

Energy Audit Report

Dr. Yeshawant Moreshwar Donde Sarwajanik Shaikshanic Trust's

INDIRA MAHAVIDYALAYA

KALAMB, DIST. YAVATMAL, MAHARASHTRA 445401



Duration of Audit: August 2023 to October 2023

Assessment Period: 2020-21, 2021-2022, 2022-23

Dated this 30th day of October 2023

Prepared by

GREEN ENERGY SOLUTIONS

Authorised Energy and Environment Auditing Agency

Agency Code – MAH 4211

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This document contains the survey report of activities that **Green Energy Solutions** has performed in **Indira Mahavidyalaya, Kalamb, Dist. Yavatmal**, premises under Energy Audit. This report includes observations that agency has come across, and also recommendation and solutions for it which can be implemented to enhance the overall performance of the college.



Acknowledgment

We were privileged to work together with the administration, staff and students of Indira Mahavidyalaya, Kalamb, Dist. Yavatmal for their timely help extended to complete the audit and bringing out this report.

With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report. We also take this opportunity to thank the bona-fide efforts of team Green Energy Solutions for unstinted support in carrying out this audit. We thank our consultants, engineers and backup staff for their dedication to-bring this report.

Thank you!

Date: 30/10/2023




(Prabhakar P. Patil)
Prabhakar P. Patil
Director
Green Energy Solutions
Agency Code- MAH 4211

Do you know?

A single mobile charger consumes 1 watt while plugged into the wall, even without a phone plugged into it! The same mobile charger will also consume 4.5 watts of electricity with a cell phone plugged into it that is already fully charged! The same mobile will consume 8 watts of power while charging a cell phone. Devices that are plugged in consume energy even when the power is switched off min. 1 watt of electricity is consumed, which may not seem more but if you have 15+ appliances then it is 15 watts of energy that is consumed! This power consumption is different for every device. Therefore, unplug your devices when not in use.

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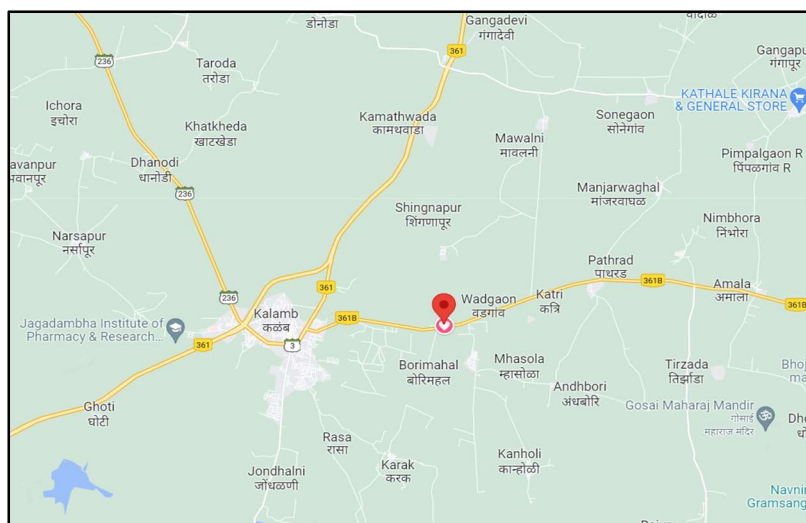
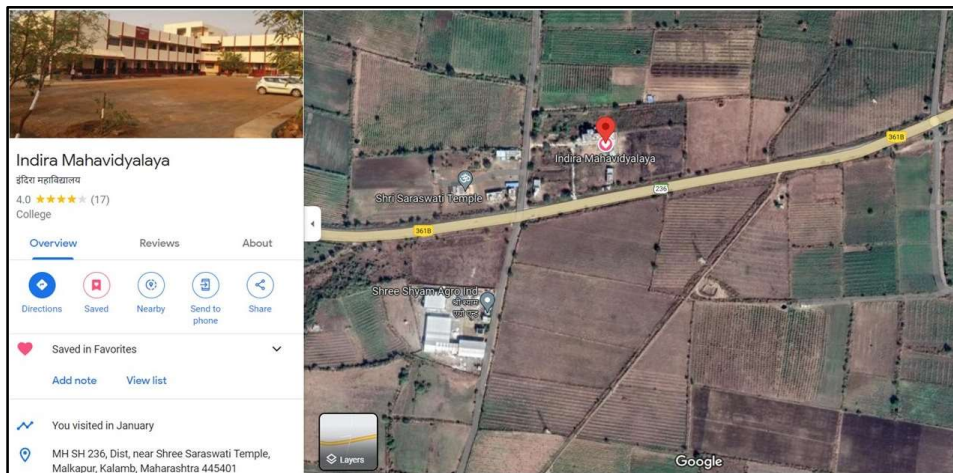


Location

Indira Mahavidyalaya is located on Kalamb-Ralegaon Road, Near Shree Saraswati Temple, Kalamb, Dist. Yavatmal (Maharashtra).

Country and State	India, Maharashtra
District	Yavatmal
Taluka	Kalamb
Government Type	Nagar Panchayat
Metropolis	10 Acers
Population of Taluka	135,992
Population of City	17447
Pin code	445401
Official language	Marathi
Location	20.4452° N, 78.3245° E

Satellite Image / Map



Executive summary

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institute which will lead for sustainable development.

The Green Campus components include environmentally friendly building, energy efficiency, and renewable energy, indoor and outdoor air quality, water efficiency, waste reduction, plantation, rain water harvesting, plastic free campus etc.

An energy audit helps to understand more about the ways energy is used in any college and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to the final consumer becomes 50%. Hence one unit saved in the end user is equivalent to two units generated in the power plant.

An energy audit is the most efficient way to identify the strength and weaknesses of energy management practices and to find a way to solve problems. An energy audit is a professional approach to utilizing economic, financial, social, and natural resources responsibly. Energy audits “adds value” to management control and are a way of evaluating the system.

