

ENERGY AUDIT REPORT

2022-23

PREPARED BY
GREEN INDIA MISSION, PATNA
IN ASSOCIATION WITH AYAN ENTERPRISES, PATNA

Mundeshwari College for Teacher Education

(Under Vikramshila Educational and Welfare Society, Patna, Bihar)

Affiliated to A.K.U., Patna Bihar and NCTE Recognized

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CERTIFICATE

Registration No. 10314/2017



Green India Mission

let's go green planet

(A Unit of Ayan Enterprises, Patna)

Audit Certificate



Mundeshwari College for Teacher Education

Sarari - Usri Road, Khagaul, Patna - 801105 (Bihar)

Has been assessed by Green India Mission, Patna for the comprehensive study of Energy Audit on institutional working framework to fulfill the requirement of

ENERGY AUDIT

ACADEMIC YEAR 2022-23

The energy-saving initiatives carried out by the institution have been verified in the report submitted and were found to be satisfactory.

The efforts taken by the management and the faculty towards all type of energy used in the institution and sustainability are appreciated and noteworthy.

The institution is credited score 8.22/10 Certificate No. GIM/ERA/11/2022-23



Senior Auditor
Green India Mission

President
Green India Mission

General Secretary
Green India Mission



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ACKNOWLEDGEMENT

Green India Mission, Patna would like to thank the management of **Mundeshwari College for Teacher Education (MCTE), Patna** for assigning this important work of Energy Audit. We appreciate the co-operation to the teams for completion of assessment.

First of all, we would like to thank **Dr. Kumari Sunita Singh – Principal and Mrs. Kumari Shashi Singh, IQAC Co-Ordinator** for giving us an opportunity to evaluate the environmental performance of the campus.

We would also like to thank **Mrs. Kumari Shashi Singh- Audit Co-ordinator**, for her continuous support and guidance, without which the completion of the project would not have been possible. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

We are also thankful to

1. **Dr. Dinesh Kumar**
2. **Anjana Kumari**
3. **Naushia Tabassum**
4. **Bandana Prakash**
5. **Reena Kumari**


Principal
Mundeshwari College for Teacher Education
Sarani Patna-801105


General Secretary
Green India Mission
Patna (Bihar)
General Secretary
Green India Mission, Patna



DISCLAIMER

Green India Mission Energy Audit Team has prepared this report for Mundeshwari College for Teacher Education, Patna based on input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

While all sensible care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the conclusions are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

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General Secretary
Green India Mission
Patna (Bihar)
General Secretary
Green India Mission, Patna

ABBREVIATION

A	Amps
AC	Air Condltioner
AC	Alternating Current
AMET	Academy of Maritime Education and Training
CFL	Compact fluorescent lamp
CIP	Comprehensive Inspection Programme
DC	Direct Current
HSD	High Speed Diesel
Hz	Hertz
kg	Kilogram
kVA	kilo-volt-ampere
kW	kilo Watts
kWh	kilowatt hour
kWp	Kilowatt peak
LED	Light Emitting Diode
LPG	Liquefied Petroleum Gas
MMS	Module mounting structure
MPPT	Maximum Power Point Tracker
NAAC	The National Assessment and Accreditation Council
SEC	Specific Energy Consumption
SPV	Solar Photovoltaic
STC	Standard Test Condition
TV	Television
V	Volts
W	Watts
W/m²	watt per square metre

OVERVIEW OF THE COLLEGE

Mundeshwari College for Teacher Education (MCTE) is a permanently affiliated to Aryabhata Knowledge University, Patna. It was established in the year 2013. The college possesses a campus of 0.625 acre with a student strength of 197 and 17 strong core faculty members along with visiting / guest faculties along with guest faculties located in the semi-urban area of Khagaul, Patna, MCTE was born out of a vision to address the critical need for qualified educators and to provide a platform for quality education. The founders envisioned an institution that would not only impart academic knowledge but also instill values of social responsibility, ethical conduct, and community service among its students.



As an institution of learning it has a commanding presence both in the University as well as in the capital of the state. The college while maintaining its exemplary record in University examinations.

