# NAGAON G.N.D.G. COMMERCE COLLEGE

# ENERGY AUDIT 2024-2025

Prepared by :

**Energy Audit Committee**

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## ACKNOWLEDGEMENT

We express our sincere gratitude to the authorities of NAGAON GNDG COMMERCE COLLEGE, Nagaon for entrusting and offering the opportunity of energy performance assessment assignment.

*Dr. Mriganka Saikia- Principal
*Mr. Mridul Mahanta- Vice Principal
*Prof. Aranya Jyoti Gayan- Coordinator, IQAC

We are thankful to NAGAON GNDG COMMERCE COLLEGE, Nagaon for their positive support in undertaking the task of system mapping and energy efficiency assessment of all electrical system, air conditioners, utilities, and other equipment.

The field studies would not have been completed on time without their interaction and guidance. We are grateful to their cooperation during field studies and providing necessary data for the study.

We are also thankful to all field staff and agencies working with whom we interacted during the field studies for their wholehearted support in undertaking measurements and eagerness to assess the system / equipment performance and saving potential. Also thankful to all concerned staff interacted during the conduct of this exercise for completing official documentations.

Energy Audit of system is key instrument in knowing the present level of efficiency of various components and establishing the areas of shortfall for improvement.

This report made with sincere effort gives details of the relevant data collected during energy audit study, observation, analysis & recommendations made pertaining to different facilities in campus.

Several Energy Conservation Opportunities (Measures) have been identified & proposed in course of our study & these options when implemented, are expected to bring in lasting benefits (saving) in term of energy as well as cost saving to the management.

We are pleased to submit this Detailed Energy Audit Report to Hon. Principal Dr. Mriganka Saikia with energy conservation opportunity as well as recommendation after sincere study & observations.

For Audit Team

Debabrata Debnath

Associate professor
Department of Physics
Dhing College

# ENERGY AUDIT REPORT
# SUBMITTED TO
# THE PRINCIPAL
# NAGAON G.N.D.G. COMMERCE COLLEGE, NAGAON, ASSAM

## SUBMITTED BY
## AUDIT TEAM

| Sl. No. | Name | Nature of Appointment | Signature |
|---|---|---|---|
| 1. | Mr. Debabrata Debnath,<br>Associate Professor,<br>Department of Physics,<br>Dhing College | External Member | Associate professor<br>Department of Physics<br>Dhing College |
| 2. | Mr. Rabindra Sarma Baruah,<br>Associate Professor,<br>Department of Physics,<br>Dhing College | External Member | Associate Professor<br>Department of Physics<br>Dhing College |
| 3. | Mr. Rupjyoti Kar,<br>Electrical Supervisor,<br>Electrical Licensing Board,<br>Govt. of Assam, License No. - 17765 | External Member | Electrical Supervisor<br>License No - 17765 |
| 4. | Mr. Nayan Jyoti Bora,<br>Junior Assistant,<br>Nagaon G.N.D.G. Commerce College | Internal Member | |

# DEPARTMENT OF PHYSICS
## DHING COLLEGE

**P.O.: Dhing, Pin:782123 :: Nagaon :: Assam**

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*Ref. No.* -_____ *Date:* -

**CERTIFICATE OF ENERGY AUDIT**

This is to certify that Nagaon G.N.D.G. Commerce College, Nagaon has conducted a detailed Energy Audit of the College for the session 2024-25, including the whole campus, and has shown exemplary efforts in energy management. The audit report confirms that there is no excess consumption of energy in the campus, and the College authorities and stakeholders are fully aware of the measures to conserve energy. Currently, Solar panels are installed in the College Campus and are using as backup power source to the campus in power break down times.

The techniques and strategies adopted by the College authorities and other stakeholders for consuming minimum energy in the campus are satisfactory and commendable. The College has demonstrated its commitment to sustainable practices, which is evident from the efficient use of energy resources.

The Certificate is presented to Nagaon G.N.D.G. Commerce College as an acknowledgment of their dedication to energy management and sustainable practices.

External Auditor,
Energy Audit

(Debabrata Debnath)
Associate Professor
Department of Physics
Dhing College

Associate Professor
Department of Physics
Dhing College

# INTRODUCTION

Energy is one of the very essential aspects and basic requirements that influence survival. In the contemporary scenario it has become such a resource that can dictate matters of development and growth in almost all sectors. At present it is a vital factor that balances the goal for sustainable lifestyle along with kickstarting the long road to further development. However, the unbalanced and uncertain use or more like over consumption of energy gravely impacts not only the sustainability of the resource but also affects the environment with detrimental consequences.

