

Phone (07256) : 222062, 223062, 225039
The Berar General Education Society, Akola's
NAAC 'B +' Grade

SHRI KISANLAL NATHMAL GOENKA ARTS & COM, COLLEGE KARANJA
(LAD) 444 105 Dist. Washim
(Affiliated S.G.B. Amravati University, Amravati)
Website – www.skngacckrj.net
Email-collegekaranjakn@gmail.com

Dr.P.P.Yeole

Officiating Principal
ppyolener@gmail.com

Self-Declaration

This is to certify that, the attached information and true copies of supporting documents are verified and found correct.

Hence this certificate is issued.



Officiating Principal
Shri K. N. Goenka College,
Karanja Lad

3.4.2 Number of awards and recognitions received for extension activities from government /government recognised bodies during the last five years (05)				
Name of the activity	Name of the Award/ recognition for Institution	Name of the Awarding government/ government recognised bodies	Year of award	
	2022-2023			
Cleanliness	Clean College Award-2023	Nagar Parishad Karanja Lad	2022-2023	
	2021-2022			
Cleanliness	Clean College Award-2022	Nagar Parishad Karanja Lad	2021-22	
Promoting Eco friendly environment in College Campus	EFEC -Enroll & Educate Award 2022	Bio-diversity Facilitator -EFEC	2021-22	
Exceptional Courage & Devotion Towards NSS activities & promoting conservation of nature	EFEC -Enroll & Educate Award 2022	Bio-diversity Facilitator -EFEC	2021-22	
Exceptional Courage & Devotion work in "Pani Foundation"	EFEC -Enroll & Educate Award 2022	Bio-diversity Facilitator -EFEC	2021-22	
	2020-2021			
Cleanliness	Clean College Award-2021	Nagar Parishad Karanja Lad	2020-2021	
Cleanliness	Clean College Award-2021	Nagar Parishad Karanja Lad	2020-2021	
	2019-2020			
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	2018-2019			
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(Signature)

Officiating Principal
Shri K. N. Goenka College
Karanja Lad

Name of the activity- Cleanliness

Clean College Award-2023

Nagar Parishad Karanja Lad



Year 2021-2022
Clean College Award-2022
Nagar Parishad Karanja Lad



नगर परिषद कारंजा जि.वाशिम
स्वच्छ सर्वेक्षण २०२२

* प्रमाणापत्र *

प्रमाणित करण्यात येते कि,
स्वच्छ भारत अभियान अंतर्गत
स्वच्छ सर्वेक्षण २०२२ मध्ये स्वच्छ
महाविद्यालय स्पर्धेमध्ये श्री. किष्कनलाल नरमल
कला व वाणिज्य महाविद्यालय कारंजा यांना स्वच्छ
महाविद्यालय म्हणून गौरविण्यात येत आहे.

(१०/०७/२२)

दादाराव डोल्हारकर
मुख्याधिकारी
नगर परिषद कारंजा जि.वाशिम



Promoting Eco friendly environment in College Campus

EFEC -Enroll & Educate Award 2022

Bio-diversity Facilitator -EFEC



Exceptional Courage & Devotion Towards NSS activities & promoting
conservation of nature
EFEC -Enroll & Educate Award 2022
Bio-diversity Facilitator -EFEC



Exceptional Courage & Devotion work in "Pani Foundation"
EFEC -Enroll & Educate Award 2022
Bio-diversity Facilitator -EFEC



**ENROLL & EDUCATE
AWARD 2022**

Dr. V. R. Kodape

Principal

**Shree Kisanlal Nathmal Goenka
Arts & Commerce College, Karanja Lad**

The award is conferred upon you for your
exceptional courage & devotion to work pro-
actively towards promoting environmental
education & making utmost efforts in keeping
campus eco-friendly.

05.04.2022

Uday Vaze

Bio-diversity Facilitator - EFEC

Cleanliness
Clean College Award-2020
Nagar Parishad Karanja Lad
2020-2021



Clean College Award-2020
Nagar Parishad Karanja Lad
2020-2021




Official Principal
Shri K. N. Goenka College
Karanja Lad

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,
Sus Road, Sus, Pune 411 021

Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

Date: 13/09/2022

CERTIFICATE

This is to certify that we have conducted Green Audit at Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) for the year 2021 – 22.

