behavior:** People's energy consumption habits play a significant role in carbon footprints. Educating individuals about energy conservation and promoting sustainable practices can reduce overall energy use.

The carbon footprint audit of the Shobhit University Campus was conducted using a comprehensive questionnaire to assess the community's impact on the global environment. This analysis is a critical step in evaluating the institution's carbon emissions and implementing measures to reduce its environmental footprint. Through the audit, Shobhit University gained a clearer understanding of its greenhouse gas inventory and can use this knowledge to strategically plan for future emissions reductions. Isolating each source of emissions allows the institution to develop targeted reduction strategies, evaluate their potential impact, and determine the feasibility and payback of various options. The audit also raises awareness of the institute's potential reporting obligations under energy and emissions reporting legislation. The data collected revealed that the primary sources of pollution on the university campus include the use of diesel and petrol vehicles, air conditioners, a power generator, and kitchen waste and other biodegradable waste from the canteen. Additionally, the use of electronic appliances contributes to the campus's carbon footprint. Armed with this information, Shobhit University can take proactive steps to minimize emissions, such as promoting cleaner transportation options, optimizing waste management, and encouraging the use of energy-efficient appliances.

List of Particulars

SN	Particulars	Quantity
1	Total number of students	3235
2	Total number of teachers	206
3	Number of non-teaching staff	157

4	Number of persons using cars	50
	- Distance travelled per day	4850 km
	- Fuel consumption per day	296 L
5	Number of persons using two-wheelers	2280
	- Distance travelled per day	114000 km
	- Fuel consumption per day	2850 L
6	Number of persons using public transport (bus)	1237
	- Distance travelled per day	14620 km
	- Fuel consumption per day	294.4 L
7	Number of cycles used on campus	30
8	LPG usage	6 cylinders

The data provided offers insight into the demographics of the Shobhit University campus community, highlighting students, teachers, non-teaching staff, and their transportation habits. The carbon footprint and energy consumption impact of the transportation choices is significant. The use of cars and two-wheelers, as well as reliance on public transportation, contributes to substantial emissions of greenhouse gases, such as carbon dioxide (CO₂), which play a role in global warming and climate change. The total daily fossil fuel usage of excluding LPG and fuel for generators adds to the institution's carbon emissions and indicates a high energy consumption pattern, primarily from transportation. This reliance on fossil fuel-based transportation leads to increased carbon emissions and may impact local air quality. Given the current transportation and energy consumption patterns, the institution has an opportunity to reduce its carbon footprint and energy consumption impact. Encouraging the use of alternative transportation options, such as cycling or electric vehicles, can help lower emissions and energy usage. The adoption of energy-efficient practices and a shift toward renewable energy sources may also contribute to reducing the carbon footprint and enhancing sustainability on campus. By taking proactive measures, Shobhit University can work toward a greener, more sustainable future.

The energy audit at the University revealed key building envelope characteristics that contribute to overall energy consumption. The walls of the campus buildings are constructed with brick and finished with cement plaster, providing thermal mass and insulation. The roofing incorporating reinforced concrete (RCC) roofs, which influence heat retention and overall energy efficiency. The windows across campus are present in sufficient numbers in all rooms, offering natural ventilation and daylighting. Doors are well-ventilated, facilitating airflow and maintaining indoor air quality. These building envelope features impact the campus's energy usage by affecting heating and cooling loads and natural lighting levels in classrooms and offices. Addressing any deficiencies in the building envelope could lead to energy savings and improved comfort for occupants.