As defined by Energy Conservation Act, 2001, Energy auditing refers to "the verification, monitoring and analysis of the use of energy including submission of technical reports containing recommendations for improving energy efficiency with cost benefit analysis". Energy Auditing aims to understand the usage and calculate the same with reference to necessary guidelines. It becomes an important process to gauge the range of energy consumption by an organization with respect to its discrete functions. This is done by reading the energy input with its use.

The aim of this report is to contribute to the larger picture of energy consumption by analyzing the usage of the institution and throwing light on the scopes of conservation by carefully calibrating the consumption to a stable level. This report is our mite in contributing to the larger picture of effective energy management and conservation. Thereby energy auditing is a continuous process so as to contribute to the betterment of the future in a sustainable manner.

# OVERVIEW OF NAGAON GNDG COMMERCE COLLEGE

Nagaon Gopinath Dev Goswami Commerce College is one of the pioneer institutions of higher education in the entire central Assam region. The college was started on the 24th of September, 1984 in the premises of Sankardev Natya Chora under the name of Nagaon Commerce College. It was renamed as Nagaon GNDG Commerce College. After the name of Late Gopinath Dev Goswami, an illustrious son of Nagaon and was shifted to its present site at Panigaon, Nagaon in 1991. Environmental SettingCollege is easily accessible by road as it is located at the road side of the AT Road (NH 37) and at the very entrance of the Nagaon Town from the eastern side i.e. from Tezpur, Jorhat, etc. and from other direction it is 3 km away from the centre of Nagaon Town. By railways it is nearly 2km from Morikolong railway station and 5km from the Haiborgaon railway station. The college is spread over 3 acres of area. Although campus is located in semi urban area, presence of green belt including gardens, lawns and an herbal garden has considerably reduced pollution in the
campus.

College Campus Land area and Total Building area
Campus area = 135039sqft = 12558.63m (3 acres 1 katha 11 losha)
Academic & others College Building Area = 51700 sqft.
Administrative Building Area = 6266 sqft.
Girls Hostel = 3614 sqft.
Total = 61580sqft,

# OBJECTIVES

Energy Audit aims at analyzing the consumption of energy and its usage. As per the Energy Audit Manual of the Energy Management Centre, Government of Assam, the primary objective of energy audit is to determine "ways to reduce energy consumption per unit of product output or to lower operation costs".

The specific objectives are:

- To identify the inefficient or inadequate management of energy usage in the campus.
- To improve upon the identified areas so as to better manage energy conservation
- To identify other scopes in the campus to bring forth innovative measures for energy conservation.
- To assess the overall performance of the college regarding energy consumption and usage.

# METHODOLOGY

The task of this audit undertaken by GNDG Commerce College is to identify the energy usage pattern and figure out areas with scope for improvement so as to recommend an action plan for proper management of the same.

The energy audit was conducted during summer and winter season, so as to review the data of energy usage and identify conservation opportunity. The methodology keeps track of the following:

1) Inventory of various electrical load
2) Study of the APDCL bills to work out the average cost of power.
3) Identification of various energy conservation measures and opportunities.

4) Review of Awareness programmes if any for optimum use of electricity as well as its saving.

5) Review of implemented non–conventional energy installation and applications in college campus as well as its quantification.

The Method used for Energy Audit is a Preliminary Audit. A Preliminary audit uses existing data to scrutinize the existing energy consumption patterns extensively and identify the areas for improvement.

## SYSTEMS STUDIED DURING ENERGY AUDIT

- Lighting fixtures in the campus have been physically verified and recorded.
- The implemented usage of non-conventional energy installation and applications in college have been reviewed.
- Electricity bills from APDCL are verified and analyzed to work out the cost of power.
- Awareness programmes regarding proper usage of electricity and energy conservation if any are reviewed as an important initiative of the college towards the goal of sustainable energy use.
- Any innovative strategy or method used for catering to energy conservation have been reviewed and analyzed to understand the efforts of the college.

# ENERGY AUDIT TEAM

## Internal Energy Audit Committee

1. Chairman : Dr. Mriganka Saikia, Principal, GNDG Commerce College, Nagaon, Assam
2. Member : Mr. Nayan Jyoti Bora, Junior Assistant

## External Audit Evaluators

1. Mr. Debabrata Debnath,
   Associate Professor,
   Department of Physics, Dhing College
   Dhing, Nagaon

2. Mr. Robindra Sarma Baruah,
   Associate Professor,
   Department of Physics, Dhing College
   Dhing, Nagaon

3. Mr. Rupjyoti Kar
   Electrical Supervisor,
   Electrical Licensing Board
   Govt. of Assam

# DATA COLLECTION

For the purpose of this audit, audit groups for specific areas were formed. Data was collected through