The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit or environment audit as well as energy audit. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures. In view of the NAAC circular, Indira Mahavidyalaya decided to conduct an external Energy Audit by Green Energy Solutions.

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the government recommended Energy Policy. The methodology include: preparation and filling up of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. At the same time college conducted total Green/Environmental Audit by our Agency.

Thanks to the management of Dr. Yashawant Moreshwar Donde Sarwajanik Shaikshanik Trust and Principal of Indira Mahavidyalaya for providing this opportunity to work together towards making day-to-day operations of the institution environmentally sustainable. We thank all the employees who participated in the staff survey including non-teaching staff, the students who helped us for gathering the data. We hope our recommendations will be used to create a model of energy saving as well as green institution, and will benefit the institution for NAAC accreditation.

Date: 30/10/2023



5

A handwritten signature in blue ink that reads "Prabhakar P. Patil".

(Prabhakar P. Patil)

Director, GES

Prabhakar P. Patil
Director

Green Energy Solutions
Agency Code- MAH 4211

Disclaimer

GREEN ENERGY SOLUTIONS Team has prepared this report of Energy Audit for Indira Mahavidyalaya, Kalamb based on input data submitted by the representatives of the college complemented with the best judgment capacity of the expert team. While all reasonable 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 at 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. If you wish to distribute copies of this report external to your organization, then all pages must be included. GREEN ENERGY SOLUTIONS, its staff and agents shall keep confidential all information relating to your organization and shall not disclose any such information to any third party, except that in the public domain or required by law or relevant accreditation bodies.

Introduction to the Energy-Audit programme

Green & Energy audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity, energy usage. Audit is the tool of management system used methodically for protection and conservation of the environment. It is also used for the sustenance of the environment. The 'Green Audit' aims to analyse environmental practices within and outside the college campus, which will have an impact on the eco- friendly ambience. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit.

The 'Energy audit' aims it is a technique used to establish the pattern of energy use, and identifies the areas where energy can be saved or where energy can be used judiciously. An energy audit consists of a detailed examination of how a facility uses energy, what the facility pays for that energy, and finally, a recommended program for changes in operating practices or energy consuming equipment that will effectively save on energy bills.

Definition of Energy Audit under the Energy Conservation Act, 2001

As per the Energy Conservation Act, 2001, an energy audit is defined as "the verification, monitoring and analysis of use of energy including submission of a technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption."

Energy accounting gives us an overall picture of energy availability and its use. Energy audit helps us in analyzing the data in a systematic and meaningful manner to evolve appropriate measures to

- introduce checks and balances in the system for reducing leakages and losses; and
- achieve technical performance.

About the College

Dr. Yashawant Moreshwar Donde Sarwajanik Shaikshanik Trust and Indira Mahavidyalaya, Kalamb is 40 years young college having Arts, Commerce, and Science faculty. College is reaccredited with B+ Grade by NAAC. The college is located on a beautiful campus of 10 acres. The college main building is in “L” shape. There are few separate buildings for few departments, canteen, gymnasium, open air theatre etc. There are separate laboratories for Chemistry, Botany, Zoology, Physics, Electronics, Computer Science, Geography, Home Economics, and Psychology. The college has also adopted a system for environmental conservation and sustainability.



Objectives of the Study

Energy audit can help us understand more about the ways energy and fuel are used in the institute, and help in identifying the areas where waste can occur and where scope for improvement exists.

Energy audit is carried out with the following aims:

- a) review and upgrading of procedure for energy accounting;
- b) review of technical efficiency of system elements in sub-transmission and distribution (ST&D) system;
- c) analysis of the techniques for measuring the energy received, energy billed and the corresponding revenue collection;
- d) review of performance of equipment, meters, distribution transformers, etc.;
- e) segregation of technical and non-technical losses; and
- f) establishment of norms for checking the consumption of various categories of consumers and overall energy balance in the circles.

In general, energy audit facilitates the translation of ideas about energy conservation into reality, by lending technically feasible solutions with economic and other organisational considerations within a specified time frame. The primary objective of energy audit is to determine ways of reducing energy consumption. For a distribution utility, energy is a commodity and its monitoring is essential.

Energy audit for a distribution utility

- ensures that input units into an area are recorded;
- ensures that the corresponding output units are recorded;
- identifies areas of deficiency (under recording and/or theft) and its correction;
- enables accurate calculation of systemic losses (both technical and commercial);

Energy audit in a power utility provides a benchmark or reference point for managing energy in the utility and the basis for planning a more effective use of energy in the utility. Proper

energy accounting and auditing would facilitate in the creation of a data base to act as input for the following improvements in the distribution system:

- load management;
- details of power factor, active and reactive power flows and suitable location for reactive power injection in the system;
- assessment of diversity in the system;
- optimum utilisation of equipment and services;
- improved voltage profile in the system;
- details of category-wise consumption of loads and proper forecast of demand; and
- better system augmentation and expansion planning.

College has focused on 2 aims:

- 1) To minimise the use of natural resources
- 2) Conservation of energy

College has focused on 3 Objectives:

- 1) To save non-conventionally produce electric energy
- 2) Use of conventional source of energy
- 3) Minimization of electric expenses



Steps in Energy Audit

Pre-Audit

1. Make a plan for the audit.
2. Form an auditing team.
3. Schedule for an audit.
4. Gather the necessary background information regarding institute and Energy Audit.

On Site

1. Understand the scope of audit.
2. Analyse the strengths and weaknesses of the internal controls.
3. Conduct the audit.
4. Evaluate the observations of audit program.
5. Prepare a report of the observations side by side.