Chapter 4 Recommendations for Future

Recommendations

1. **Promote Sustainable Transportation:** Encourage carpooling among students and staff to reduce fuel consumption for private cars.
2. **Encourage Bicycle Use:** Consider promoting the use of bicycles on campus to reduce carbon emissions and energy usage from motorized vehicles.
3. **Assess Public Transport Efficiency:** Monitor and evaluate the fuel efficiency of public transportation options and consider alternative methods for lowering fuel usage.
4. **Upgrade Appliances:** Replace older, less efficient appliances like refrigerators, freezers, and printers with energy-efficient models.
5. **Optimize Lighting:** Replace CFL and tube lights with more energy-efficient LED bulbs to lower electricity usage.
6. **Upgrade Air Conditioning:** Replace or maintain the existing air conditioning system for more efficient operation.
7. **Invest in Renewable Energy:** Explore solar power options for reducing reliance on fossil fuels, particularly for campus electricity needs.
8. **Implement Energy-Efficient Water Filtration:** Examine and update water filtration systems for energy efficiency.
9. **Review Sound Systems and Projectors:** Evaluate and replace older sound systems and projectors with energy-efficient alternatives.
10. **Encourage Reduction in Motor Pump Usage:** Optimize water usage to reduce reliance on 2 HP motor pumps.
11. **Limit the Use of Televisions:** Restrict television usage to necessary areas and ensure energy-efficient operation.
12. **Manage and Optimize Printers and Xerox Machines:** Encourage the use of electronic documents to reduce paper and ink usage, which also decreases the energy used by printers and copiers.
13. **Educate on Efficient Appliance Use:** Provide training to staff and students on proper usage and maintenance of appliances to extend their life and improve efficiency.
14. **Review Fuel Usage for Transportation:** Implement policies and practices to lower fuel usage from cars and two-wheelers, such as combining trips or using electric or hybrid vehicles.
15. **Track and Monitor Energy Use:** Maintain a regular system for tracking energy usage in different campus facilities to identify areas for improvement.

Conclusion

In conclusion, the data provided offers insight into the energy consumption and usage patterns at Shobhit University. By implementing the recommendations based on the data, the institution can significantly improve its energy efficiency, reduce its carbon footprint, and create a more sustainable campus environment. These initiatives include promoting sustainable transportation, upgrading to energy-efficient appliances, optimizing lighting and air conditioning systems, and investing in renewable energy sources. Furthermore, proper monitoring and analysis of energy use will allow the institution to make data-driven decisions and continuously enhance its energy conservation efforts. By taking these steps, Shobhit university can lead the way in demonstrating a commitment to environmental stewardship and resource conservation while providing a healthier and more productive learning environment for students and staff.

Annexure 1

Questionnaire for Energy Audit

The provided questionnaire is comprehensive and covers various aspects of energy management and usage within the campus. It assesses the current energy consumption and provides an opportunity for identifying areas for improvement. Below, I have divided the questionnaire into distinct categories based on the themes of energy sources and consumption, lighting and equipment usage, and energy conservation methods. Kindly answer the details in a truthful way.

Energy Sources and Consumption

1. List ways of energy usage on the campus (e.g., electricity, LPG, firewood, petrol, diesel).
2. Provide electricity bill amounts for the last three years.
3. Amount paid for LPG cylinders over the last three years.
4. Other energy-related payments over the last three years.
5. Weight of firewood used per month and cost, including petrol/diesel/others.
6. Does the campus have any alternative energy sources (e.g., solar, windmill)?

Lighting and Equipment Usage

7. What types of bulbs are used on campus? Provide quantities of each type.
8. Provide total energy utilization by each type of bulb per month.
9. How many fans, air conditioners, computers, and other electrical equipment are used on campus? Specify usage (hours/day for how many days in a month).
10. Energy used by all fans, air conditioners, computers, and electrical equipment per month (kWh).
11. How many photocopier machines are installed and in use? Specify usage.
12. How many cooling apparatus and inverters are present on campus? Specify usage and energy consumption.

Energy Conservation Methods

13. Do you run "switch off" drills on campus?
14. Are your computers and other equipment put on power-saving mode?
15. What energy conservation methods are adapted by the college?
16. Is there any public awareness system informing about the necessity of energy conservation?
17. Write a note on methods or practices that can reduce energy use in the college campus in the future.

Annexure 2

Questionnaire for Carbon Footprint Identification

This questionnaire provides a comprehensive approach to auditing the carbon footprint of WIRAS College. It is structured to capture various aspects of the institution's carbon emissions sources and offers insight into how different modes of transportation and energy use contribute to the college's overall carbon footprint. Below, the questionnaire is grouped into categories based on themes related to individuals on campus, transportation and energy usage, and methods to reduce carbon footprint.

Campus Population and Vehicle Use

1. Total number of students, teachers, and non-teaching staff by gender.
 - Record the gender distribution of students, teachers, and non-teaching staff.
2. Total number of vehicles used by stakeholders of the college per day.
3. Number of cycles used per day in the campus.
4. Number of two-wheelers used daily, including average distance traveled, engine size(cc), and quantity of fuel and cost per day.
5. Number of cars used daily, including average distance traveled, engine size (cc), and quantity of fuel and cost per day.