MISSION

MCTE's mission is to develop outstanding educators who are not only proficient in their subjects but also deeply committed to the welfare of their students and communities. The college aims to provide an environment where students can develop their intellectual, social, and emotional capacities, preparing them for the challenge of the modern educational landscape. MCTE is dedicated to continuous improvement, ensuring that its programs are responsive to the evolving needs of the education sector. Through its commitment to research, community service, and academic excellence, MCTE strives to be a leader in teacher education in India.

VISION

The founders of MCTE were driven by a profound commitment to educational excellence and social reform. Their vision was to create an institution that would serve as a catalyst for change in the educational system of Bihar, which had long suffered from neglect and underdevelopment. They believed that by training high-quality teaching professionals, MCTE could play a crucial role in transforming the educational landscape of the state. This vision continues to guide the college's operations, shaping its mission, curriculum, and community engagement initiatives.



Geo Location
Geo Coordinates from Google
maps:
25.58980724,109.12.85,0226555
9895476



AUDIT PARTICIPANTS

On behalf of College Administration

Name	Designation
<i>Dr. Kumari Sunita Singh</i>	<i>Principal</i>
<i>Mrs. Kumari Shashi Singh</i>	<i>IQAC Coordinator</i>
<i>Dr. Dinesh Kumar</i>	<i>Member</i>
<i>Ms. Reena Kumari</i>	<i>Member</i>
<i>Ms. Anjana Kumari</i>	<i>Member</i>
<i>Mr. Pravin Kumar</i>	<i>Member</i>
<i>Ms. Naushia Tabassum</i>	<i>Member</i>

On behalf of Green India Mission, Patna

Name	Position	Qualifications
<i>Dr. S. E. Afzal</i>	<i>Senior Auditor</i>	<i>M.Com, MBA, Ph.D., Field Expert</i>
<i>Dr. Mirza H. Abbas</i>	<i>Co-Auditor</i>	<i>M.Sc(Physics), Field Expert</i>



EXECUTIVE SUMMARY

The purpose of this Energy Audit was to seek opportunities to improve the energy efficiency of the Mundeshwari College for Teacher Education. Reducing the energy consumption despite improving the human comfort, health and safety were of primary concern.

Beyond just identifying the energy consumption pattern, this audit sought to detect and categorize the most energy efficient appliances. Additionally, some daily practices relating common appliances have been shared which may help reducing the energy consumption. Data collection for energy audit of the campus was carried out by the AYAN ENTERPRISES Team. The Energy Audit Report accounts for the energy consumption patterns of the institution on actual survey and detailed analysis during the audit.

The work comprehends the area wise consumption traced using suitable equipment. The analysis was carried out by our team with the support of the staff members from Mundeshwari College for Teacher Education. The report provides a list of possible actions to preserve and efficiently access the available source, resources and their saving potential was also identified. We look forward towards optimization

that the authorities, students and staff members would follow the recommendations in the best possible way. The report is based on certain generalizations including the approximations wherever necessary. The views conveyed may not reveal the general opinion. They merely represent the opinion of the team guided by the interviews of clients. We are happy to submit this Energy audit report to the Mundeshwari College for Teacher Education.

ENERGY AUDIT - ANALYSIS



1. ENERGY CONSUMPTION

To understand the Energy Consumption trends and to analyze the average monthly consumption we have collected electricity energy bills from July 2022 to June 2023

The details of "Meter Connection" at "Mundeshwari College for Teacher Education" are as follows-

Name	-	Vikramshila Educational & Welfare Society
CA No.	-	101167771 & 108757621

Note : "Mundeshwari College for Teacher Education, Patna uses only 40% of the electricity of Vikramshila Educational & Welfare Society, Patna