Post-Audit

1. Produce a draft report of the data collected.
2. Produce a final report of the observations and the inference with accuracy.
3. Distribute the final report to the management.
4. Prepare an action plan to overcome the flaws.
5. Keep a watch on the action plan.

Methodology

In order to perform Energy Audit, the methodology included different tools such as preparation of charts of available data, physical inspection of the campus, observation and review of the documentation, data analysis, measurements and recommendations.

There are several types of energy audits:

- Preliminary Audit,
- Utility Cost Analysis,
- Standard Energy Audit, and
- Detailed Energy Audit.

Our focus is on **Preliminary Energy Audit and on Utility Cost Analysis**. This is the simplest and quickest type of audit. It focuses on evaluating the energy usage pattern and generates baseline data on the operational

practices in vogue. It is a relatively quick exercise to:

- establish energy consumption in the college;
- estimate the scope for energy savings;
- identify the most likely (and the easiest) areas for attention;
- identify immediate (especially no-/low-cost) improvements/ savings;
- identify areas for more detailed study/measurement.

Preliminary energy audit uses existing or easily obtainable data. It usually collects an overall facility profile and information on major energy using systems and equipment. Corrective measures are briefly described, and quick estimates of implementation cost, potential savings, and simple payback periods are provided. Recommendations resulting from a preliminary audit include low to no-cost actions that can provide immediate energy use and/or operating savings. The purpose of Utility Cost Analysis of audit is to analyze the operating costs of the facility, and determine the potential for energy efficiency retrofits.

In college, agency has collected utility bills for a period of 36 months to evaluate the energy demand to rate structures, and energy usage profiles. The additional task was to find energy consuming systems as well as to gain an insight into the variations in consumption and demand. A detailed financial analysis is performed for each measure based on detailed implementation cost estimates, site-specific operating cost savings, and the investment criteria.

Activity Performed

The following issues were studied for the Energy Audit in Indira Mahavidyalaya.

- Present level of Energy Consumption Energy Audit.
- Assess the various equipment/facilities from the Energy efficiency aspect.
- Scope for the usage of Renewable Energy.
- Various measures to reduce the Energy Consumption.

This study has been prepared based on the available data, samples, and information supplied by the College and recommendations for improving the efficient use of Energy have been made by college officials.

The various activities performed in the college for conducting an energy audit as follows:

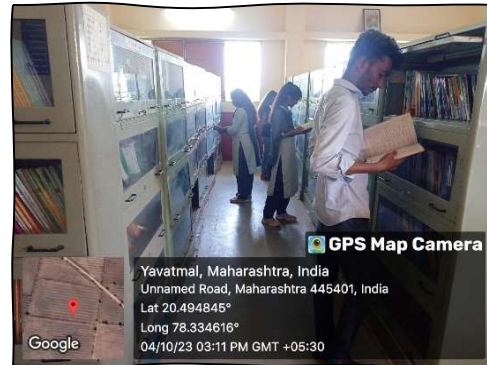
1. Gathering and collating information in a specially designed, “Energy Systems Questionnaire” format.
2. Collection of electricity bills for 3 years and comparison of the collected data.
3. Assessment of present efficiency index for energy consumption.
4. Study of equipment and systems for operational efficiency and potential for economising.
5. Evaluation of the detailed recommendations for energy saving/conservation,

6. Formulation of detailed action plans/strategies in consultation with plant management for implementation of the identified energy saving measures.
7. Guidance to teaching and non-teaching staff for energy conservation and to implement the recommendations and also to monitor the progress on a periodic basis.

Utilization of energy/electricity in various parts of college infrastructure

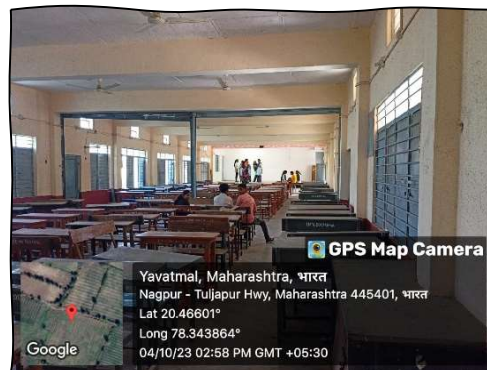
Library

The College library is automated and well equipped with computers, printer, tube lights and fans. There is a large and comfortable seating place having natural light and air. Consumption of electricity is not more than the average.



Seminar Hall

The college has a well-equipped seminar hall with capacity of more than 300 seats. Along with various kinds of programs, the seminar hall is also used frequently to organize events. There are many windows and ventilations for natural light and fresh air. Seminar hall is equipped with tube lights, LED lights and fans. There is a sound system with 2 speakers of not more than 150 w. Consumption of electricity is at average level.



Other buildings with Good Daylight design and ventilation

Class rooms, laboratories, offices etc. include high ceiling, wide windows and doors. These features help providing ample sunlight which in turn saves electricity. Also, cross ventilation in classrooms and offices are facilitated due to wider windows in parallel walls.

Transportation

Almost all the students generally use public transports like state transport bus, sometimes auto rikshaw, bicycles, Motor cycles, etc. for commuting between college and their living places. The college authority also encourages themselves and neighbouring people to use public transport facilities which leads to fuel saving and also reduce carbon emission. Faculties use cars by pooling together 4 to 5 persons in a vehicle. Non-teaching staff use two wheelers with the colleagues. The fuel saving methods used by college are appreciable. Staff motivates students to use cycles. The college has a dedicated parking space at the main gate which is slightly away from class rooms, office and other buildings to reduce hazardous pollution in the campus.

Energy consumption analysis

The College using Electricity as a main Energy Source. Sectioned load for college is 1.5 KW with having 3 phase electricity supply.

