



GOOD EARTH ORGANIZATION

An NGO dedicated to restore human bonds with our only home, The Earth.



ENERGY AUDIT REPORT

NASRA COLLEGE OF ARTS AND SCIENCE



Registered under Indian Societies Registration Act XXI of 1860, Reg No: MPM/CA/223/2020

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[M goodearthorganisation@gmail.com](mailto:goodearthorganisation@gmail.com) [Instagram goodearthorg](https://www.instagram.com/goodearthorg) [Facebook GEO Nature Club](https://www.facebook.com/GEO.Nature.Club)



+91949636230

Dr. P. Zubair

Principal

Nasra College of Arts and Science

Tirurkad



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Energy Audit

Educational institutions, as vital hubs of learning and communal living, rely on diverse energy sources such as electricity, petroleum gas, diesel, petrol, firewood, solar electric, and solar thermal to sustain their operations while striving to manage expenses effectively. However, the environmental impact of these energy-related activities, primarily reflected in the carbon footprint, emerges as a critical concern within such institutions.

The carbon footprint of an educational institution is largely attributed to energy consumption, making it imperative to adopt measures that address this ecological challenge. One effective strategy is the implementation of Energy Audits, a valuable activity accessible to students and, consequently, their families. Energy Audits serve as a conduit for realizing the feasibility and profitability of achieving greater productivity with the same energy input. Achieving this goal hinges on the adoption of a deliberate "lesser consumption" approach known as energy conservation, simultaneously reducing waste production within the campus.

The principal contributors to the carbon footprint within educational institutions encompass electricity and various energy forms, transportation, as well as waste generated in relation to food preparation and consumption. To assess the conservation consciousness of stakeholders at Nasra College of Arts and Science, an inaugural comprehensive green audit was conducted. Student green guardians meticulously monitored data related to electricity, transportation, and diverse waste types. This undertaking aimed to gauge the extent of conservation awareness among individuals within the college community.

The green guardians undertook physical inspections of every building and its respective rooms, scrutinizing fixtures such as lamps, fans, and other connected equipment. Parameters such as power consumption, average daily usage hours, and typical usage frequency were meticulously documented. Through this detailed scrutiny, the energy consumed, measured in kilowatt-hours (kWh), was quantified. The outcomes of this audit not only shed light on the current state of energy consumption but also laid the groundwork for the formulation of dependable strategies to conserve energy within the educational institution.

In essence, the initiative taken by Nasra College exemplifies a proactive approach towards environmental sustainability within educational settings. By fostering awareness and implementing practical measures through energy audits, the institution strives to minimize its carbon footprint, contributing to a more ecologically responsible and resource-efficient future.

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goodearthorganization.com

[M goodearthorganisation@gmail.com](mailto:goodearthorganisation@gmail.com) [@goodearthorg](#) [GEO Nature Club](#)

Dr. P. Zubair
-919 Principal
Nasra College of Arts and Science
Bhubaneswar



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Sl. no	Name of Equipment	Power (Watt)	No.	Average (hr/day)	Energy kWh1
1	Ceiling fan	36W	184	6.5	8998.70
2	Wall fan	55W	21	4.0	965.58
3	Pedestal fan	60W	1	2.0	25.08
4	LED tube	20W	105	6.0	2633.4
5	LED light	9W	35	3.0	197.51
6	Exhaust fan	28W	9	2.0	105.34
7	Computer	70W	66	4.5	4345.11
8	LED TV	65W	29	4.0	1575.86
9	Speaker	10W	13	0.5	13.59
10	CCTV Camera	3W	37	24	556.78
11	Projector	340W	3	1.5	319.77
12	Flood light	50W	4	11	459.80
13	Printer	300W	5	1.5	470.25
14	Panel light	15W	62	1.0	194.37
15	Panel light	24W	10	1.0	50.16
16	Sound system	30W	6	0.5	18.81
				Total kWh/year	20930.11

Note: kWh1 Assuming 250 working days during the year

Total Usage (According to Student Assessment): 20930.11 kWh/year (1744.18 Units/month)

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goodearthorganization.com

goodearthorganisation@gmail.com [goodearthorg](#) [GEO Nature Club](#)

+919496365598


Dr. P. Zubair

Principal

Alaska College of Arts and Sciences
Murkad



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Table 2: Room-wise Equipment details & Energy Estimate

Such assessment sheets are compared or checked with the monthly electricity bills

Month -> Charges	Energy Use Units (kWh)*	Energy Charges Rs	Average cost per unit Rs.
June 2022	1446	18063	12.49
July 2022	1081	15267	14.12
August 2022	1249	16976	13.59
September 2022	971	14148	14.57
October 2022	1591	20456	12.86
November 2022	1380	18309	13.27
December 2022	1377	18279	13.27
January 2023	1334	17845	13.38
February 2023	1524	19912	13.07
March 2023	1441	19060	13.23
April 2023	758	12049	15.89
May 2023	847	13044	15.40
Year total	14999	203408	13.76

Nasra College's average monthly electricity consumption comes to 1249.92 kWh. The annual energy consumption that accounts for GHG emission due to electricity use in the campus based on billed electricity consumption is 14999 units (kWh) for 2022-23.