The College has already adopted **Green** practices like:

- Installation of Rain Water Harvesting system
- Installation of Bio composting pit
- Usage of Energy Efficient LED
- Usage of Energy Efficient BEE STAR Rated equipment

We appreciate the support of Management, involvement of faculty members and students in the process of making the campus Green.

Nutan Urja Solutions,

K G Bhatwadekar,

Certified Energy Auditor,

EA - 22428

Nutan Urja Solutions

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This is to certify that we have conducted Environmental Audit at Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) in the year 2021-22.

The College has already adopted following projects for making the campus **Energy Efficient**.

- Installation of Bio Composting Pit
- Installation of Rain Water Harvesting System

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

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This is to certify that we have conducted Energy Audit at Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) as per the guidelines of Maharashtra Energy Development Agency (www.mahaurja.com) in the year 2021-22.

The College has already adopted **Energy Efficient** practices like:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

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Report
On
Green Audit
At
Shri. Kisanlal Nathmal Goenka Arts & Commerce College
Karanja (Lad)



Prepared by
Nutan Urja Solutions
A 703, Balaji Witefield, Near Sunni's World,
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Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) for awarding us the assignment of Green Audit of their college premises.

We are also thankful to various Head of Departments & other Staff members for helping us during the field measurements.

We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures and green practices. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.

Executive Summary

Green Audit of Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) is conducted by Nutan Urja Solutions, Pune. Based On the audit field study, following important points can be presented.

1. Present Energy Consumption

Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) uses Electrical Energy as the source of Energy for various equipment in the college campus. In the following Table, we present the details of Energy Consumption.

Table no 1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	1,982	1.6
2	Minimum	708	0.6
3	Average	1,215	1.0
4	Total	14,580	11.7

2. Various Measures Adopted for Energy Conservation

1. Usage of STAR Rated ACs at new installations
2. Usage of LED lights at some indoor locations
3. Usage of LED Lights for outdoor lighting.

3. Rain Water Harvesting

The College has installed the Rainwater harvesting project, to reduce dependency on municipal corporation water supply.

4. Waste Management

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

The internal communication is through emails and there is hardly any generation of e-Waste in the premises.

5. Notes and Assumptions

1. Daily working hours-10 Nos

2. Annual working Days-250 Nos
3. Average Rate of Electrical Energy : **Rs 11/- per kWh**

Abbreviations

CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
kVA	:	Active Power

1. Introduction

Kisanlal Nathmal arts and commerce Karanja was established in 1961 on the land generously donated by Kisanlal Nathmal Goenka . It is run by the Berar general education society Akola. It is situated in a rural area.

The College, definitely, has promoted research activities. As a result many of the teachers have acquired the Doctoral degree in the respective areas. Environmental concern has been another task of the college. Regular teaching of environmental studies is the salient feature of the college curriculum.

1.1 Objectives

1. To study present level of Energy Consumption
2. To Study the present CO₂ emissions
3. To assess the various equipment/facilities from Energy efficiency aspect
4. To measure various Electrical parameters
5. To study Scope for usage of Renewable Energy
6. To study various measures to reduce the Energy Consumption

1.2 Audit methodology

1. Study of connected load
2. Study of various Electrical parameters
3. To prepare the Report with various Encon measures with payback analysis

2. Study of Electrical Energy Consumption

In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table no 2.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	Jun-22	1,587	13,430
2	May-22	1,982	14,850
3	Apr-22	1,102	7,830
4	Mar-22	1,872	14,350
5	Feb-22	1,013	14,140
6	Jan-22	815	6,320
7	Dec-21	1,140	8,400
8	Nov-21	1,214	20,190
9	Oct-21	1,434	10,860
10	Sep-21	726	11,290
11	Aug-21	708	5,544
12	Jul-21	987	7,558
	Total	14580	134,762