	LED 15W	CFL	Tube light 20W	LED Focus 50W	Ceiling Fan 33W	AC 1kW	Compu ter	Printer	CC TV	TV	Other
Principal office	6	0		0	2	2	1	1	1	2	0
Office	0	4	3	0	4	0	4	2	3	0	0
Staff Room	0	0	3	0	2	0	0	0	1	0	0
IQAC Room	0	0	5	0	3	1	1	1 Xerox	1	1	0
Exam Dept.	0	0	2	0	2	0	1	1 Xerox	0	0	0
Computer Lab.	0	0	4	0	2	0	26	1	0	0	0
Smart Room	0	0	2	0	2	1	2	0	1	0	Projector 1, Smart board 1
G8 Class Room	0	0	2	0	4	0	0	0	1	0	0
Seminar Hall	4	0	2	1	15	0	0	0	2	0	0
G.F. Corridor	5	0	6	4	2	0	0	0	3	0	Water Cooler-2, Water Filter-2
Library	0	0	6	0	6	0	4	0	2	1	0
Chemistry Department	0	0	7	0	9	0	0	0	1	0	Fridge 1, Ovean- 1(750W), furnance- 1(2kW), Hot plate- 2(300W),
Zoology Department	0	0	7	0	6	0	0	0	1	0	Incubator 1(300W), Oven- 1(1450 W), microwav e ovan- 1(800W)
Home Economics	0	0	7	0	6	0	0	0	1	0	Fridge 1, Ovan- 1(750W), furnance- 1(2kW), Hot Plate 2(300W),
F15 Class Room	0	0	1	0	2	0	0	0	1	0	
F14 Class Room	0	0	1	0	2	0	0	0	1	0	0

F13 Class Room	0	0	1	0	2	0	0	0	1	0	0
F12 Class Room	0	0	2	0	2	0	0	0	1	0	0
1st Floor corridor	0	0	9	1	0	0	0	0	0	0	0
Physics Lab.	0	0	5	0	5	0	0	0	1	0	Ovan-1(2kW)
Economics Dept.	0	0	0	0	2	0	0	0	0	0	0
Psychology Dept.	0	0	2	0	2	0	0	0	0	0	0
Old Science Building	5	0	14	0	12	0	0	0	0	0	0
Yoga Centre	12	0	13	2	6	0	0	0	0	0	0
Sports Room	0	0	1	0	1	0	0	0	0	0	0
Gymnasium	0	0	2	0	2	0	0	0	0	0	Home Theatre Speakers
Botany Dept.	0	0	2	0	2	0	0	0	0	0	0
Geography Dept.	0	0	2	0	5	0	0	0	0	0	0
English Dept.	0	0	3	0	1	0	0	0	0	0	0
Total Apparatus	32	4	114	8	113	4	38	6	23	4	
Total consumption	480 W	80 W	2.28 kW	400 W	3.7kW	4kW	370 W	90 W	345 W	750 W	10 kW

Observations:

- The Institute has about 114 tube lights with maximum LED lights, 4 LED focus, 32 LED lights ,4 CFL, which are more Energy Efficient than old patterned fluorescent tube lights. All LED tube lights are fitted with electronic ballast.
- The College has 113 fans in different Classrooms, departments, Workshops, labs and offices. All fans are fitted with an electronic regulator.
- There are 4 AC units with 3 to 4-star rating. As no daily use of AC, the consumption is below average.
- There are 38 computes, 6 printers, 23 CCTV cameras and 4 TV sets.
- Few equipment like DVD player, tape recorders, Dish TV etc. are there but not in use now a days. So, there is no electricity consumption on that old equipment or on apparatus.
- The use of electricity is less in comparison to other colleges; the electricity bill is not much high and no point of worry.



Electricity Bill Analysis of the College:

Energy Bill for Consumer number 377990010567, Principal, Indira Mahavidyalaya

2020-2021

Month	Amount	Fixed charge	Energy charge	Duty	S.T.	Consumption
June 2020	5930	333	1161.81	508.95	63.18	351
July 2020	2070	333	1161.81	508.95	63.18	351
Sept.2020	920	333	609.04	266.30	33.12	184
Oct. 2020	1040	333	473.33	207.35	25.74	143
Nov. 2020	1000	333	450.16	189.20	24.48	136
Dec. 2020	1030	333	466.71	204.45	25.38	141
Jan. 2021	960	333	417.06	182.70	22.68	126
Feb. 2021	1210	333	595.80	261.00	32.40	180
Av. added for 2 months	3540	-	-	-	-	403
For 10 months	17700	-	-	-	Total	2015

