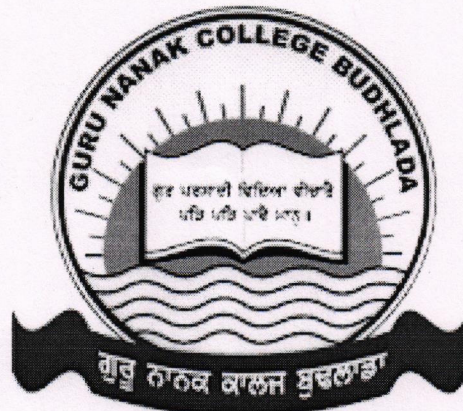



# Guru Nanak College, Budhlada

NAAC Accredited 'A' Grade,  
Under the management of S.G.P.C. Sri Amritsar Sahib  
Affiliated with Punjabi University, Patiala & Approved by AICTE

## ENERGY AUDIT REPORT 2018-19

PRINCIPAL  
DR. KULDIP SINGH BAL



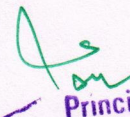
  
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# INDEX

Sr. No.	Content	Page No.
1	Introduction	
2.	Need for an Energy Audit	
3.	Aims and Objectives of an Energy Audit	
4.	About the college	
5.	Energy Audit Methodology	
6.	Detailed analysis	
7.	Energy Resource Management and Conservation Practices	
8.	Summary	
9	Conclusion	
10.	Recommendations	



  
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## Energy Audit Team

We, the external Energy Audit Committee members carried out the Energy Audit of Guru Nanak College Budhlada- 151502 (Mansa) Punjab for session 2018-19, assessed the energy consumption and energy conservation practices conducted in the Campus and supporting documents presented by the internal committee were examined and certified.

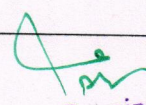
## Internal Committee

1. Dr.Narinder Singh, Coordinator IQAC
2. Dr.Gurjasjeet Kaur, Assist. Prof. Department of English
3. Dr. Rishi Kumar, Assist. Prof. Department of Physics
4. Dr.Hardeep Singh, Assist. Prof. Department of Physics

## External Committee

Sr. No.	Name and Designation	Signature
1.	Dr.Ramneek Kaur Department of Physics, Mata Gujri College, Fatehgarh Sahib (Punjab)	
2.	Dr.Rajpal Singh Department of Physics, Government Rajindra College, Bathinda (Punjab)	
3.	Sh. Jagmail Singh Rtd. S.D.O. PSPCL Budhlada (Punjab)	



  
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## 1. Introduction

An energy audit is a survey in which energy consumption is examined in the Organization, for the purpose of energy conservation. The audit includes suggestions of alternative means and methods for achieving energy savings to a larger extent. In general, the primary objective of an energy auditing and management of energy consumption is to offer services at the lowest possible cost and with the least impact on environmental. The purpose for an energy audit is to identify the savings potential and cost reducing methods, understand the ways in which energy is used and find the scope for improvement.

Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption".

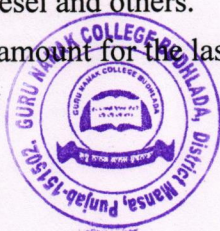
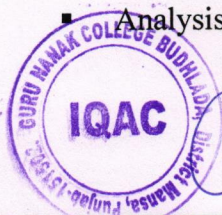
## 2. Need for an Energy Audit

The energy management function constitutes a strategic area for cost reduction. Energy Audit will help to understand more about the ways energy and fuel are used, and help in identifying the areas where waste can occur and where scope for improvement exists. The Energy Audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programmes. In general, Energy Audit is the translation of conservation ideas into realities. The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs. Energy Audit provides a Reference point for managing energy in the organization and also provides the basis for planning a more effective use of energy throughout the organization. It also increases overall consciousness among the people working in institution towards an environment.

## 3. Aims and Objectives of an Energy Audit

An energy audit is a useful tool for developing and implementing comprehensive energy management plans of an Organization. The aim of an energy audit is to identify the energy efficiency, conservation and savings opportunities at the premises of the audit sites in a systematic manner. The audit process is carried out as per the following.

- Identification of additional various energy conservation measures and saving opportunities.
- Implementation of alternative energy resources for energy saving opportunities and decision making in the field of energy management.
- Detailed analysis on the calculation of energy consumption.
- List ways that the use of energy in terms of electricity, electric stove, kettle, microwave, LPG, Petrol, diesel and others.
- Analysis of electricity bill amount for the last years.



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- Use of tungsten and CFL bulbs, fans, air conditioners, heaters, computers, photo copiers, generators and laboratory equipment and instruments installed in the organization
- Alternative energy sources / nonconventional energy sources are employed / installed in the organization (photovoltaic cells for solar energy, energy efficient stoves etc.).
- Creating awareness among the stakeholders on energy conservation and utilization.