Transportation Methods and Usage

6. Number of persons using public transportation daily, including average distance traveled, quantity of fuel, and cost per day.
7. Number of persons using college conveyance (transportation for students, non-teaching staff, and teachers), including average distance traveled, quantity of fuel, and cost per day.
8. Number of parent-teacher meetings per year and estimated attendance.
 - Gather information on the mode of travel and estimated cost of travel for parents attending the meetings.
9. Number of visitors with vehicles per day.
10. Number of generators used daily, including hours of operation, quantity, and cost of fuel used.
11. Number of LPG cylinders used in the campus, including quantity and cost of fuel used daily.
12. Quantity of kerosene used in the canteen/labs, including quantity and cost of fuel used per day.

Carbon Footprint Reduction and Future Planning

13. Amount of taxi/auto charges paid per month for transportation of vegetables and other materials to the campus.
14. Amount of taxi/auto charges paid per month for the transportation of office goods to the college.
15. Amount of taxi/auto charges paid per month by stakeholders of the college.
16. Use of any other fossil fuels in the college, including the amount of fuel used per day and amount spent.
17. Describe methods the college might adopt in the future to reduce the quantity of fuel used by stakeholders, students, and teachers.

Annexure -III



विद्युत बीजक /Electricity Bill

Table with account details: Account No. 8027205646, Name SHOBHIT UNIVERSITY, Address C/O SH MAHIPAL S/O SH. BISHMBER SINGH, JAMDEHRA ROAD, GANGOH, SRE, Gangoh, UP-247341, IND.



Table with bill details: Bill No. 802915738954, Bill Date 03-OCT-2023, Bill Month OCT-2023, Net Billed Unit 17055.

This bill will be construed as final notice under section 171 of Supply Code 2005. Supply can be disconnected at any date on non-payment of old dues.

Main bill details table with columns: Details, Amount, Gross Amt, Subsidy, Amount. Includes Energy Charges, Demand Charges, Electricity Duty, etc.

Pay your bill online on < www.upenergy.in > or through various consumer centers... EXECUTIVE ENGINEER-EDD NAKUR

Table with meter details: Meter No. 8528797, Meter Status A, Recorded BMD 31.7, Previous Date 02-SEP-23, Current Date 02-OCT-23.

Table with financial details: Opening Surplus Solar Units 0.00, Closing Surplus Solar Units 0.00, Net Energy Charge, Last Payment Details, Current Payment Details.

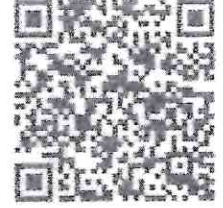
Printed By: As On Date: 05-Oct-23 11:23 AM

अधिकारी अधिकारी EXECUTIVE ENGINEER - EDD NAKUR



विद्युत बिल / Electricity Bill

खाता नं./Account No	8027269546	वार्ड /Division	EDD NAKUR(DIV130181)	Scan & Pay your Bill स्कैन करें और अपने बिल का भुगतान करें
नाम/Name	SHOBHI UNIVERSITY	उपवार्ड /Subdivision	SDO1301811	
पति/पति का नाम Father/Husband name	C/O SH MANIPAL S/O SH. BISHMBER SINGH, JANDEHRA ROAD, GANGOH	संयुक्त भार /Sanctioned Load	250 KVA	
पता /Address	C/O SH MANIPAL S/O SH. BISHMBER SINGH, JANDEHRA ROAD, GANGOH, BRE, Gangoh, UP-247341, IND	मीटर का नंबर /Meter S.No	8528787	
दोस्ताना नं./Mobile No	xxxxxx1101	रीटिंग /Tariff	HV1	
ईमेल /Email	xxxxxx009h@shobhiuniversity.ac.in	सप्लाय का प्रकार /Supply Type	H11	
		सुरक्षा जमा /Security Deposit	000000	
		रीटिंग नं./Latitudo	0	
		रीटिंग नं./Longitude	0	
		संयोजन तिथि /Connection Date	30-DEC-2020	