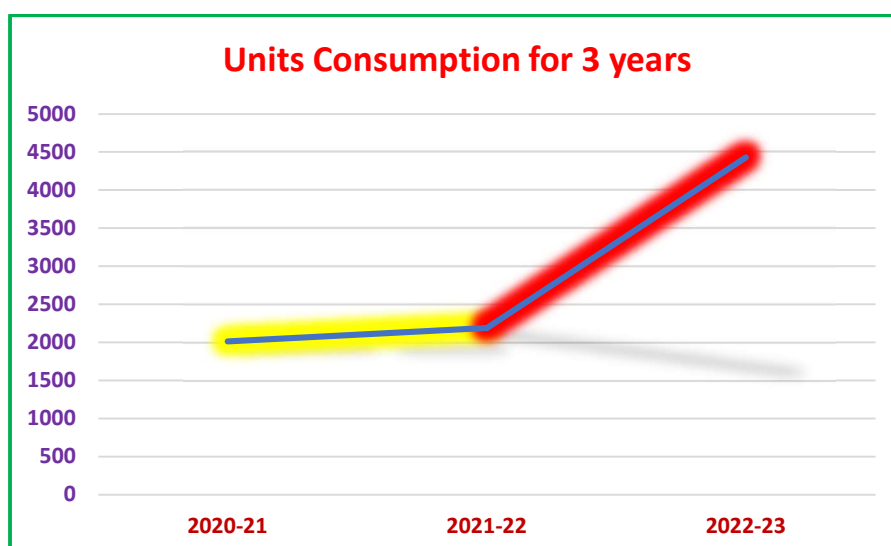
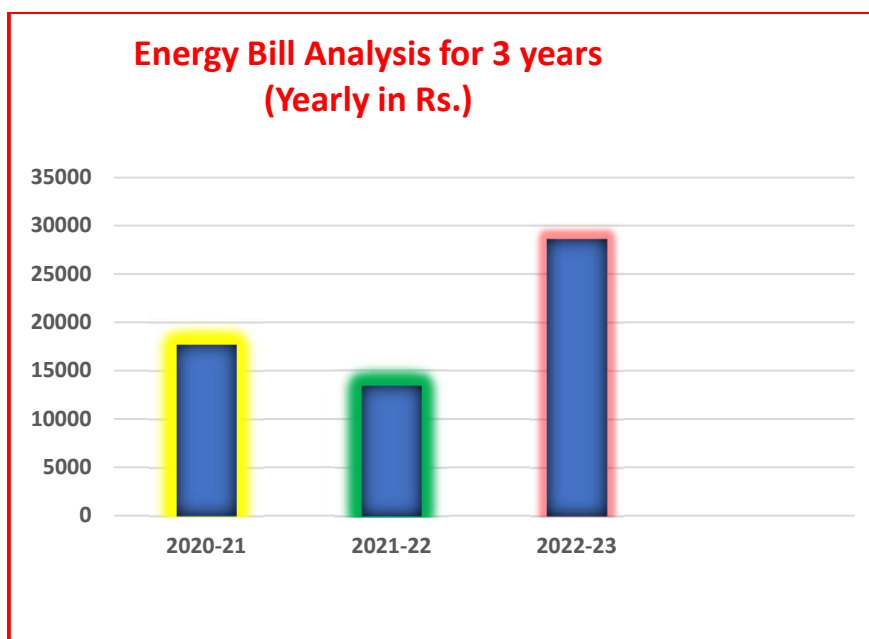
2021-2022

Month	Amount	Fixed charge	Energy charge	Duty	S.T.	Consumption
April 2021	1530	335	388.97	346.23	43.38	241
May 2021	920	343.00	549.12	242.88	31.68	176
June 2021	1330	343.00	670.80	296.70	38.70	215
Sept. 2021	1880	343.00	1026.48	454.02	59.22	329.
Oct. 2021	1420	343.00	730.08	322.82	42.12	234
Nov. 2021	1520	343.00	798.72	353.28	46.08	256
Dec. 2021	1120	343.00	530.40	234.60	30.60	170
Jan. 2022	1460	343.00	742.56	328.44	42.84	238
Feb. 2022	1180	343.00	574.08	253.92	33.12	184
Mar. 2022	1040	343.00	468.00	207.00	27.00	150
For 10 months	13400	-	-	-	Total	2193

2022-2023

Month	Amount	Fixed charge	Energy charge	Duty	S.T.	Consumption
April 2022	2220	345	1233.78	541.47	70.92	394
June 2022	3120	353	1838	780.30	104.04	578
July 2022	3300	353	1768.08	750.06	100.08	556
August2022	2870	353	1500.96	306.80	84.96	472

Sept. 2022	2700	353	1411.92	599.40	79.95	444
Oct. 2022	3700	353	2009.76	856.20	113.76	632
Nov. 2022	2940	353	1542.13	654.75	87.30	485
Dec. 2022	2150	353	1081.20	459.0	61.20	340
Jan. 2023	2590	353	1348.32	572.40	76.32	424
Feb. 2023	3010	353	1593.18	676.35	90.18	501
For 10 months	28600	-	-	-	Total	4432





महाराष्ट्र स्टेट इलेक्ट्रिसिटी डिस्ट्रीब्यूशन कंपनी लि.



वीज पुरवठा देयक माहे: OCT-2023

Website : www.mahadiscom.in
GSTIN of MSEDCL 27AAECM2933K1ZB
BILL NO.(GGN): 000002174106310

HSN code 27160000

ग्राहक क्रमांक: 377990010567
SHRI PRINIPAL.INDIRA.MAHAWAIDAYA
NEAR BORI RALEGAON ROAD KALAMB KALAMB 445401
मोबाइल/ ईमेल: 94*****58/

देयक दिनांक: 11-OCT-23
देयक रक्कम रु: 2,100.00

देय दिनांक: 31-OCT-23
या तारखे नंतर भरल्यास: 2,130.00

बिलिंग युनिट: 3166 :KALAMB S/DN.
दर संकेत: 017 /LT Public Services Govt. Educa
पोल नं: 000IM 01
पी.सी./चक्र+मार्ग क्रमांक/डि.टी.सी.: 2 / 01-0090-0220 /4316652
मिटर क्रमांक: 07805374187
रिडिंग ग्रुप: F2

पुरवठा दिनांक: 11-Oct-1985
मंजूर भार: 1.5 KW
सुरक्षा ठेव जमा(रु): 5,200.00
चालू रिडिंग दिनांक: 06-OCT-23
मागील रिडिंग दिनांक: 06-SEP-23

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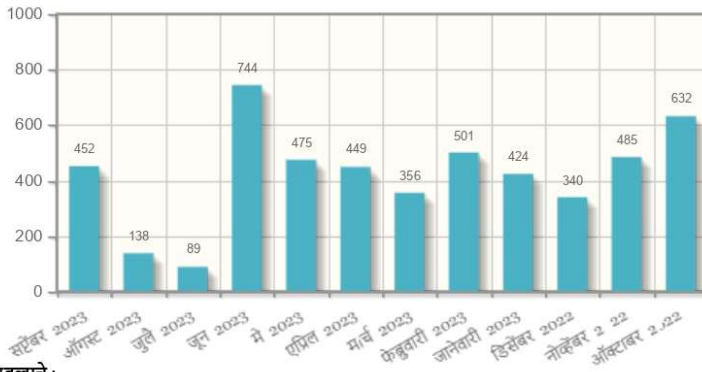
चालू रिडिंग	मागील रिडिंग	गुणक अवयव	युनिट	समा. युनिट	एकूण
41550	41246	01	304	0	304

QR कोडद्वारे भरणा केल्यास, भरणा दिनांकानुसार लागू असलेली तत्पर देयक भरणा सूट किंवा विलंब आकार पुढील देयकात समाविष्ट करण्यात येईल.