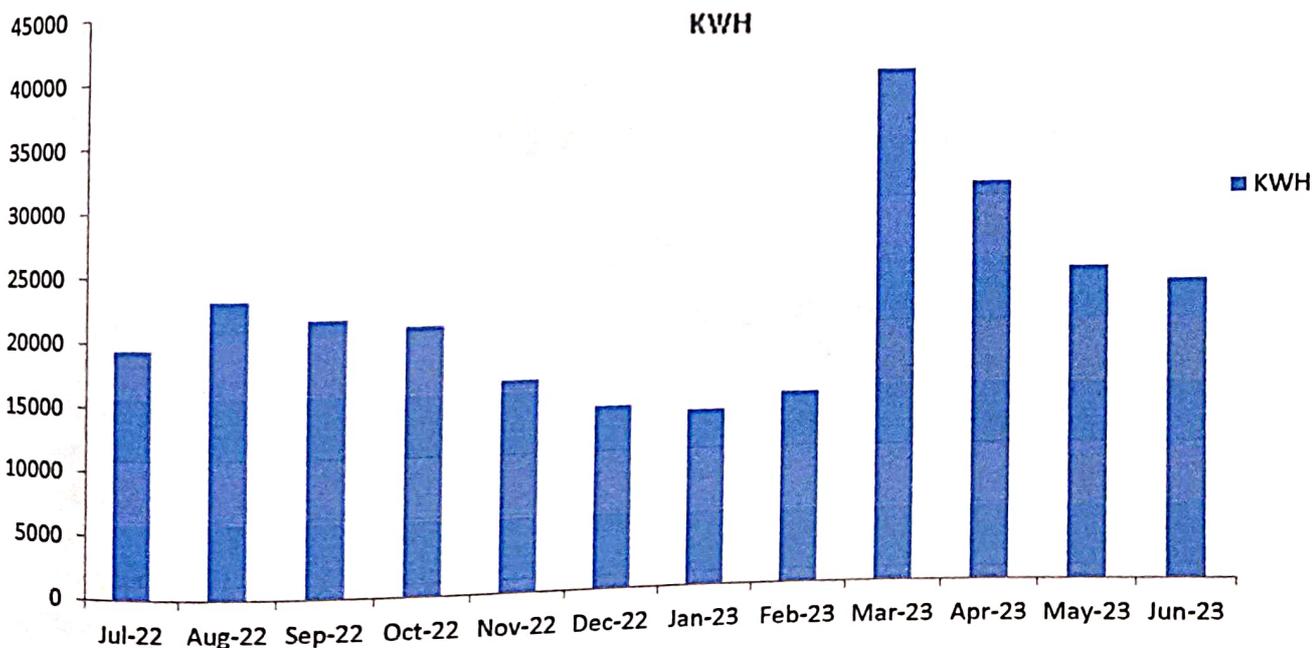


1.1 Summary of Monthly Electricity Consumption and Total Bill Amount

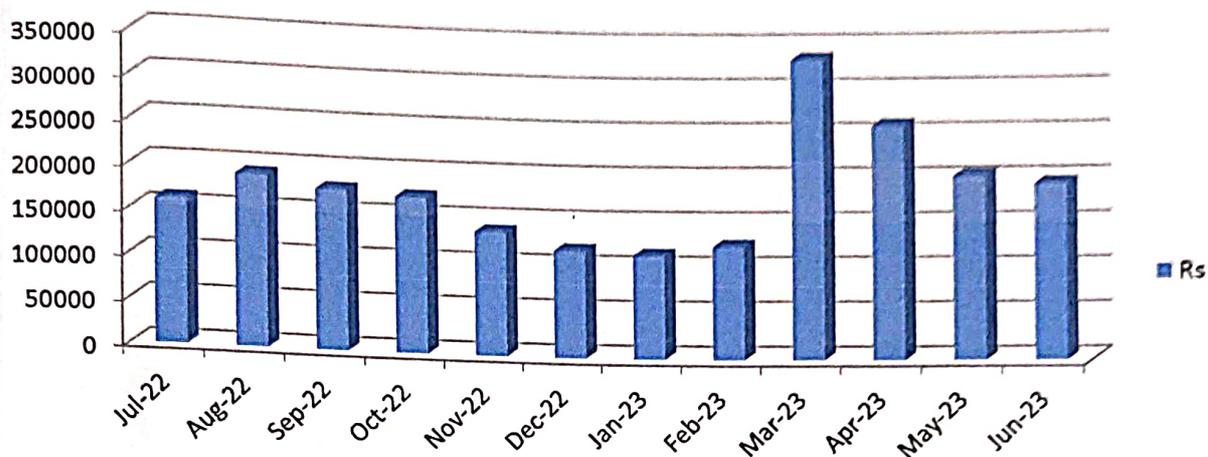
To understand the Energy consumption trend and to develop the baseline parameter we have collected monthly energy bills for the 12 months i.e. from July 2022 to June 2023.