- Inspection and observation
- Identification of energy consumption
- Calculations and analysis
- Validation

**Data analysis**

The gathered data was then quantified and separated according to the following criteria:

- Energy consumption by end use
- Estimated energy use block-wise
- Consumption equipment-wise

**Table 1: Building/Department wise electrical/electronic appliances and equipment**

| Sl. No | Classroom/Department | Tube light | LED bulb | | AC | Computer+ Printer+ Xerox | Inverter/ Motor | Others |
|---|---|---|---|---|---|---|---|---|
| 1 | Commerce Building (Ground floor) | 24 | 49 | 39 | 02 | 0+1+0 | 0/2 | Smart board:1<br>Projector:03<br>Calling bell: 01<br>Speaker:01<br>WiFi:1 |
| 2 | Commerce building(First floor) | 34 | 05 | 38+2 wall fan | 6 | 10+0+0 | - | 100W bulb:1<br>Projector:01<br>CCTV:05 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | WiFi:1 |
| 3 | Commerce building (2nd floor) | 42 | 03 | 35+5 exhaust fan | 04 | 41+0+0 | - | Smart board:03<br>Smart tv: 01<br>CCTV: 10<br>Projector:02<br>Microphone:01<br>100W bulb:02<br>Fire alarm:06<br>WiFi:2 |
| 4 | Administrative Block | 11 | 86 | 31+4 Exhaust fan | 06 | 7+4+2 | 2/0 | Lithograph machine:01<br>TV:03<br>CCTV:02<br>Refrigirator:01<br>WiFi:1<br>Attendant machine:1<br>Speaker:01<br>Calling bell:04<br>Fire alarm:01 |
| 5 | Mini Auditorium & Classroom building (Ground floor) | 0 | 22 | 8 | 03 | - | - | Smart TV: 1<br>Aquaguard:01<br>Speaker:02<br>Amplifier:01<br>Microphone:01<br>WiFi:1 |
| 6 | Indoor Stadium Building | 0 | 15 | 6+9 wall fan+ 10 exha | 0 | 0 | 0 | Stage light: 16<br>Speaker :06 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | ust fan | | | | |
| 7 | Science Building (Ground and 1st floor) | 11 | 59 | 48+6 exhaust fan | 02 | - | 0/1 | Smart TV: 01<br>WiFi: 1 |
| 8 | Warden Quarter Building | 01 | 08 | 06 | - | - | - | - |
| 9 | Principal Quarter Building | 05 | 06 | 04 | 01 | - | - | Aquaguard:01<br>Smart TV:01<br>Dim bulb:02<br>WiFi:1 |
| 10 | Girls Hostel Building (Ground and 1st floor) | 11 | 59 | 26 | - | - | - | Smart TV:01<br>WiFi:01 |
| 11 | Old Assam Type Building (NCC store & medical room) | - | 02 | 02 | - | - | - | - |
| 12 | Street Light | - | 5 | - | - | - | - | - |
| 13 | College Campus | - | - | - | - | - | - | Water fountain:1<br>RGB LED Light:06<br>Dim light:01<br>Fire alarm:01<br>CCTV:01<br>100W bulb:01<br>DG Set:01 |
| 14 | College gate | - | 05 | - | - | - | - | LED spot light:02 |
| 15 | College garden | - | 04 | - | - | - | - | Dim light :01 |
| 16 | College boundary wall | - | 04 | - | - | - | - | LED Spot light: 19 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 17 | Solar Street light | - | 04 | - | - | - | - | - |