Dr. P. Zubair
Principal
Nasra College of Arts & Science
Tirunelveli
PM/CA/203/2020

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goodearthorganization.com

 goodearthorganisation@gmail.com

 [goodearthorg](https://www.instagram.com/goodearthorg)

 [GEO Nature Club](https://www.facebook.com/GEO.Nature.Club)

 +919496363308



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Observations

1. As an educational institution, it is impossible to maintain a uniform demand level, either daily or monthly. The actual electricity bills for the audit period helped to get a picture of normal Carbon footprint contribution.
2. The annual per capita electricity consumption based on the campus population (1018) is 14.73 kWh.
3. The extent of power failures in the campus during class hours are not recorded in a log book.
4. Nasra College of Arts and Science should maintain a register on energy use of all forms and record the energy in units consumed every month, and the charges paid for it. Green Guardians can compare this with previous month's data and alert the IQAC team on trends, and inadequacies.

Energy Efficiency Improvement

Enhancing energy efficiency is crucial in various applications, and Nasra College's commitment to environmental sustainability is evident in the transition from incandescent bulbs to LED lamps. Emphasizing the importance of energy-efficient devices, especially guided by the 'life cycle cost' philosophy, not only showcases the campus's dedication but also educates students about the benefits of such improvements in both workspaces and homes. For instance, replacing an old fluorescent tube with an LED equivalent not only maintains illumination but also reduces wattage by 36W, leading to significant energy and cost savings. This not only aligns with green protocols but also demonstrates a swift 'money back' period of 4 to 5 months, with long-term net profits and environmental benefits. This illuminating exercise allows students to grasp the substantial energy cost savings, promoting awareness and understanding of the 'Life Cycle Cost' approach.

In every realm of energy usage, the most enticing prospect for advancing sustainability through energy management lies in eschewing incandescent bulbs and substituting conventional fluorescent lamps (tubes). The Nasra College campus has recognized this and transitioned to employing LED lamps. Nonetheless, adhering to the campus green protocol emphasizes the need to prioritize the shift to energy-efficient devices. The resolute choice to exclusively utilize energy-efficient devices, guided by the 'life cycle cost' philosophy, aims to exemplify to students, particularly newcomers, the significance of enhancing energy efficiency in both workplaces and homes.

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goodearthorganization.com

[M goodearthorganisation@gmail.com](mailto:goodearthorganisation@gmail.com) [Instagram goodearthorg](https://www.instagram.com/goodearthorg) [Facebook GEO Nature Club](https://www.facebook.com/GEO.Nature.Club)

Dr. P. Zubair
Principal
College of Arts and Science
Tirukkad
496008



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If an old type tube lamp is replaced with an LED tube which gives the same illumination, the reduction in wattage will be 56 minus 20 or 36 W. The decrease in Carbon Footprint is also a result of the electricity saved by using LED lamps. Assuming a daily usage of 6 hours for such a lamp, and considering 250 days in a year, the energy cost savings (based on the current effective cost of Rs. 13.43 per kWh on average) can be calculated as follows: $(36 \text{ W} \times 6 \text{ h} \times 250 \text{ d})$ divided by 1000 and multiplied by Rs. 13. This amounts to Rs. 702 annually from just one tube light. Considering that such a tube can be acquired for Rs. 250, the investment pays off within 4 to 5 months. With a presumed minimum lifespan of 5 years for the tube, the net profit per replaced tube exceeds Rs. 3,000 for an initial investment of Rs. 250. Higher-quality tubes may endure beyond 5 years. Engaging the students in an illuminating exercise would involve understanding the potential energy cost savings for the college through superior technology, comparing it with the required investment, and delving into the 'Life Cycle Cost' approach.

Observations and suggestions (for improvement of energy use pattern):

1. Analyze room-wise connected load data to identify energy efficiency opportunities, particularly focusing on lighting devices and fans. Consider introducing Brushless DC (BLDC) fans to enhance energy savings and reduce carbon footprints.
2. Develop a maintenance schedule for switchboards and distribution boards. Display the schedule prominently for all stakeholders to ensure adherence.
3. The Nature Club members should conduct an "energy needs" survey, gathering input from students to create an action plan addressing all required energy services for the campus.
4. Implement a strategy of physical isolation by unplugging devices when not in use. Communicate this practice to teachers and staff through stickers on or near common office equipment to enhance safety and reduce 'Phantom load' – energy consumption in the 'switched off' state.

Address :
Sabir .P
Energy Auditor
Good Earth Organisation
Vazhakkad PO
Malappuram dist
673640
Email : goodearthorganisation@gmail.com



Sabir.P



Registered under Indian Societies Registration Act XXI of 1860, Reg No: M/11/2020

goodearthorganization.com

[M goodearthorganisation@gmail.com](mailto:goodearthorganisation@gmail.com) [Instagram goodearthorg](https://www.instagram.com/goodearthorg) [Facebook GEO Nature Club](https://www.facebook.com/GEO.Nature.Club)


Dr. P. Zubair
Principal
Nasra College of Arts and Science
Tiruvkad
96563308