NORMAL

Bill Period: 1 Month(s) /

मागील वीज वापर



* मध्यवर्ती तक्रार निवारण केंद्र 24*7

MSEDCL Call Center:

18002333435

18002123435

1912

ग्राहकांच्या तक्रारीचे निवारण करण्यासंबंधीचे नियम व कार्यपद्धति महावितरणच्या

संकेत स्थळ:-

www.mahadiscom.in >

ConsumerPortal > CGRF

यावर उपलब्ध आहे.

महत्वाचे :

१. छापील बिला ऐवजी ई-बिला साठी नोंदणी करा व प्रत्येक बिलामागे १० रुपयांचा गो-ग्रीन डिस्काउंट मिळवा.नोंदणी करण्यासाठी:-<https://pro.mahadiscom.in/Go-Green/gogreen.jsp> (GGN नंबर तुमच्या छापील बिलावर वरच्या बाजूला डाव्या कोपऱ्यामध्ये उपलब्ध आहे.)

२. डिजिटल माध्यमाद्वारे विज बिल भरा व 0.२५% (रु.५००/- पर्यंत) सवलत मिळवा.(टॅक्सेस व ज्यूटीज वगळून)

३. तुमचा मोबाइल नंबर व ईमेल पत्ता चुकिचा असल्यास दुरुस्त करा त्यासाठी <https://consumerinfo.mahadiscom.in/> येथे भेट द्या.

४. पुढील महिन्याची रिडिंग साधारणतः 06-11-2023 ह्या तारखेला होईल.

विशेष संदेश :

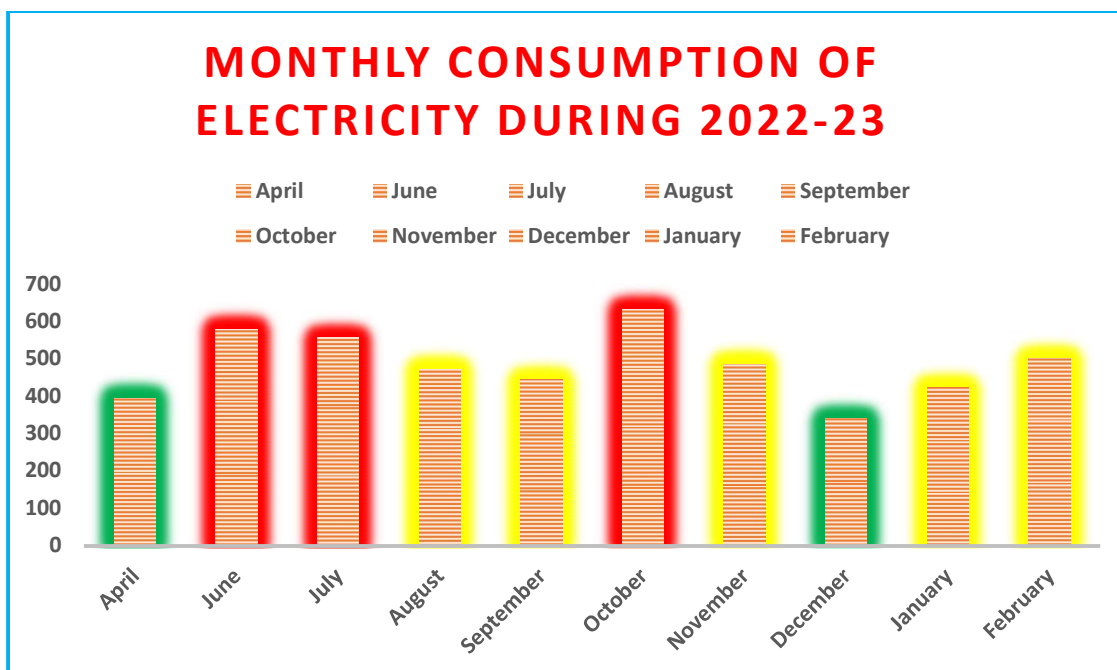
* प्रिय ग्राहक, आपला नोंदणीकृत भ्रमणध्वनी क्र.94*****58 आहे. आपला भ्रमणध्वनी क्रमांक बदलण्यासाठी/नवीन क्रमांक नोंदणीसाठी महावितरण संकेतस्थळ/मोबाईल ॲप वापरा किंवा ९९३०३९९३०३ ह्या क्रमांक वर खालील संदेश पाठवा **MREG 377990010567**

* महावितरणला कोणत्याही प्रकारच्या रकामेचा भरणा करताना संगणकीकृत क्रमांक असलेली संगणकीय पावतीच स्वीकारावी. हस्तलिखित पावती स्वीकारू नये. गैर सोय टाळण्यास ऑनलाइन भरणा सुविधेचा पर्याय वापरावा.

For making Energy Bill Payment through RTGS/NEFT mode, use following details

- Beneficiary Name: **MSEDCL**
- Beneficiary Account Number:**MSEDCL01377990010567**
- IFS Code: **SBIN0008965**
- Name of Bank: **STATE BANK OF INDIA**
- Name of Branch: **IFB BKC**
- Amount:**As per Bill**

Disclaimer: Please use above bank details only for payment against consumer number mentioned in beneficiary account number.