# DATA ANALYSIS

**Table 2: Estimated energy consumption in KWH during summer**

| Block | Items | Number | Power in W/item | Time consumed (In hours) | Days | Total Power consumption in KWH |
|---|---|---|---|---|---|---|
| Commerce Building | Ceiling fan | 112(55 used) | 60W | 5 | 26 | 429 |
| | Wall fan | 2(1 used) | 100W | 5 | 26 | 13 |
| | Exhaust fan | 5 | 35W | 1 | 26 | 4.55 |
| | Tubelight | 100 (60used) | 20W | 2 | 26 | 62.4 |
| | LED Bulb | 57 (22 used) | 9W | 2 | 26 | 10.296 |
| | Water pump (Motor) | 2 | 746W | 0.5 | 26 | 19.396 |
| | Desktop | 21 (15 used) | 300W | 2 | 26 | 234 |
| | Printer | 1 | 30W | 0.5 | 26 | 0.390 |
| | AC | 12 (6 used) | 1500W | 5 | 26 | 1170 |
| | Smart TV | 1 | 40W | 0.5 | 15 | 0.3 |
| | Smart board | 4 | 150W | 0.5 | 26 | 7.8 |
| | CCTV | 21 | 23W | 24 | 26 | 301.392 |
| | Calling bell | 1 | 5W | 0.5 | 26 | 0.065 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 100W bulb | 3 | 100W | 1 | 26 | 7.8 |
| | Wi-Fi | 2 | 20W | 6 | 26 | 6.240 |
| | Speaker | 1 | 500W | 0.5 | 26 | 6.5 |
| | Projector | 6 | 250W | 0.2 | 20 | 6 |
| | Microphone | 1 | 2W | 0.5 | 26 | 26 |
| **Total** | | | | | | **2305.129** |
| Administrative Building | Ceiling fan | 31 (15 used) | 60W | 6 | 26 | 140.4 |
| | Tubelight | 11 (5 used) | 20W | 6 | 26 | 15.6 |
| | LED Bulb | 03 (2 used) | 9W | 6 | 26 | 2.808 |
| | Exhaust fan | 4 | 35W | 1 | 26 | 3.64 |
| | AC | 6 (4 used) | 1500W | 6 | 26 | 936 |
| | Inverter | 02 | 1500W | 6 | 26 | 468 |
| | Desktop | 7 (5 used) | 300W | 6 | 26 | 234 |
| | Printer | 4 | 30W | 2 | 26 | 6.24 |
| | Xerox | 02 | 2000W | 3 | 26 | 312 |
| | Lithograph Machine | 01 | | - | 26 | - |
| | TV | 03 | 40W | 6 | 26 | 18.72 |
| | CCTV | 02 | 23W | 24 | 26 | 28.704 |
| | Refrigerator | 01 | 60W | 6 | 26 | 9.360 |
| | Wi-Fi | 01 | 20W | 6 | 26 | 3.12 |
| | Attendant machine | 01 | 20W | 10 | 26 | 5.2 |
| | Speaker | 01 | 500W | 0.5 | 26 | 6.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Calling bell | 04 | 5W | 2 | 26 | 1.040 |
| | Fire alarm | 01 | 45W | 24 | 26 | 28.080 |
| | **Total** | | | | | **2219.412** |
| Mini Auditorium & classroom building (Ground Floor) | Ceiling fan | 08 (4 used) | 60W | 1 | 26 | 6.24 |
| | LED Bulb | 22 (11 used) | 9W | 1 | 26 | 2.574 |
| | Aquaguard | 01 | 100W | 1 | 26 | 2.6 |
| | AC | 03 | 1500W | 2 | 20 | 180 |
| | Smart TV | 01 | 40W | 0.5 | 15 | 0.3 |
| | Speaker | 02 | 500W | 0.5 | 26 | 13 |
| | Amplifier | 01 | 100W | 0.5 | 26 | 1.3 |
| | Microphone | 01 | 2W | 0.5 | 26 | 26 |
| | Wi-Fi | 01 | 20W | 2 | 20 | 0.8 |
| | **Total** | | | | | **232.814** |
| Indoor Stadium Building | Ceiling fan | 06 (4 used) | 60W | 1 | 26 | 6.24 |
| | Wall fan | 09 (5 used) | 100W | 1 | 26 | 13 |
| | Exhaust fan | 10 | 35W | 1 | 26 | 9.1 |
| | LED Bulb | 15 (10 used) | 9W | 1 | 26 | 2.34 |
| | Stage light | 16 | 20W | 0.5 | 26 | 4.16 |
| | Speaker | 06 | 500W | 0.5 | 26 | 39 |
| | **Total** | | | | | **73.84** |
| Science Building | Ceiling fan | 48 (24 used) | 60W | 5 | 06 | 187.2 |
| | Smart TV | 01 | 40W | 0.5 | 02 | 0.04 |