Month	CA No. 101167771 Total Readings	CA No. 108757621 Total Readings	40 % Total Readings	Rate INR	Amount in INR
Jul-22	14758	33730	19395	8.30	160978.5
Aug-22	23383	34375	23103	8.30	191754.9
Sep-22	19941	33988	21571	8.30	179039.3
Oct-22	18861	33542	20961	8.30	173976.3
Nov-22	18290	23210	16600	8.30	137780
Dec-22	17950	17985	14374	8.30	119304.2
Jan-23	17275	17390	13866	8.30	115087.8
Feb-23	18857	18965	15128	8.30	125562.4
Mar-23	20790	80330	40448	8.30	335718.4
Apr-23	21556	57123	31471	8.30	261209.3
May-23	28970	32710	24672	8.30	204777.6
Jun-23	27568	31388	23582	8.30	195730.6
Total	2,48,199	4,14,736	2,65,174		22,00,944

MONTHLY ENERGY CONSUMPTION IN KWH



Monthly Consumption - from July 2022 to June 2023



	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
Rs	160978.5	191754.9	179039.3	173976.3	137780	119304.2	115087.8	125562.4	335718.4	261209.3	204777.6	195730.6

2. DIESEL CONSUMPTION

Below is the diesel consumption details in liters from July 2022 to June 2023.

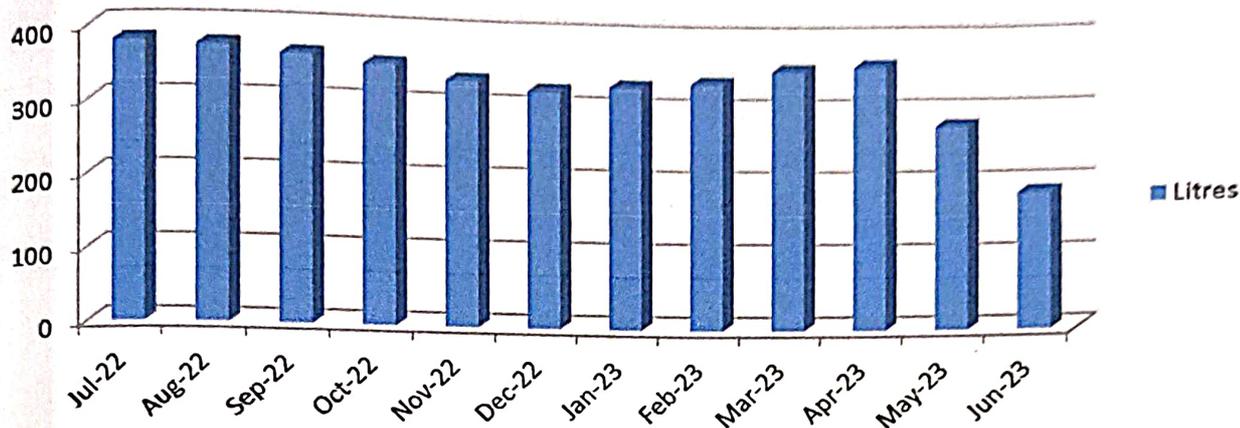
Period	Diesel consumption (in liters)
Jul-22	380
Aug-22	374.4
Sep-22	364
Oct-22	354.4
Nov-22	336
Dec-22	324.4
Jan-23	332
Feb-23	338
Mar-23	356
Apr-23	362
May-23	280
Jun-23	188
Total	3989.2 Ltrs



Note: College doesn't have records of monthly diesel consumption, so average value has been taken based on college's representative suggestion

DIESEL CONSUMPTION (LITRES) JULY 2022 TO JUNE 2023

Diesel consumption in litres



3. ANALYSIS OF DG SETS

In the campus, there are one Diesel Generator (DG) set for its electrical power needs in case of Grid power failure. DG set capacity is 63 kVA.