## 4. About the College

Guru Nanak College, affiliated to Punjabi University, Patiala (listed in 12(b) & 2(f) sections of UGC Act 1956) is situated on the outskirts of Budhlada city - a small town of district Mansa in Punjab. To tribute the 500th birth anniversary of "Sri Guru Nanak Dev Ji", it was started in 1971 by some eminent personalities of the region to keep in mind the noble cause of making affordable education accessible to all the people of this backward, rural and remote area. In the beginning, it was functioning under the local management but later on handed over to SGPC (Shiromani Gurdwara Parbandhak Committee, Sri Amritsar Sahib), an apex and philanthropic body of the Sikhs committed to serving humanity, on 09 November 1994 due to meagre financial resources and some other executive problems. It was followed by some significant reforms in both college functioning and infrastructure. The growth of the college has been at a phenomenal pace since 2008 with a radical adjustment in a number of courses, faculty, infrastructure and other teaching learning resources. At present, it has become the foremost organization in the area, having 16 PG and 12 UG courses, 132 faculty members, about 5239 students with state-of-the-art infrastructure and technology to provide quality education. In addition to it, the institute was awarded 'A' grade assessed by NAAC in 1st cycle during 2017.

### 4.1. Motto, Vision, Mission and Quality Policy

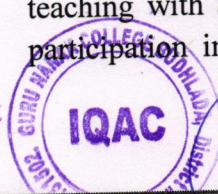
**Motto-** Learning with Perseverance; Rising with Honour

**Vision-** Enlightening Human Minds and Social Empowerment through Education

**Mission-** Transforming the youth into a productive asset of society through value-based quality education focusing on their all-round development so that they are able to contribute to the progress of society to their utmost potential.

#### Quality Policy

The institute is committed to promoting and supporting all-round effective learning and teaching with a view to contributing to development through increasing equal access and participation in higher education. Our quality policy aligns with our vision, mission and



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objectives. The policy aims to achieve perfection and excellence in every step we take to shape the future of the younger generation towards a brighter tomorrow. To this end, each academic program is designed to hone students' skills inside and outside the classroom. Each program allows them to discover something beyond the syllabus and motivates them to read between the lines. We believe that children are agents of change, and every effort is made to engage them in meaningful discussions. Our Quality Policy seeks to celebrate and recognize quality in teaching and learning and to ensure that the premier quality education is always with us in every field.

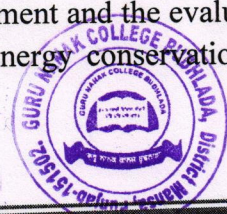
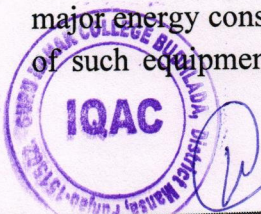
#### 4.2. Overview of Administration block and other buildings of GNC



View of Administrative Block

### 5. Energy Audit Methodology

A detailed audit provides a detailed plan for a facility, since it evaluates all major energy consuming systems. It considers the interactive effects of all projects, accounts for the energy use of all major equipment, and includes detailed energy cost saving calculations and project cost. This is based on an account of energy using systems, assumptions of current operating conditions and calculations of energy usage. This estimated use is then compared to utility bill charges. Discussions were held with technical personnel at the premises to understand its operations and energy requirements completely. The energy audit focused on the study of all major energy consuming equipment and the evaluation of operational efficiency/performance of such equipment from the energy conservation point of view. Also, the study involved



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assessment various load handling equipment and to assess their utilisation. The methodology adopted for the audit involved:

- Resource planning, establish/organize the Energy audit team
- Organize instruments & time frame
- Familiarization of activities
- First hand observation & assessment of current level operation and practices

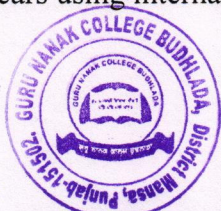
### 5.1. Comprehensive Energy Audit

Depending on the nature and complexity of the site, a comprehensive audit can take from several weeks to several months to complete. Detailed studies to establish, and investigate, energy and material balances for specific plant departments or items of process equipment are carried out. Whenever possible, checks of plant operations are carried out over extended periods of time, at nights and at weekends as well as during normal daytime working hours, to ensure that nothing is overlooked.

The audit report will include a description of energy inputs and product outputs by major department or by major processing function, and will evaluate the efficiency of each step of the Organization. The audit report should conclude with specific recommendations for detailed engineering studies and feasibility analyses, which must then be performed to justify the implementation of those conservation measures that require investments. The comprehensive energy audit may be useful to identify the consuming areas to be surveyed during the audit and to identify any existing instrumentation/ additional metering required. It will be definitely useful for energy management towards energy savings opportunities.