As per the above tables and graphs, the average monthly Electricity Consumption is 201.5 units in 2020-21, 219.3 in 2021-22, 443.2 in 2022-23 per month, and The Average Monthly Electricity Bill is Rs. 1770 in 2020-21, Rs. 1340 in 2021-22, Rs. 2860 in 2022-23. There are slight fluctuations in Electricity Consumption in college. The use of electricity during 2022-23 is increased as compared to previous two years. As per the data for 2022-23, during June, July and October months the consumption of electricity is above average whereas during April and December it is below average. Rest months' consumption is at average level. An initiative is taken the college to conversion to LED light for reducing the total electricity consumption.

Best Practices and Initiatives

Checklist	Yes/No/NA	Total marks 100
Renewable Energy / Solar Power Plant	No	00
Energy Audit Conducted	Yes	10
Biogas Plant installed	No	00
Biodiversity Conservation	Yes	08
Use of LED, CFL bulbs and tubes	Yes	08
Stabilizers to protect instruments	Yes	08
Are there energy saving methods adopted?	Yes	07
Are your computers and other equipment put on power saving mode?	Yes	07
E Waste Management	Yes	06
Adoption of Village for green practices	Yes	10
	Total	64

Observations:

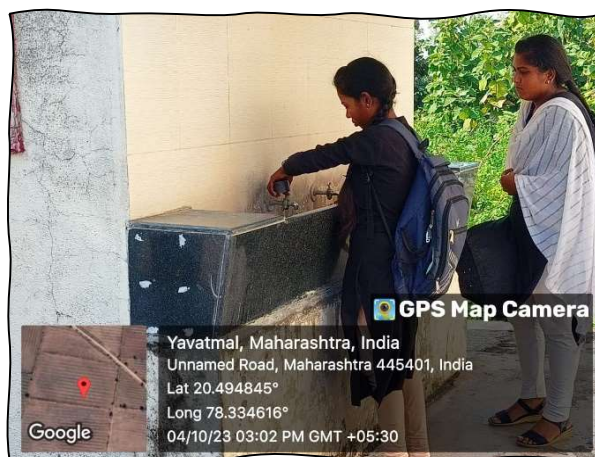
1. Lux light level is sufficient in the Campus, where students spend most of their time and focus on learning.
2. Homogeneous lighting achieved with LED lighting systems reduces shadows and improves visibility.
3. College installed LED lighting systems which is a good option for Energy Consumption. These systems provide energy-efficient lighting and reduce maintenance costs to a minimum.
4. Natural lighting is considered for corridors.
5. Regular monitoring of Equipment and immediate rectification of any problems is being done.
6. Unit consumption and the amount paid for bills increased slightly. This is due to the increase in electricity prices; and now it is a post covid period.

Analysis of Water Pumps

The water supply to the College is taken from the 2 wells. Main building water tanks are connected to a well by PVC pipes and other building water tanks are connected to other well. There are 3 Overhead water tanks and 1 is at ground level that store water coming from the wells.

Capacity of water storage tanks

Sr. No.	Tank	UGT capacity in litre	No. of times filled Water	storage/usage (m3/day)
1	Main Building terrace water tank	15000	1	120
2	Old Science Building-South-West Block water tank	5000	1	80
3	Ground level water tank	5000	1	80
4	Old Building – North-West Block water tank	2500	1	50



Water Pump Capacity

Sr. No.	Motor Capacity	Electrical loading
1	1.0 hp	746watt 2 hrs/day
2	1.0 hp	746watt 2 hrs/day

Other Sources of Energy

Generator

There is a 2.7 Kva generator in college which run on LPG. As there are 3 battery invertors available in college, generator is not in use and so there is no consumption of LPG by the generaor.

Inverters

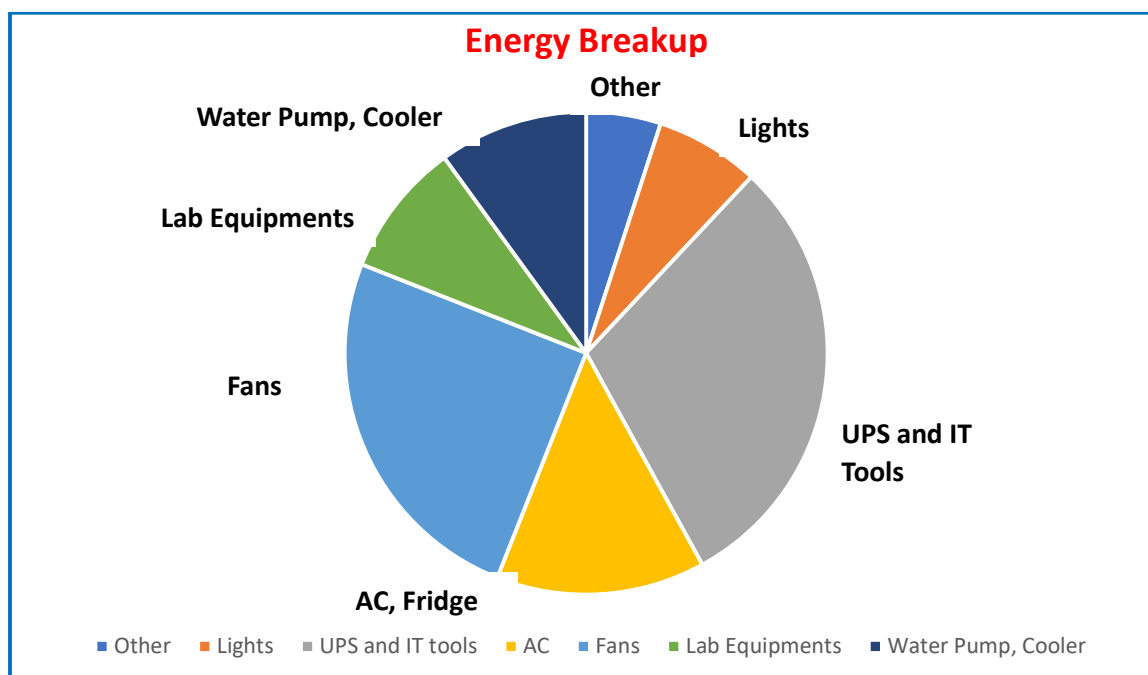
There are 3 battery inverters are in college. Two 1500 VA inverters and one 3000VA sinewave inverters are available in college. As there is no load shading now a days, inverters are using less electricity.