Variation in energy consumption is as follows,



Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

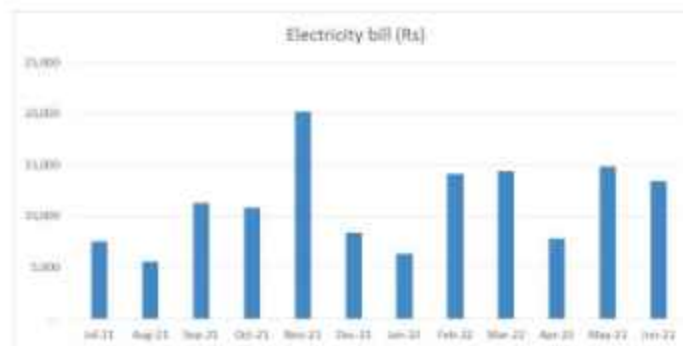


Figure 2.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 2.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	1,982	1.6
2	Minimum	708	0.6
3	Average	1,215	1.0
4	Total	14,580	11.7

3. Carbon Foot printing

1. A **Carbon Foot print** is defined as the Total Greenhouse Gas emissions (CO₂ emissions), emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

2. Basis for computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy is as under

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO₂** into atmosphere.

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

We herewith furnish the details of various forms of Energy consumption as under

Table 3.1: Month wise Consumption of Electrical Energy & CO₂ Emissions

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Jun-22	1,587	1.27
2	May-22	1,982	1.59
3	Apr-22	1,102	0.88
4	Mar-22	1,872	1.50
5	Feb-22	1,013	0.81
6	Jan-22	815	0.65
7	Dec-21	1,140	0.91
8	Nov-21	1,214	0.97
9	Oct-21	1,434	1.15
10	Sep-21	726	0.58
11	Aug-21	708	0.57
12	Jul-21	987	0.79
	Total	14,580	11.66

In the following Chart we present the CO₂ emissions due to usage of Electrical Energy.

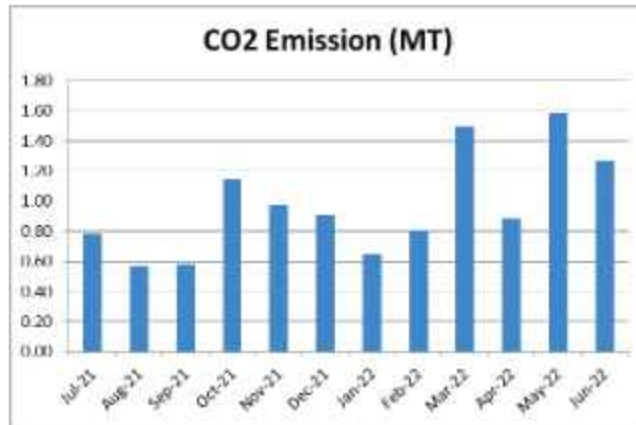


Figure 3.1: Month wise CO2 Emission

4. Study of Rain Water Harvesting

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is fed to underground Water Storage tank. This stored water is then reused for domestic purpose.

Photograph of Rain Water Harvesting pipe



5. Study of Waste Management

5.1 Solid Waste Management

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

5.2 e-Waste Management

The internal communication is through emails and there is hardly any generation of e-Waste in the premises.

6. Study of Green Practices

6.1 No of students who don't use own Vehicle for coming to Institute

Out of total students coming to Institute, about 40% students use own Automobile.

6.2 Usage of Public Transport

During the Students transport study, it was revealed that the local students who are residing near areas make use of Public Transport like Municipal Transport local buses, local sharing type auto rickshaws. Some students use bicycles. Institute encourages students to not to use automobiles.

6.3 Pedestrian Friendly Roads

The Institute has well defined pedestrian foot paths as to facilitate the easy movement of the students within the campus.

Photograph of Road within campus



6.4 Plastic Free Campus

The Institute is an active participant in the Government of India's most prestigious project of SWATCHH BHART ABHIYAN. The Institute has displayed boards in the Campus, to make the campus plastic free. Various measures adopted for this purpose are as follows

- Installation of Separate waste bins for Dry waste & wet waste
- Usage of paper tea cups in the Institute canteen
- Display of boards in the campus for Plastic Free campus

6.5 Paperless Office

The internal communication of the Institute is through the Internet. There are hardly any day to day operations, where printing is required.

7 Green Landscaping with Trees and Plants

The Institute has beautiful maintained Garden. The trees in college campus are as follows.

Table 7.1: Trees in college campus.