DG Set Design Details		
Description	Unit	DG at Station
Rated capacity	kVA	63
Hz		50
SI No.		2321199
Make		JCB Power
Rated Power	kW	50.4
PF		0.8 Cos f
Phase		3
Noise Limit		75.5 dB (A) at 1m
Amps	Amps	87.5
Mfg.		Feb 2018



DG Set Operation details

Operating hours during testing	Hours	0.50
% Loading	%	66.54
Energy Generation	kWh	33.86
Load	kVA	93.65
Fuel consumption during testing	Litre	8
Specific energy generation	kWh/litre	3.17

Observation and Suggestions:-

Soundproof silent generators are an efficient tool to keep both noise and vibration at low levels. For the power backup of the institution, the soundproof model is installed in the institution.

As per the trial taken during the energy audit the percentage loading of DG set is 66.54% which is ok and specific energy consumption of DG Sets 3.17 kWh/Litre which is satisfactory because as per manufacturer recommendation, best practices for SEC in DG sets range from 3.0 to 3.5 kWh/Litre and above.

We recommend college to initiate periodic maintenance schedule and stack monitoring of DG set through authorized lab.

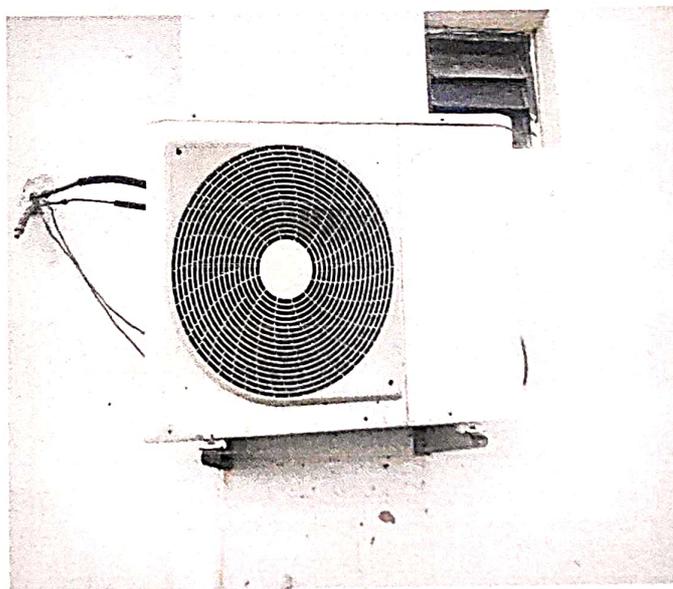
4. AC SYSTEM

Energy Efficiency Ratio (EER): Performance of smaller chillers and ground floor units is frequently measured in EER rather than kW/ton. EER is calculated by dividing a chiller's cooling capacity (in Btu/h) by its power input (in watts) at full-load conditions.

There are 03 ACs installed in Mundeshwari College for Teacher Education in various areas of various capacity which detail is given below:-

Location	Number of AC
Principal chamber	01
Staff room	01
Administrative Block Ground	01
Total	03

Remarks: - We have checked Energy Efficiency Ratio of AC's and EER of AC's is fairly OK. But in future you should purchase 3-Star rated inverter based split AC's because power consumption of Inverter based BEE 3-Star rated AC's is less than non-star rated AC's.



We recommend Mundeshwari College for Teacher Education to organize periodic maintenance schedule and take corrective actions for insulating of AC's refrigerant lines in order to protect energy losses.



5. FANS ANALYSIS

In the Mundeshwari College for Teacher Education, there are 60 fans installed. The observation and suggestion are given below.