| | | | | | | |
|---|---|---|---|---|---|---|
| (Ground and 1st floor) | AC | 02 | 1500W | 1 | 02 | 6 |
| | Exhaust fan | 06 | 35W | 1 | 26 | 5.460 |
| | Tube light | 11 (5 used) | 20W | 1 | 26 | 2.6 |
| | LED Bulb | 59 (22 used) | 9W | 1 | 26 | 5.148 |
| | Wi-Fi | 01 | 20W | 6 | 26 | 3.12 |
| | **Total** | | | | | **209.568** |
| Warden Quarter Building | Ceiling Fan | 06 (4 used) | 60W | 8 | 30 | 57.6 |
| | Tube light | 01 | 20W | 6 | 30 | 3.6 |
| | LED Bulb | 08 (5 used) | 9W | 6 | 30 | 6.750 |
| | Total | | | | | 67.95 |
| Principal Quarter Building | Ceiling Fan | 04 | 60W | 8 | 30 | 57.6 |
| | Tubelight | 05 | 20W | 5 | 30 | 15 |
| | AC | 01 | 1500W | 5 | 08 | 60 |
| | Smart TV | 01 | 40W | 1 | 08 | 0.32 |
| | LED Bulb | 06 | 9W | 5 | 30 | 8.1 |
| | Aquaguard | 01 | 100W | 2 | 30 | 6 |
| | Dim bulb | 02 | 1W | 6 | 30 | 0.36 |
| | Wi-Fi | 01 | 20W | 2 | 08 | 0.32 |
| | Total | | | | | 147.7 |
| Girls Hostel Building | Ceiling Fan | 26 (15 used) | 60W | 8 | 30 | 216 |
| | LED Bulb | 59 (25 used) | 9W | 6 | 30 | 40.5 |
| | Smart TV | 01 | 40W | 1 | 30 | 1.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Tube light | 11 (5 used) | 20W | 6 | 30 | 18 |
| | Wi-Fi | 01 | 20W | 10 | 30 | 6 |
| | Total | | | | | 281.7 |
| Street Light/ College Gate/College Campus/ College Garden/College Boundary Wall | LED Bulb | 14 | 9W | 10 | 30 | 37.8 |
| | Water Fountain | 01 | 9W | 1 | 30 | 0.27 |
| | RGB LED Light | 06 | 20W | 1 | 30 | 3.6 |
| | CCTV | 01 | 23W | 24 | 30 | 16.56 |
| | Dim light | 02 | 1W | 10 | 30 | 0.6 |
| | Fire alarm | 01 | 45W | 24 | 30 | 32.4 |
| | 100W Bulb | 01 | 100W | 10 | 30 | 30 |
| | DG set | 01 | | | 30 | |
| | LED Spot light | 21 | 20W | 10 | 30 | 126 |
| | Total | | | | | 247.23 |
| Old Assam Type Building | Ceiling Fan | 02 | 60W | 4 | 26 | 12.48 |
| | LED Bulb | 02 | 9W | 1 | 26 | 0.468 |
| | Total | | | | | 12.948 |