Sr no	Botanical Name	Comman Name	Total nos
1	Azadirachta Indica A. Juss	Kadunim	12
2	Aeglemormelos (L.) Corr	Bel	1
3	Millingtonia hortensis	Buch	9
4	Dentrocalamusstrictus (Roxb.) Nees	Mamboo	2
5	Terminalia catapa	Kadubadam	24
6	Acacia nilotica (L.) Wild ex. Delile	Subhabhul	12
7	Murrayakoenigii (L.) Spreng	Godnimbh	1
8	Roystonea regia O.F. Cook	Palm tree	53
9	Ficus religiosa	Pimple	6
10	Nerium Oleander L.	Kanher	11
11	Hibiscus rosa-sinensisL.	jaswand	2
12	Delonix regia	Gulmohor	6
13	Saraca asoca	Ashoka	11
14	Prunus duleis	Badam	3
15	Pilea peperomioides	Maniplant	4
16	Platyclusus Orientails	Vidhya	8
17	Mitragyna speciosa leaves	Krotams	14
18	LawsoniainermisL	Mehandi	1
19	Jasminum sambac	Batmogra	1
20	ficus racemosa	Umber	2
21		Octosus	2
22		Christmas	1
23	Dita bark	Saptparni	23
24		Kashid	16
25	Carica papaya	Papai	1
26	Ficus benghalensis	Wad	3
27		Munga	1
28		Tikoma	10
29	Dalbergia sissoo	Sisam	10



Figure 7.1: Beautiful maintained Garden of college

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The College has already adopted following projects for making the campus **Energy Efficient**.

- Installation of Bio Composting Pit
- Installation of Rain Water Harvesting System

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

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**Report
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At
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Acknowledgement

We at Nutan Urja Solutions, Pune wish to express our sincere gratitude to the management of Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) for assigning the work of Environmental Audit of college campus.

We appreciate the co-operation and support extended to our team members during the entire tenure of field study.

We are also thankful to various Head of Departments & other Staff members for helping us during the field measurements.

We are also thankful to all other staff members who helped us during the Measurements at the field and for giving us the necessary inputs to carry out this vital exercise.

Executive Summary

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the dependency on Natural resources & reduce the pollution.

Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) consumes various resources for day to day operations, namely: Air, Water, Electrical Energy & LPG.

1. Various Pollution due to College Activities:

- Air pollution: Mainly CO₂ on account of Electricity & LPG Consumption
- Solid Waste: Bio degradable Kitchen Waste, Garden Waste
- Liquid Waste: Human liquid waste

2. Present Level of CO₂ Emissions:

Sr no	Parameter	Energy consumed, (Units)	CO ₂ Emission (MT)
1	Maximum	1,982	1.6
2	Minimum	708	0.6
3	Average	1,215	1.0
4	Total	14,580	11.7

3. The various projects already implemented for Environmental Conservation:

- Usage of Energy Efficient BEE STAR Rated ACs
- Usage of Natural Day light in corridors
- Implementation of Bio Composting pit for disposal of Bio degradable waste
- Implementation of Rain Water Harvesting

4. Recommendations:

1. Installation of Bio Gas Generator Plant instead of Bio composting Plant.
2. Installation of Sewage treatment Plant to make campus a Zero Discharge campus

5. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.8 Kg of CO₂ into atmosphere
2. 1 kWp Solar PV plant generates 5 kWh/day Electrical Energy for 300 days in an year.

Abbreviations

AC	: Air conditioner
PES	: Progressive Education Society
CFL	: Compact Fluorescent Lamp
FTL	: Fluorescent Tube Light
LED	: Light Emitting Diode
kWh	: kilo-Watt Hour
Qty	: Quantity
W	: Watt
kW	: Kilo Watt
PF	: Power Factor
M D	: Maximum Demand
PC	: Personal Computer
MSEDCL	: Maharashtra State Electricity Distribution Company Ltd

1. Introduction

1.1 Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment"

1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Some Important Environmental Rules in India: Table No-2:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules

2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 National Environmental Plans & Policy Documents: Table No-3:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives

1. To study present usage of Natural resources the College is consuming
2. To Study the present pollution sources
3. To study various measures to make the campus Self sustainable in respect of Natural resources
4. To suggest the various measures to reduce the pollution: Air, Water, Noise

1.3 Audit Methodology:

1. Study of College as System
2. Study of Electrical Energy Consumption
3. Study of CO2 emissions
4. Suggestions on usage of Renewable Energy

1.4 General Details of College

No	Head	Particulars
1	Name of Institution	Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad)
2	Address	Karanja, Washim - 444105, At Post Karanja Lad Taluka Karanja District Washim
3	Affiliation	Sant Gadge Baba Amravati University, Amravati.