बिल नं./Bill No	802848725490	बिल अवधि/Bill Basis	OK	दस्तावेज जारी तिथि /Doc Date	16-NOV-2023
बिल जारी तिथि/Bill Date	01-NOV-2023	बिल अनुमति/Authorized Demand	187.50	एन सी एस जमा तिथि /Due Date Security	1729.82
बिल का मास/Bill Month	NOV-2023	प्रगतिशील उपभोग /Progressive Substiky		एन सी एस जमा तिथि/ Payable By Due Date	154142
बिल का इकाई /Not Billed Unit	11091	अवशिष्ट/अनिश्चित राशि /Inoperative Amount	0	बिल नं./Bill No	22-NOV-2023

This bill will be construed as final notice under section 171 of Supply Code 2006. Supply can be disconnected at any date on non-payment of old dues.
यह बिल को अंतिम सूचना के रूप में 171 के अंतर्गत विद्युत वितरण नियम, 2006 के अंतर्गत अद्यतन किया जा सकता है। आपका बिजली का आपूर्ति अंतर्गत अद्यतन किया जा सकता है।

Details	Amount			Details	Amount
	Gross Amt	Subsidy	Amount		
Energy Charges	82277.12	0.00	82277.12	प्रतिभूति स्वयंसेवा/Interest on Security	0.00
एन सी एस /Fixed/Demand Charges	80625.00	0.00	80625.00	दैनिक प्रतिभूति /Due Security	0
एन सी एस /Min. Charge	0.00	0.00	0.00	टी डी एस जमा/ TDS Amount	0
वैद्युत /Electricity Duty			12967.56	टी डी एस जमा/ TDS Amount	0
ग्रीन /Green, EC			0.00	सी जी एस टी/CGST	0
अधिक मांग/Excess Demand Penalty			0.00	एन सी एस टी/SGST	0
टी डी एस /Low P.F. Surcharge			0.00	वर्तमान बिल/Current bill/Current LPSC	6.87
प्रारंभिक/Provisional Adjustment			0.00	पिछले बिल/Last Current Bill	185576.65
दर/Rate Adjustments			0.00	दैनिक प्रतिभूति/Prev. Due Date Rebate Adj.	-2225.23
क्रेडिट /Credit			0	अनुपयुक्त/Arrear Amount	2196.47
डेबिट /Debit			0	पूर्व बिल/Prev. Arrear LPSC	88.79
टी डी एस /Misc Charges			0.00		
कैबल लागत /Armoured Cable Cost			0		
फैक्टो			0		
आपूर्ति/Compensation Amt			0.00	दैनिक प्रतिभूति /Payable Amount	185577
अनुपयुक्त/Disonor Cheque			0		
अनुपयुक्त/Disonor Charge			0	शब्दों में /In Words : One Lakh Eighty Five Thousand Eight Hundred Seventy Seven	
चोरी/Thief Assessment			0	Rupees Only	

Your bill online on < <http://www.pvn.org> > बिजली बिल को ऑनलाइन भुगतान करने के लिए आप अपने घर के बिजली के कनेक्शन पर जा सकते हैं। बिजली के कनेक्शन पर जाकर आप बिजली के कनेक्शन पर जा सकते हैं। बिजली के कनेक्शन पर जाकर आप बिजली के कनेक्शन पर जा सकते हैं। बिजली के कनेक्शन पर जाकर आप बिजली के कनेक्शन पर जा सकते हैं।

Serial No	Meter Status	Recorded BHP	Previous Date	Previous Read	Current Date	Current Read	Diff	Rate	Meter Unit	Period Months	Meter Remark
8027	A		02-OCT-23	121304	01-NOV-23	124788	3485	3	10455 KWH	1	OK
8027	A		02-OCT-23	121304	01-NOV-23	131878	3987	3	11081 KVAH	1	OK
8027	A	24.5						3	74.4 KVA	1	OK

अनुपयुक्त/Assessed Unit	Opening Surplus Solar Units	0.00	Closing Surplus Solar Units	0.00	मीटर नं./Meter Units	11091
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अनुपयुक्त/EC Calculation						अंतिम भुगतान विवरण/Last Payment Details		अंतिम भुगतान विवरण/Current Payment Details	
Rate	Rate	Amount	Subsidy Rate	Subsidy Amount	Net Energy Charge	अंतिम भुगतान/Last Paid Amount	अंतिम भुगतान/Last Paid Date	अंतिम भुगतान/Last Paid Amount	अंतिम भुगतान/Last Paid Date
						28000	02-OCT-2023		