### 6. Detailed analysis

Auditing for Energy Management may be studied in terms of energy savings and opportunities. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, vehicle movement, electrical and electronics appliances, and transportation. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. However, energy saving and opportunities may be taken into consideration while energy is extensively used. An old incandescent (tungsten) bulb uses approximately 15W to 100W, while an energy efficient light emitting diode (LED) uses only less than 20W which indicated the positive indication on energy savings. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. In addition, suggestions and recommendations might be given after auditing which in turn useful for energy savings. It is therefore essential that any environmentally responsible institution examine its energy use practices at least once in two years using internal and external auditors.



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The conduct of energy audit is playing important role in any organization in terms of energy management. It is able to measure the impact of energy potential in an organization so that we can determine better ways to manage the impact on environment. It is necessary to know how much the organization is contributing towards sustainable development in terms of energy management is being done. It is therefore to recommend to measure the carbon footprint in each organization which may be useful for maintaining the eco-friendly campus to the stakeholders.

Electricity Load of Guru Nanak College campus approved by Punjab State Power Corporation Limited (PSPCL) is 219.42 KW. Average units of energy consumed per month is 10,000- 15,000 to maintain its volumetric activities throughout the year. The average expenditure per month is around Rs. 73,000- 1,85,000/-. Different measures of the college for efficient power consumption are as follows:

- Most of the PCs and LED screens in the campus have the feature of auto screen off to save electricity.
- The college has been replacing the old filament bulbs, CFL bulbs and tube lights by low energy consuming LED bulbs and LED tubes and bulky high-power consuming fans by energy efficient fans.
- Underground water pumping motor of power 5hp, which works for almost 4 hours a day, has an inbuilt feature of auto power cut to save energy and water.
- Outer lighting is maximum on solar lights.

Following table shows the detailed annual power (KWh) requirement for lighting the campus, which have been calculated from the available lighting sources. It has been found that the major area of concern is CFL bulbs (Approx. 32% of the total) and other ordinary lights used in the campus.

Annual lighting power requirement met through LED bulbs, Tubes and other lights (in KWh)	20393.1
Using Solar energy lights for outer Lighting .	2%
Percentage Lighting through LED Bulbs and Tubes	46%
Percentage Lighting through CFL Bulbs	32%

### 6.1. Energy Consumption and Cost Profile



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The following figure shows the energy consumed and the cost for one year by the stakeholders for 2018-19.

**Guru Nanak College Principal A/c**  
**Electricity Charges**  
Ledger Account

1-Apr-2018 to 31-Mar-2019

Date	Particulars	Vch Type	Vch No.	Debit	Credit
11-4-2018	To Axis Bank 71442 A/c	Payment	50	1,25,130.00	
16-5-2018	To Axis Bank 71442 A/c	Payment	224	1,20,590.00	
15-6-2018	To Axis Bank 71442 A/c	Payment	387	1,66,290.00	
17-7-2018	To Axis Bank 71442 A/c	Payment	578	1,10,850.00	
21-8-2018	To Axis Bank 71442 A/c	Payment	839	1,17,090.00	
17-9-2018	To Axis Bank 71442 A/c	Payment	1080	1,67,070.00	
16-10-2018	To Axis Bank 71442 A/c	Payment	1278	1,84,730.00	
17-11-2018	To Axis Bank 71442 A/c	Payment	1414	1,36,860.00	
15-12-2018	To Axis Bank 71442 A/c	Payment	1555	77,280.00	
	By Canteen Security	Payment	1560		28,020.00
16-1-2019	To Axis Bank 71442 A/c	Payment	1660	73,660.00	
14-2-2019	To Axis Bank 71442 A/c	Payment	1868	80,000.00	
9-3-2019	To Axis Bank 71442 A/c	Payment	2037	77,960.00	
	By Closing Balance			14,37,510.00	28,020.00
				14,37,510.00	14,09,490.00
				14,37,510.00	14,37,510.00

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Fig. Electricity bill of the college for 2018-19

Energy review is done through: Analysis of energy bills. Records of bills and analysis are in place. The campus has large number of lights installed indoor and outdoor. The lighting sources includes LED bulbs, LED Tubes, ordinary lights, Solar lights, sensor based lights etc. The following pie chart shows the data on power consumption by different types of lights installed in the campus. The following graph shows the share of different types of lighting sources in the campus. The pie chart shows that the LED Bulbs shares the 23%, LED tubes shares the 23% of the total consumption for lighting, whereas the 32% is shared by the CFL bulbs and 20% by other energy inefficient lights.