2. Study of Consumption of Various Resources

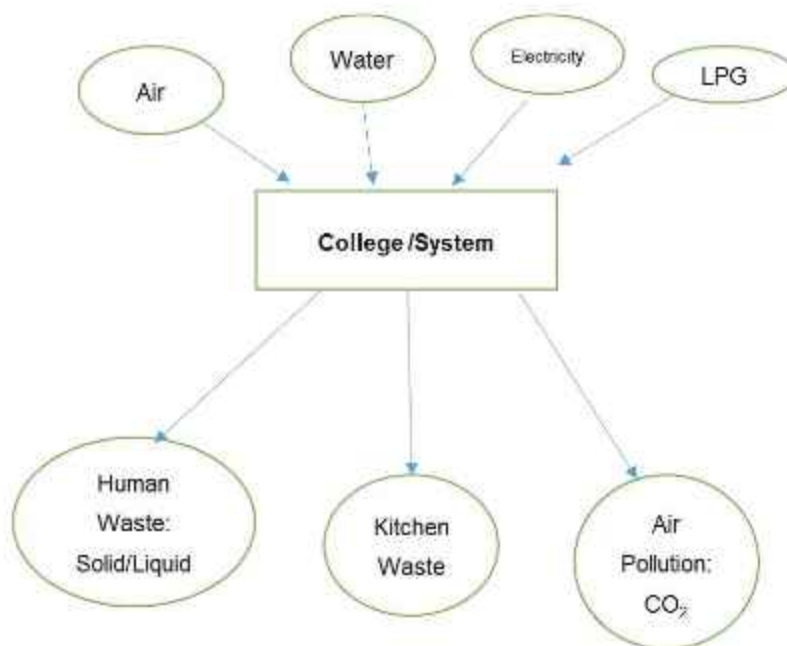
The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

Also, college emits following pollutants to environment

1. Human Waste: Solid/ Liquid
2. Kitchen waste
3. Air pollution

We try to draw a schematic diagram for the College System & Environment as under.



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy & LPG as under.

The calculation of electrical energy consumption by college can be given as,

Table 2.1: Electrical Energy Consumption

No	Month	Energy (kWh)
1	Jun-22	1,587
2	May-22	1,982
3	Apr-22	1,102
4	Mar-22	1,872
5	Feb-22	1,013
6	Jan-22	815
7	Dec-21	1,140
8	Nov-21	1,214
9	Oct-21	1,434
10	Sep-21	726
11	Aug-21	708
12	Jul-21	987
	Total	14580
	Maximum	1,982
	Minimum	708
	Average	1,215

2.1 Variation of Monthly Electrical Energy Consumption

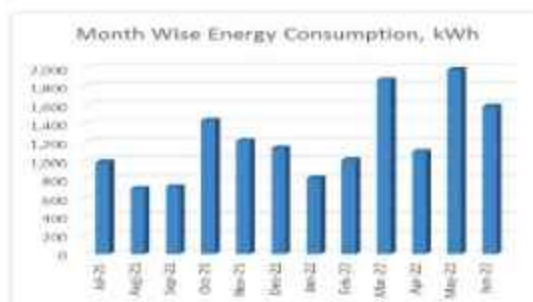


Figure 2.1 : Monthly Electrical Energy Consumption

2.2 Key Inference drawn

From the above analysis, we present following important parameters:

Table 2.2: Variation in Important Parameters

No	Parameter/ Value	Energy Consumed, kWh
1	Maximum	1,982
2	Minimum	708
3	Average	1,215
4	Total	14580

3. Study of Environmental Pollution

In this Chapter, we present the various types of Pollution as under:

3.1 Air Pollution

The College is using two forms of Energies, namely: Thermal in the form of LPG and Electrical Energy used for day to day operations of the College. The major pollutant on account of above Energy forms is the Carbon Di Oxide.