Printed By: As On Date: 06-Nov-23 11:38 AM अधिकारी/Officer EXECUTIVE ENGINEER - EDD NAKUR

Signature and Date: 06/11/23

Signature and Date: 06/11/23



विद्युत बिल / Electricity Bill

बिल नं./Account No.	5027269846	बि/Division	EDD NAKUR(DIV130101)	Scan & Pay your Bill! स्कैन करें और अपने बिल का भुगतान करें
नाम/Name	SHOBHIT UNIVERSITY	उपबि/Subdivision	DDCI13010111	
पिता/सहोदर का नाम Father/husband name	C/O SH MAHPAL S/O SH. BISHMBER SINGH, JANDEHRA ROAD, GANGOH	संयुक्त नाम /Sanctioned Load	250 KVA	
पता/Address	C/O SH MAHPAL S/O SH. BISHMBER SINGH, JANDEHRA ROAD, GANGOH, SRE, Gangoh, UP-247341, IND	मीटर का वेग (Meter S.No)	8026797	
मोबाइल नं./Mobile No	xxxxxx1101	बि/Type	HV1	
ईमेल/Email	xxxxxxxxxxxx@shobhituniversity.ac.in	सप्लाय टाइप /Supply Type	H11	
		सुरक्षा जमा /Security Deposit	000000	
		बिल नं./ Bill Number	0	
		बिल तिथि / Bill Date	0	
		संशोधन तिथि /Correction Date	30-DEC-2023	

बिल नं./Bill No	50269044490	बिल स्थिति/Bill Status	OK	बिल तिथि/Bill Date	16-DEC-2023
बिल की तिथि/Bill Date	09-DEC-2023	बिल के लिए/Billed Demand	187.50	बिल नं./Bill No	1430.75
बिल माह/Bill Month	DEC-2023	प्रगतिशील /Progressive Subsidy	152384	बिल नं./Bill No	152384
बिल के लिए /Not Billed Unit	7500	प्रगतिशील की Insensitive Amount	0	बिल तिथि/Bill Date	23-DEC-2023

This bill will be construed as final notice under section 171 of Supply Code 2005. Supply can be discontinued at any date on non-payment of old dues.
इस बिल को अंतिम सूचना के रूप में 171 के अंतर्गत अंतर्गत किया जाएगा। पूर्ण भुगतान न करने पर आपकी आपूर्ति को अंतर्गत करने का अधिकार है।

Details	Amount			Details	Amount
	Gross Amt	Subsidy	Amount		
ऊर्जा शुल्क /Energy Charges	62449.92	0.00	62449.92	सुरक्षा जमा/Interest on Security	0.00
स्थिर शुल्क /Fixed/Demand Charges	80625.00	0.00	80625.00	दो माह का सुरक्षा /Due Security	0
सुरक्षा शुल्क /Min Charge	0.00	0.00	0.00	टी सी एस एम/TDS Amount	0
विद्युत शुल्क /Electricity Duty			10730.62	टी सी एस एम/TCS Amount	0
ग्रीन शुल्क /Green EC		0.00	0.00	जी टी एस टी/CGST	0
अतिरिक्त मांग पर /Excess Demand Penalty		0.00	0.00	जी टी एस टी/SGST	0
कम पी एफ चार्ज/Low P.F. Surcharge		0.00	0.00	वर्तमान बिल का भुगतान /Current LPSC	9.74
प्रारंभिक समायोजन/Provisional Adjustment		0.00	0.00	पहले का बिल /Not Current Bill	153815.28
टैरिफ समायोजन /Tariff Adjustments		0.00	0.00	बिल तिथि पर समायोजन/Prev. Due Date Rebate Adj.	-1720.02
क्रेडिट /Credit		0	0	समाप्त राशि /Arrear Amount	1663.02
डेबिट /Debit		0	0	पूर्व भुगतान /Prev. Arrear LPSC	85.56
विभिन्न शुल्क /Misc Charges		0.00	0.00		
आवृत तार शुल्क /Armoured Cable Cost		0	0		
रिबेट /Rebate		0	0		
प्रतिपूर्ति राशि /Compensation Amt		0	0	दिया गया /Payable Amount	153815
स्थापना शुल्क /Installation		0.00	0.00		
अपमान चेक/Dishonor Cheque		0	0		
अपमान शुल्क/Dishonor Charge		0	0	शब्दों में /In Words : One Lakh Fifty Three Thousand Eight Hundred Fifteen Rupees Only	
चोरी/थैफ्ट/Thft Assessment		0	0		