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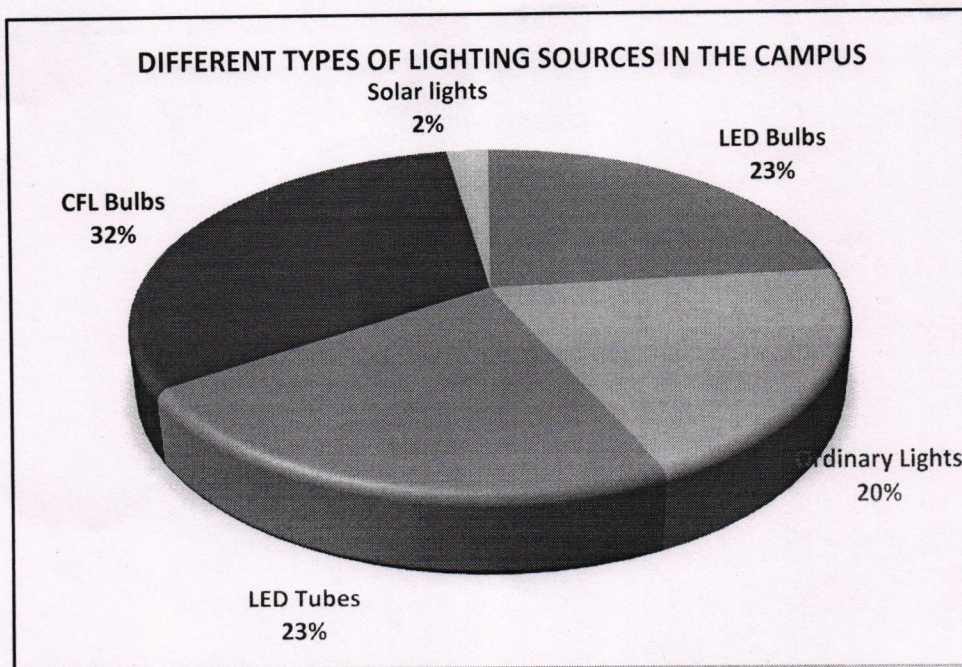


Fig. Share of different types of lights of the campus

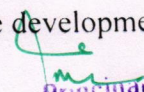
## 7. Energy Resource Management and Conservation Practices

The college has planned to conserve energy and power saving at different levels by use of LEDs, solar lights, energy efficient and power saving. All the College buildings are interconnected with proper power supply, the LED bulbs, tubes have been installed in Library, Administration Block, Computer Science Block, Seminar Hall, Conference room and Principal office etc. Alternative energy sources of energy (Solar lights) have been installed at various places inside the campus. Electrical appliances like fans, tube lights, desktop computers, are being just switched off immediately, if they are not in use. The students are also being motivated to adopt energy conservation methods.

## 8. Summary

Energy Audit is one of the important tools to check the balance of use of energy and power resources and its sensible use. Energy auditing is the process of identifying and determining whether institutional practices are eco-friendly and sustainable. It is a process of regular identification, quantification, reporting and monitoring of the appliances in various parts of the campus. Guru Nanak College, Budhlada has conducted a "Energy Audit" in the academic year 2018-2019. The main objective to carry out energy audit is to check the various practices followed by GNC and to conduct a well-defined audit report to understand whether the GNC is on the track of conservation of energy, natural resources and sustainable development.



  
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## 9. Conclusion:

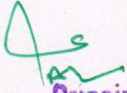
Thus, the Guru Nanak College has in recent years considered the environmental impacts of most of its actions and has made concrete efforts to act in an environmentally responsible manner. As always, there is scope for further improvement; and Guru Nanak College is committed to take more initiatives towards sustainable development.

## 10. Recommendations for improving the energy efficiency and energy conservation in the Organization

The energy audit included key suggestions for energy cost reduction, preventive maintenance and quality control activities, all of which are critical for utility operation in the audit sites.

- Optimal water usage and temperature settings may be used which are coming under automatic process towards energy savings.
- Turn off electrical equipment when not in use
- Maintain appliances and replace old appliances in all laboratories.
- Use computers and electronic equipment in power saving mode.
- Installation of Solar power plant/lights for more energy conservation in the campus.
- Monthly use of electricity in the College is very high which may be reduce to a greater extent by means of undertaking a periodical energy audit.
- Replace lights (Old filament bulbs, CFL, tube lights, halogen street lights) with LEDs and other energy efficient lights.
- There are fans of older generation and non-energy efficient which can be phase out by replacing with new energy efficient fans.
- Regular monitoring of equipment in all laboratories and immediate rectification of any problems.
- Procurement of equipment with energy efficiency during replacement may be considered.
- Increase in Energy conservation promotional activities for spreading awareness at campus.



  
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