- 1 unit (kWh) of Electrical Energy emits 0.8 Kg of CO₂ in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO₂ in the atmosphere

In the following Table, we present the CO₂ emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO₂ Emissions:

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	Jun-22	1,587	1.27
2	May-22	1,982	1.59
3	Apr-22	1,102	0.88
4	Mar-22	1,872	1.50
5	Feb-22	1,013	0.81
6	Jan-22	815	0.65
7	Dec-21	1,140	0.91
8	Nov-21	1,214	0.97
9	Oct-21	1,434	1.15
10	Sep-21	726	0.58
11	Aug-21	708	0.57
12	Jul-21	987	0.79
	Total	14,580	11.66
	Maximum	1,982	1.6
	Minimum	708	0.6
	Average	1,215	1.0

In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

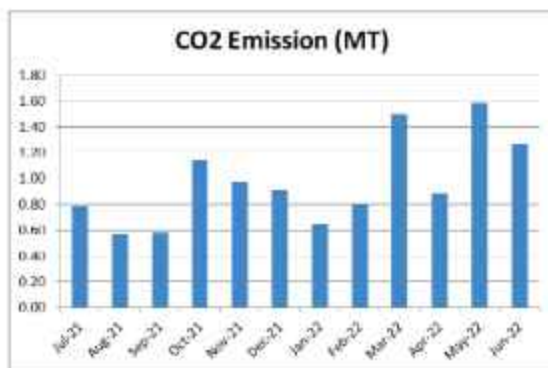


Figure 2.1: CO2 emission due to usage of electrical energy.

3.2 Study of Solid Waste Generation

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

3.3 Study of Liquid Waste Generation

At present the Liquid Waste generated due to day to day operations is drained off to the municipal Corporation through a pipe.

3.4 Study of e-Waste Management:

The internal communication is through emails and there is hardly any generation of e-Waste in the premises.

4. Study of Rain Water Harvesting

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is fed to underground Water Storage tank. This stored water is then reused for domestic purpose.

Photograph of Rain Water Harvesting Pipe:



5. Recommendations

In order to reduce the dependency on Natural resources and also in order to reduce the various pollutions arising due to the day to day operations of the College we herewith recommend following recommendations.

- Installation of Bio Gas Generator Plant instead of Bio composting Plant.
- Installation of Sewage treatment Plant to make campus a Zero Discharge campus

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,
Sus Road, Sus, Pune 411 021

Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

Date: 13/09/2021

CERTIFICATE

This is to certify that we have conducted Energy Audit at Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) as per the guidelines of Maharashtra Energy Development Agency (www.mahaurja.com) in the year 2021-22.

The College has already adopted **Energy Efficient** practices like:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

Nutan Urja Solutions,

K G Bhatwadekar,

Certified Energy Auditor,

EA - 22428

**Report
On
Energy Audit
At
Shri. Kisanlal Nathmal Goenka Arts & Commerce College
Karanja (Lad)**



Prepared by
Nutan Urja Solutions
A 703, Balaji Witefield, Near Sunni's World,
Sus Road, Sus, Pune 411 021
Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

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Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad) for awarding us the assignment of Energy Audit of their college premises.

We are also thankful to various Head of Departments & other Staff members for helping us during the field measurements.

We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures through energy savings. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.

Executive Summary

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the Energy Consumption & mitigate the CO₂ emissions. College consumes Energy in the form of Electrical Energy used for various gadgets, Office & other facilities.

1. Present Energy Consumption

In the following Table, we present the details of Energy Consumption.

Table no 2.1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO₂ Emission (MT)
1	Maximum	1,982	1.6
2	Minimum	708	0.6
3	Average	1,215	1.0
4	Total	14,580	11.7

2. Energy Conservation Projects already installed

1. Usage of STAR Rated ACs at new installations
2. Usage of LED lights at some indoor locations
3. Usage of LED Lights for outdoor lighting.

3. Key Observations

1. Usage of LED lights.
2. Usage of star rated equipment.
3. Maintained a good power factor.
4. There are 1 Nos, 1.5 TR Old ACs which need to be replaced with STAR Rated ACs.

4. Percentage of Usage of LED Lighting

The College has various Types of Light fittings, namely: LED tubes, LED flood lights and LED tubes. Usage to Annual Lighting requirement works out to be 100 %.