**Table 3: Estimated energy consumption in KWH during winter**

| Block | Items | Number | Power in W/item | Time consumed (In hours) | Days | Total Power consumption in KWH |
|---|---|---|---|---|---|---|
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Commerce Building | Ceiling fan | 112(90 used) | 60W | 0 | 26 | 0 |
| | Wall fan | 2(1 used) | 100W | 0 | 26 | 0 |
| | Exhaust fan | 5 | 35W | 1 | 26 | 4.55 |
| | Tubelight | 100 (60used) | 20W | 2 | 26 | 62.4 |
| | LED Bulb | 57 (22 used) | 9W | 2 | 26 | 10.296 |
| | Water pump (Motor) | 2 | 746W | 0.5 | 26 | 19.396 |
| | Desktop | 63 (10 used) | 300W | 2 | 26 | 156 |
| | Printer | 2 | 30W | 0.5 | 26 | 0.78 |
| | AC | 12 | 1500W | 0 | 20 | 0 |
| | Smart board | 4 (2 used) | 150W | 0.5 | 26 | 3.9 |
| | CCTV | 21 | 23W | 24 | 26 | 301.392 |
| | Calling bell | 1 | 5W | 0.5 | 26 | 0.065 |
| | 100W bulb | 3 | 100W | 1 | 26 | 7.8 |
| | Wi-Fi | 2 | 20W | 6 | 26 | 6.240 |
| | Speaker | 1 | 500W | 0.5 | 26 | 0.195 |
| | Projector | 6 | 250W | 0.5 | 10 | 2.5 |
| | Microphone | 1 | 2W | 0.5 | 10 | 0.01 |
| **Total** | | | | | | **575.524** |
| Administrative Building | Ceiling fan | 31 (15 used) | 60W | 0 | 26 | 0 |
| | Tubelight | 11 (5 used) | 20W | 6 | 26 | 15.6 |
| | LED Bulb | 86 (30 used) | 9W | 1 | 26 | 7.02 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Exhaust fan | 4 (2 used) | 35W | 1 | 26 | 1.82 |
| | AC | 6 | 1500W | 0 | 26 | 0 |
| | Inverter | 02 | 1500W | 6 | 26 | 468 |
| | Desktop | 7 (4 used) | 300W | 6 | 26 | 187.2 |
| | Printer | 4 (3 used) | 30W | 2 | 26 | 4.68 |
| | Xerox | 02 | 2000W | 3 | 26 | 312 |
| | Lithograph Machine | 01 | | - | 26 | - |
| | TV | 03 (2 used) | 40W | 6 | 26 | 12.48 |
| | CCTV | 02 | 23W | 24 | 26 | 28.704 |
| | Refrigerator | 01 | 60W | 0 | 26 | 9.360 |
| | Wi-Fi | 01 | 20W | 6 | 26 | 3.12 |
| | Attendant machine | 01 | 20W | 10 | 26 | 5.2 |
| | Speaker | 01 | 15W | 0.5 | 26 | 0.195 |
| | Calling bell | 04 | 5W | 2 | 26 | 1.040 |
| | Fire alarm | 01 | 45W | 24 | 26 | 28.080 |
| | **Total** | | | | | **1084.499** |
| Mini Auditorium & classroom building (Ground Floor) | Ceiling fan | 08 (4 used) | 60W | 1 | 26 | 6.24 |
| | LED Bulb | 22 (11 used) | 9W | 1 | 26 | 2.574 |
| | Aqua guard | 01 | 100W | 1 | 26 | 2.6 |
| | AC | 03 | 1500W | 2 | 20 | 180 |
| | Smart TV | 01 | 40W | 0.5 | 15 | 0.3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Speaker | 02 | 500W | 0.5 | 26 | 13 |
| | Amplifier | 01 | 100W | 0.5 | 26 | 1.3 |
| | Microphone | 01 | 2W | 0.5 | 26 | 26 |
| | Wi-Fi | 01 | 20W | 2 | 20 | 0.8 |
| | **Total** | | | | | **232.814** |
| Indoor Stadium Building | Ceiling fan | 06 (4 used) | 60W | 0 | 12 | 0 |
| | Wall fan | 09 (5 used) | 100W | 0 | 12 | 0 |
| | Exhaust fan | 10 | 35W | 1 | 12 | 4.2 |
| | LED Bulb | 15 (10 used) | 9W | 1 | 12 | 1.08 |
| | Stage light | 16 | 20W | 0.5 | 12 | 1.92 |
| | Speaker | 06 | 500W | 0.5 | 12 | 18 |
| | **Total** | | | | | **25.2** |
| Science Building (Ground and 1st floor) | Ceiling fan | 48 (24 used) | 60W | 0 | 26 | 0 |
| | Exhaust fan | 06 | 35W | 1 | 12 | 2.52 |
| | Tube light | 11 (5 used) | 20W | 1 | 26 | 2.6 |
| | LED Bulb | 59 (10used) | 9W | 1 | 26 | 2.34 |
| | Wi-Fi | 01 | 20W | 6 | 26 | 3.12 |
| | Smart TV | 01 | 40W | 0.5 | 02 | 0.04 |
| | Water pump | 01 | 746W | 0.5 | 26 | 9.698 |
| | **Total** | | | | | **20.318** |
| Warden Quarter Building | Ceiling Fan | 06 (4 used) | 60W | 0 | 30 | 0 |
| | Tube light | 01 | 20W | 6 | 30 | 3.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | LED Bulb | 08 (5 used) | 9W | 6 | 30 | 6.750 |
| | Total | | | | | 10.35 |
| Principal Quarter Building | Ceiling Fan | 04 | 60W | 0 | 10 | 0 |
| | Tubelight | 05 | 20W | 5 | 10 | 5 |
| | Smart TV | 01 | 40W | 1 | 08 | 0.32 |
| | LED Bulb | 06 | 9W | 5 | 10 | 2.7 |
| | Aquaguard | 01 | 100W | 2 | 10 | 2 |
| | Dim bulb | 02 | 1W | 6 | 10 | 0.12 |
| | Wi-Fi | 01 | 20W | 2 | 08 | 0.32 |
| | Total | | | | | 10.46 |
| Girls Hostel Building | Ceiling Fan | 26 (20 used) | 60W | 0 | 30 | 0 |
| | LED Bulb | 59 (35 used) | 9W | 6 | 30 | 56.7 |
| | Smart TV | 01 | 40W | 1 | 30 | 1.2 |
| | Tube light | 11 (5 used) | 20W | 6 | 30 | 18 |
| | Wi-Fi | 01 | 20W | 10 | 30 | 6 |
| | Total | | | | | 81.9 |
| Street Light/ College Gate/College Campus/ College Garden/College Boundary Wall | LED Bulb | 14 | 9W | 10 | 30 | 37.8 |
| | Water Fountain | 01 | 9W | 1 | 30 | 0.27 |
| | RGB LED Light | 06 | 20W | 1 | 30 | 3.6 |
| | CCTV | 01 | 23W | 24 | 30 | 16.56 |
| | Dim light | 02 | 1W | 10 | 30 | 0.6 |
| | Fire alarm | 01 | 45W | 24 | 30 | 32.4 |
| | 100W Bulb | 01 | 100W | 10 | 30 | 30 |
| | DG set | 01 | | | 30 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | LED Spot light | 21 | 20W | 10 | 30 | 126 |
| | **Total** | | | | | **247.23** |
| Old Assam Type Building | Ceiling Fan | 02 | 60W | 0 | 26 | 0 |
| | LED Bulb | 02 | 9W | 1 | 26 | 0.468 |
| | Total | | | | | 0.468 |