Pay your bill online on www.pvnv.co.in or through our consumers can also pay bills from Dept. offices. Fair price shops, e-Rupees, Janasiksha Kendra and through Vidyut Sahit and Microcredit centres from branches. ध्यान दें कि आप, अपने बिल को ऑनलाइन www.pvnv.co.in पर या हमारे विद्युत विभाग के कार्यालयों से भी भुगतान कर सकते हैं। ई-रुपये, जनसिखा केंद्रों और विद्युत सहित और माइक्रोक्रेडिट केंद्रों से भी भुगतान किया जा सकता है।

बिल नं./Bill No	मीटर नं./Meter No	संशोधन तिथि/Revised Date	पहले की तिथि/Previous Date	पहले का पढ़ा/Previous Read	वर्तमान तिथि/Current Date	वर्तमान पढ़ा/Current Read	कमी/घटा/Min	अधिक/बढ़ा/Max	मीटर यूनिट/Meter Unit	समाप्त/पहले/Period Month	बिल स्थिति/Bill Status
8026797	A		01-NOV-23 17:40	124780	09-DEC-23 00:00	126926	2137	3	6411 KWH	1	OK
8026797	A		01-NOV-23 17:40	121878	09-DEC-23 00:00	134100	2202	3	7500 KVAH	1	OK
8026797	A	12.7						3	35.1 KVA	1	OK

अनुमानित इकाई/Assessed Unit		खुले हुए सौर इकाई/Opening Surplus Solar Units	0.00	बंद हुए सौर इकाई/Closing Surplus Solar Units	0.00	मीटर यूनिट/Meter Units	7500														
<p>ऊर्जा शुल्क/ Energy Charges</p> <p>ऊर्जा शुल्क/ Energy Charges</p>																					
<p>ऊर्जा शुल्क/ EC Calculation</p> <table border="1"> <thead> <tr> <th>इकाई/Unit</th> <th>दर/Rate</th> <th>कुल राशि/Total Amount</th> <th>सुबसिडी दर/Subsidy Rate</th> <th>सुबसिडी राशि/Subsidy Amount</th> <th>शुद्ध ऊर्जा शुल्क/Net Energy Charge</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>						इकाई/Unit	दर/Rate	कुल राशि/Total Amount	सुबसिडी दर/Subsidy Rate	सुबसिडी राशि/Subsidy Amount	शुद्ध ऊर्जा शुल्क/Net Energy Charge							<p>पहले का भुगतान/Last Payment Details</p> <p>पहले का भुगतान राशि/Last Paid Amount: 104140</p> <p>पहले का भुगतान तिथि/Last Paid Date: 10-NOV-2023</p>		<p>वर्तमान भुगतान/Current Payment Details</p> <p>वर्तमान भुगतान राशि/Current Payment Amount: 153815</p> <p>वर्तमान भुगतान तिथि/Current Payment Date: 09-DEC-2023</p> <p>भुगतान मोड/Mode of Payment: बिल नं./Bill No: 153815</p>	
इकाई/Unit	दर/Rate	कुल राशि/Total Amount	सुबसिडी दर/Subsidy Rate	सुबसिडी राशि/Subsidy Amount	शुद्ध ऊर्जा शुल्क/Net Energy Charge																

Printed By :

As On Date: 04-Dec-23 12:59 PM

सहायक अभियंता EXECUTIVE ENGINEER - EDD NAKUR

Vice Chancellor
Shobhit University, Gangoh
P.O. Saharadour, 247341 (U.P.)

Ref. No:ANM/2024-14-10

CERTIFICATE FOR ENERGY AUDIT

This is to certify that
“Shobhit University” Gangoh
Uttar Pardesh
has successfully conducted ‘Energy Audit’
on 4th Jan 2024 and the electrical energy conservation, energy saving
measures and sustainability in compliance with the applicable regulations,
policies and standards in the campus were assessed to be excellent.



A handwritten signature in black ink, appearing to read "Abhay N Mudiraj", with a horizontal line underneath.

Abhay N Mudiraj

Energy Auditor-EA-34895/23

Certified by BEE