LPG

There are 2 laboratories using LPG. One is Home Economics and other one is Chemistry. Consumption of LPG in Home Economics laboratory is two cylinders per year and in Chemistry three cylinders per year.

Energy Balance



25 % of the total energy consumed in this facility is used to operate Fans. Lighting uses 7%, UPS and IT Equipment uses 30%, AC and Fridge uses 14%, Lab Equipment uses 9%, Water Pump and Water Cooler uses 10% and other uses 3%.

Energy Consumption Profile

Sr. No.	Fuel	Consumption in Kcal for a year
1	Electricity	126120
2	LPG	30780



Audit Findings and Recommendations

Based on the analysis of Power Consumption data, Certain steps have been recommended to improve the campus's energy efficiency. Complete cost analysis of the implementation of the recommended measure has been performed wherever necessary.

Also, the general measure of energy efficiency has been listed. Described below are some crucial recommendations for better energy efficiency:

Consolidation of Audit Findings

- 1) The communication process for awareness concerning energy conservation is found adequate.
- 2) Average Power factor is maintained.
- 3) The monthly use of Electricity in the College is not very high.
- 4) Objectives for reducing energy, Water and Fuel consumption are sufficient.
- 5) Energy-efficient equipment and LED lights are being used to replace the old non-energy efficient Lights.
- 6) Regular monitoring of Equipment and immediate rectification of any problems.
- 7) Energy conservation tips/ posters are displayed in crucial points.

Recommendations

1. Housekeeping:

- **Curains:** Always keep curtains on windows to prevent direct sunlight inside the room to avoid heating cooled air.
- **Proper insulation:** Good Quality insulation must be maintained in the airconditioned rooms by keeping all doors and windows closed adequately to prevent cool air from going out and Hot air.

• **Operating:** The AC should be switched on 15 minutes before actual use and should be switched off before leaving the room.

2. Replacing Florescent Tube light to LED lights:

LED lighting systems are a good option for college. These systems provide energy-efficient lighting and reduce maintenance costs to a minimum. The College suggests that the College use LED lights instead of fluorescent tube lights.

Dominants' light sources at most places on the campus are traditional Florescent tube lights. If LEDs replace these tube lights, 18 Watts of power can be saved.

3. Replacing LED Monitors with LCD Monitors

LCD monitors consume 150 W, while LED monitors consume only 50W. The saving of 25 W per monitor is considerable, but the LED monitor is also costlier by Rs. 2000. (approx.)

4. Use of Master Switch outside each room.

Installation of a Master switch outside a room can make it easy for a person to switch off all the room's applications in case someone forgets to switch off while leaving the room. This can help improve energy efficiency.

5. Hibernating

Utilizing Hibernating feature to power down computers will reduce the current wasted Energy associated with keeping computers powered on when the building is unoccupied.

6. Conduct more save energy awareness programs for students and staff.

Conduct more save energy awareness programs for students and staff.

8. Energy Substitutions:

As in the Campus, there is a much consumption of Electrical Energy, which is not economical. Instead of using electrical energy, switch to an alternative energy source, solar power.

References

(Acts, Rules, Handbooks, Reports and Books)

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2. Energy Conservation Act 2010.
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5. The Batteries (Management and Handling) rules, 2001 (Amended 2010)
6. The Environment [Protection] Act – 1986 (Amended 1991) & Rules-1986 (Amended 2010)
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8. The Petroleum Act: 1934 – The Petroleum Rules: 2002
9. Towards campus climate neutrality: Simon Fraser University's carbon footprint (2007), Simon Fraser University, Bokowski, G., White, D., Pacifico, A., Talbot, S., DuBelko, A., Phipps, A.

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- <https://www.americangeosciences.org/critical-issues/faq/how-does-recyclingsave-energy>
- <https://www.carbonfootprint.com/factors.aspx>



Date: 30/10/2023




(Prabhakar P. Patil)
Director, GES
Prabhakar P. Patil
Director
Green Energy Solutions
Agency Code- MAH 4211



GREEN ENERGY SOLUTIONS

Authorised Energy and Environment Auditing Agency

Agency Code – MAH 4211

Opposite Wankhede Hall, Near Alnakar Cinema Dharampeth, Nagpur 440 010
greenenergysolutions@gmail.com +91 712 22614722

Ref.: GEA 102-2023

Date: 30/10/2023



Energy Audit Certification



This is to certify that,

The data collection has been carried out diligently and truthfully;

All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorised and no tampering of such devices has occurred;

All reasonable professional skill, care and diligence had been taken in preparing the energy audit report and the contents thereof are a true representation of the facts;

Adequate training provided to personnel involved in daily operations after implementation of recommendations.

Indira Mahavidyalaya, Kalamb is certified to have done exceptionally well to conserve environment and ensuring sustainable development.

Duration of Audit: August 2023 to October 2023

Assessment Period: 2020-21, 2021-2022, 2022-23

This Certificate is issued to **Indira Mahavidyalaya, Kalamb, Dist. Yavatmal** on their request.

Dated this **30th day of October 2023**.



Prabhatil
Director, GES

Prabhakar P. Patil

Director

Green Energy Solutions

Agency Code- MAH 4211