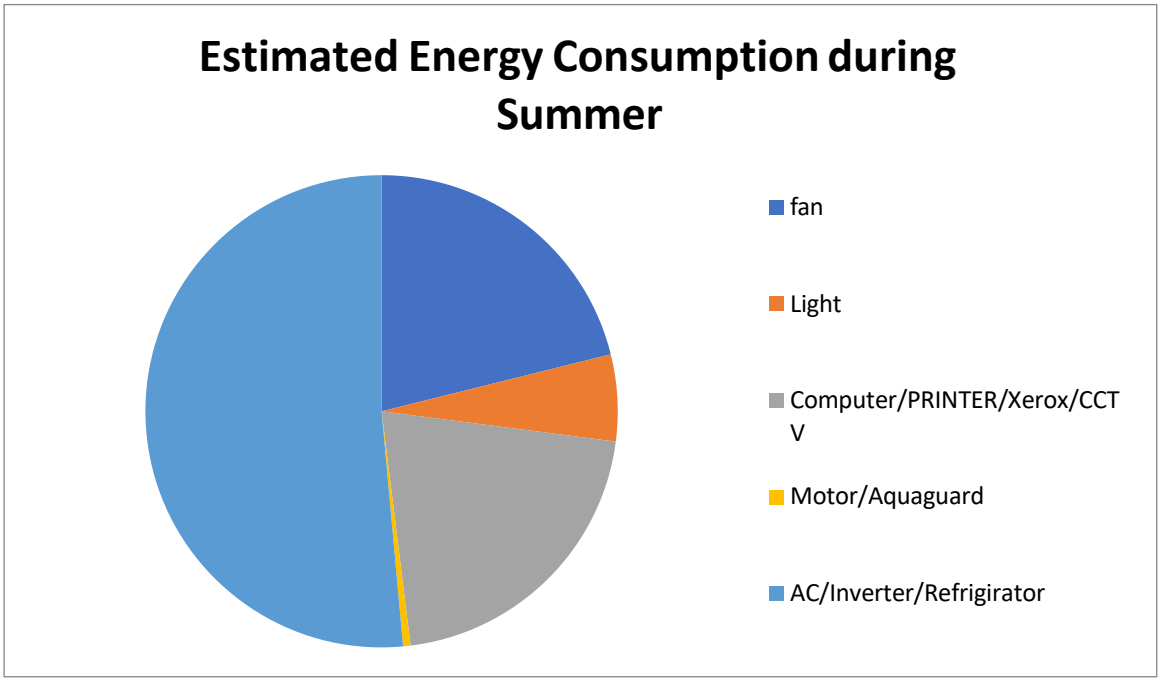


**Fig 1: Energy consumption use (summer)**

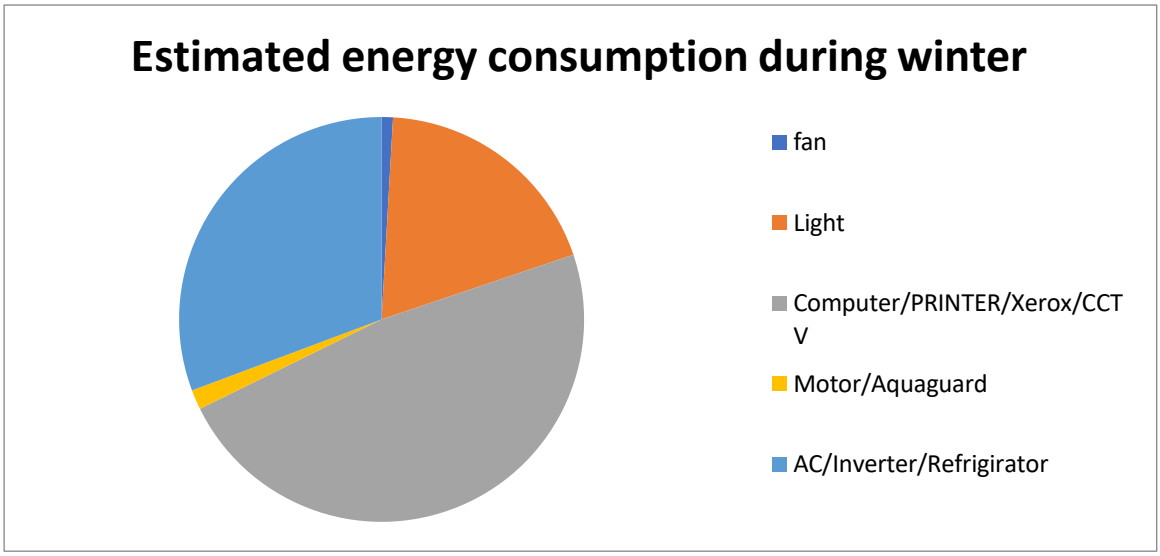


Fig 2: Energy consumption by and use (winter)

# FINDINGS AND RECOMMENDATION OF THE AUDIT

| Findings | Recommendation |
|---|---|
| The electrical wirings of many buildingswere found to be old and inefficient | Need to replace old electrical cables with newer alternatives. |
| There seems to be a lack of judicious use of power among students and staff. During the study, it was found that lights, fans and computers were kept on in vacant rooms. | Students and staffs should be encouraged constantly to use energy judiciously. Posters and pamphlets should be distributed and notices about saving energy should be posted in notice boards throughout the campus. |
| Many departments still use bulbs causing heavy power loss. | Filament bulbs and CFLs should be replaced with LEDs. |
| AC, Refrigerators and freezers used in many departments use obsolete technology and hence cause power loss. | Gadgets and equipment should be repaired and/or replaced with latest ones to save energy (with five-star rating). |
| It is noticed that resistive regulators are used in many rooms of the college. | Resistive regulators should be replaced by electronic regulators. |
| It is noticed that desktops are mostly used in the college. | Desktops must be replaced by laptops to save energy. |

# POSITIVE INITIATIVES OF THE COLLEGE

1. It is commendable that the college organizes initiatives to aware faculty members and the students regarding energy conservation. Awareness Programme on Rising Energy Demand: Deforestation and Climate Change was conducted by IQAC, GNDG Commerce College in regular interval of time to spread awareness about the dangers of rising energy demands and how to reduce energy wastage were demonstrated by the Resource Person initiating a wave of discussion and awareness regarding the same.
2. The college has taken a step towards going green by using two solar lights to illuminate the grounds.

# AREAS OF IMPROVEMENT

## Areas of Attention

Based on the physical observation and the analysis of data collected, certain areas have been identified as areas of attention.