5. Recommendations

Table no 1: Recommendations for energy savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 94 Nos Old Ceiling Fans with STAR rating fans	1,222	13,442	204,356	182
2	Replacement of 1 Nos Old 1.5 TR Acs with STAR rating Acs	1,000	11,000	52,875	58
3	Installation of 5kW grid connected PV panel	7,500	82,500	250,000	36
	Total	9,722	106,942	507,231	57

6 Notes & Assumptions

1. Daily working hours-10 Nos
2. Annual working Days-300 Nos
3. Average Rate of Electrical Energy : **Rs 11/- per kWh**

Abbreviations

CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
kVA	:	Active Power

1. Introduction

Kisanlal Nathmal arts and commerce Karanja was established in 1961 on the land generously donated by Kisanlal Nathmal Goenka . It is run by the Berar general education society Akola. It is situated in a rural area.

The College, definitely, has promoted research activities. As a result many of the teachers have acquired the Doctoral degree in the respective areas. Environmental concern has been another task of the college. Regular teaching of environmental studies is the salient feature of the college curriculum.

1.1 Objectives

1. To study present level of Energy Consumption
2. To Study Electrical Consumption
3. To assess the various equipment/facilities from Energy efficiency aspect
4. To study various measures to reduce the Energy Consumption

1.2 Audit Methodology:

1. Study of connected load
2. Study of various Electrical parameters
3. To prepare the Report with various Encon measures with payback analysis

1.3 General Details of College

Table No-1.1: Details of college

No	Head	Particulars
1	Name of Institution	Shri. Kisanlal Nathmal Goenka Arts & Commerce College Karanja (Lad)
2	Address	Karanja, Washim - 444105, At Post Karanja Lad Taluka Karanja District Washim
3	Affiliation	Sant Gadge Baba Amravati University, Amravati.

2. Study of connected load

In this chapter, we present details of various connected electrical equipment and electrical load.

Table No-2.1: Location wise study of Electrical fittings in various buildings

No	Location	LED tube (20W)	LED bulb (12W)	Fans	Computers (65W)	1.5TR Star rated AC	1.5TR old ACs
1	Open University	1	5	1			
2	Security Guard Room	2					
3	NRC hall		5	12			
4	Room no 1		2	3			
5	Room no 2		1	3			
6	Room no 3		1	1			
7	Room no 4		1	2			
8	Room no 5	1		4			
9	Room no 101			4			
10	Room no 102		1	2			
11	Room no 103			1			
12	Room no 104			2			
13	Room no 105			5			
14	Marathi Department		2	1	1		
15	English Department		1	1	6		
16	Reading hall	8	4	6			
17	Library	4	1	4	4		
18	Library Storage 1	3	1	2			
19	Library Storage 2	2	2	2			
20	Library Veranda		4				
21	Office Veranda	2	0				

22	Office	12	3	6	6		
23	PrincipalCabin	8	3	4	1	1	1
24	Staff Room		4	2			
25	History and Eco Department		3	2	2		
26	Hostel Outside	2	2				
27	Auditoriam hall	6	1	6			
28	Computer lab	7		6	17		
29	Commerce department		2	2	1		
30	Science Building	2					
31	Physics Department	3	2	2			
32	Home Economics Department	3	2	3			
33	Science lab staff	1		1			
34	Physics lab	3		1			
35	Biology lab	3		1			
36	Chemistry lab	4		1			
37	Main Gate		2				
38	Consumer store		1	1			
	Total	77	56	94	38	1	1

Apart from above load, the school has pumps, LED street lights on streets and grounds. Individual fitting wise load is as under.

Table No 2.2: Equipment wise Connected Load

No	Equipment	Qty	Load, W/Unit	Load, kW
1	Ceiling Fan	94	65	6.1
2	AC-Old (1.5 Tr)	1	2200	2.2
3	AC-New (1.5 TR)	1	1838	1.8
4	LED-20W	77	20	1.5
5	LEDBulb	56	12	0.7
6	Computers	38	65	2.5
7	Pump (1.5HP)			1.1
8	LED street lights (100W)	4	100	0.4
9	LED street lights (50W)	5	50	0.3
	Total			16.6