Fans wattage	Count
Ceiling Fan-60W	62
Bulb Led 9 unit	31
Tube light	24
Total	117

Observation and Suggestions:-

In the college, all the ceiling fans are of 60 W but BEE 5 Star Rated of 30W Ceiling Fans are present in the market. We recommend to replace to BEE 5 Star rated 30W fans.

Note:- Energy saving will increase or decrease if operating hours of machine /equipment will be increased or decreased and payback period will also increase or decrease if cost of investment (Cost of machine/equipment/accessories of machine) will increase or decrease because cost of investment is taken on tentative basis.

Lights type (based on wattage)	Count
18W LED Light	10
12 W LED Round	20
36W LED	10
36W Tube light	30
Total	70

Lux Measurement

Description	Lux	Remark
Class Rooms	120 to 235	Acceptable
Offices	130 to 240	Acceptable
Corridors	35 to 90	Acceptable
Washrooms	45 to 76	Acceptable
Outdoor	36 to 95	Acceptable
Computer Lab	150 to 289	Acceptable
Parking area	45 to 94	Acceptable
Canteen	69 to 185	Acceptable



Observation

College has initiated LED based lighting solution, but still there are 30 (36W) tube lights. LEDs save energy, the life span is much greater and emit virtually no heat. We recommend to replace the tube lights with LEDs.

Additionally, we recommend to install motion sensor-based lights in common areas such as library, washrooms, corridors, etc.

We also recommend to use solar lights for open areas like parking, ground, street lights, etc. Table below shows the performance characteristics comparison of all luminaries.

Table - Luminous Performance Characteristics of Commonly Used Luminaries

Type of Lamp	Lumens/Watt		Colour Rendering Index	Typical Application	Typical Life
	Range	Avg.			
Incandescent	8-18	14	Excellent (100)	Homes, restaurants, general lighting, emergency lighting	1000
Fluorescent lamps	46-60	50	Good w.r.t coating (67-77)	Offices, shops, hospitals, homes	5000
Compact fluorescent Lamps (CFL)	40-70	60	Very Good (85)	Hotels, shops, homes, offices	8000-10000
High pressure mercury (HPMV)	44-57	50	Fair (45)	General lighting in factories, garages, car, parking, flood lighting	5000
Halogen lamps	18-24	22	Excellent (100)	Display, flood lighting, stadium exhibition grounds, construction areas	2000 - 4000
High pressure sodium (HPSV) SON	67-121	90	Fair (22)	General lighting in ware houses, factories, street lighting	6000 - 12000
Low pressure sodium (LPSV) SOX	101-175	150	Poor (10)	Roadways, tunnels, canals, street lighting	6000 - 12000
Metal halide lamps	75-125	100	Good (70)	Industrial bays, spot lighting, flood lighting, retail stores	8000
LED Lamps	30-50	40	Good (70)	Reading lights, desk lamps, night lights, spotlights, security light signage lights, etc.	40000 - 100000

6. OTHER POWER CONSUMPTION

Inventory of IT Infrastructure

Device Type	Count
Printer 1500W	
Computer 500W	04
Camera	39
Telephone	06
Inverter 1000W	01
Interactive Board	01
Projector	02
Hot Air Oven	02
Podium	01
Total	60

Water pump details

Sr. No.	Description	Unit	Pump No.-1	Pump No.-2
1	Rated Power of Motor	KW	1 HP	1 HP
2	Motor Eff.	%	0.8	0.8
3	Discharge Head	m	70	70
4	Suction Head	m	650	650
5	Pump Type	Type	Submersible	Submersible

Exhaust fan details

Device Type	Count
Water Cooler	01
Water Purifier	01
Refrigerator 1000w	01
60w Exhaust Fan	03
Total	06

ANALYSIS

There should be regular maintenance schedule of equipment like pumps, exhaust fans and IT equipment. Electronics such as computers, printers, scanners, etc. more than 3 year or 5 years (as per their life) should be replaced with new computers/laptops. Ideal Temperature should be maintained for all electronic appliances.

[Signature]
Principal

END OF THE REPORT *****



Mundeshwari College for Teacher Education