1. Old wiring cables in many parts of the campus leading to loss of energy.
2. Use of large numbers of indicators on boards.
3. Proper lighting facilities in classrooms.
4. Increase awareness among students and bearers.

## Scopes for Saving Energy

This study could identify the following scopes for saving energy in the campus:

- Updating of technologies in laboratory equipment.
- Replacing old electrical cables.
- Replacing tube lights with LEDs.
- Ensuring even lighting facilities in all class rooms.
- Turning off electrical equipment when not in use.

- False ceilings in classroom for maintaining optimum room temperature
- Using computers and electronic equipment in power saving mode.
- Establishment of solar panels.

**Immediate areas of improvement**

Based on the study, the following areas were identified as those requiring immediate improvement:

1. Replacing tubes with LEDs
2. Repairing and updating laboratory equipment
3. Encouraging students and staff to switch off electrical instrument.

# CONCLUSION

The Energy Audit of GNDG Commerce College has been successfully concluded after thorough examination of all the aspects specified in the Objective of this Audit. Various scope for improvement like replacing old wirings, filament bulbs and tubes have been proposed as recommendation by the committee. Furthermore, a master switch can be installed at a prominent place which can be directly supervised by the HOD/supervising staff so as to help avoid power wastage in closed rooms. Also, a well-prepared electrical wiring plan for the campus, would help to identify unused points and conduct re-wiring. Beyond the sessions organized to spread awareness regarding energy conservation, further trainings /lecture sessions for both students and staff should be included for better comprehension. If everyone ensures switching off lights, fans and electrical instrument that are not in use, roughly 7% to 10% of energy saving is possible. An Instruction cum Request Sign board can be displayed near each switch-board, to influence and guide the user thus arresting misuse and wastage of power. While the college has begun to use solar energy, there is much scope for improvement and increase in solar energy usage.