Data can be represented in terms of PIE chart as under,

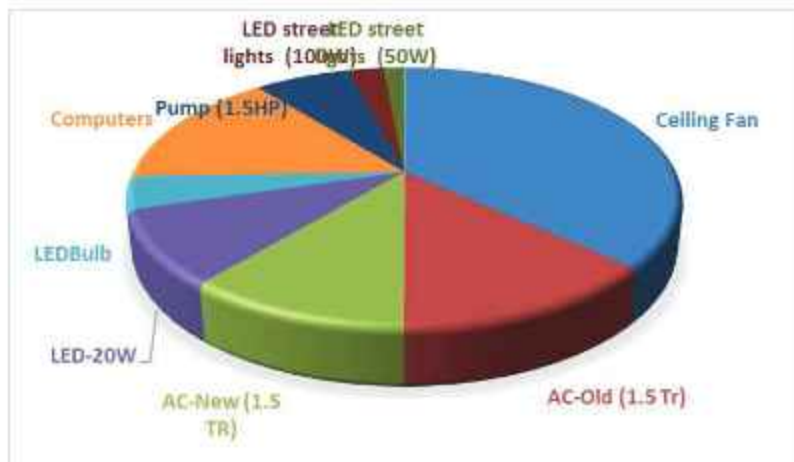


Figure 2.1: Distribution of connected load.

3. Study of Electrical Energy Consumption

In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table no 3.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	Jun-22	1,587	13,430
2	May-22	1,982	14,850
3	Apr-22	1,102	7,830
4	Mar-22	1,872	14,350
5	Feb-22	1,013	14,140
6	Jan-22	815	6,320
7	Dec-21	1,140	8,400
8	Nov-21	1,214	20,190
9	Oct-21	1,434	10,860
10	Sep-21	726	11,290
11	Aug-21	708	5,544
12	Jul-21	987	7,558
	Total	14580	134,762

Variation in energy consumption is as follows,

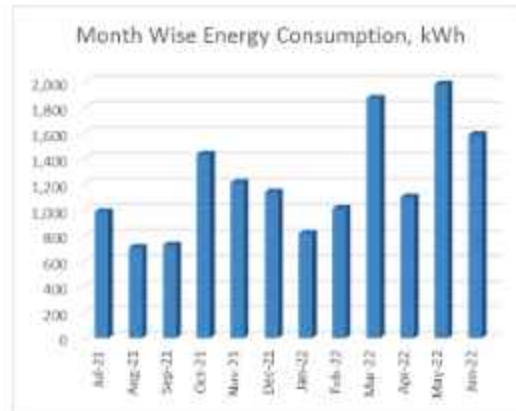


Figure 3.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

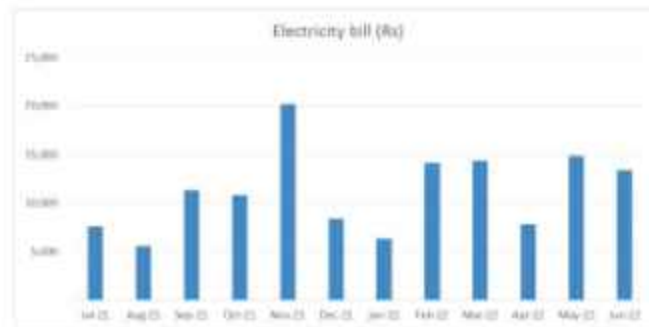


Figure 3.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 3.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	1,982	1.6
2	Minimum	708	0.6
3	Average	1,215	1.0
4	Total	14,580	11.7

4. Carbon Foot printing

1. A **Carbon Foot print** is defined as the Total Greenhouse Gas emissions (CO₂ emissions), emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

2. Basis for computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy is as under

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO₂** into atmosphere.

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

We herewith furnish the details of various forms of Energy consumption as under

Table 4.1: Month wise Consumption of Electrical Energy & CO₂ Emissions

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Jun-22	1,587	1.27
2	May-22	1,982	1.59
3	Apr-22	1,102	0.88
4	Mar-22	1,872	1.50
5	Feb-22	1,013	0.81
6	Jan-22	815	0.65
7	Dec-21	1,140	0.91
8	Nov-21	1,214	0.97
9	Oct-21	1,434	1.15
10	Sep-21	726	0.58
11	Aug-21	708	0.57
12	Jul-21	987	0.79
	Total	14,580	11.66

In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

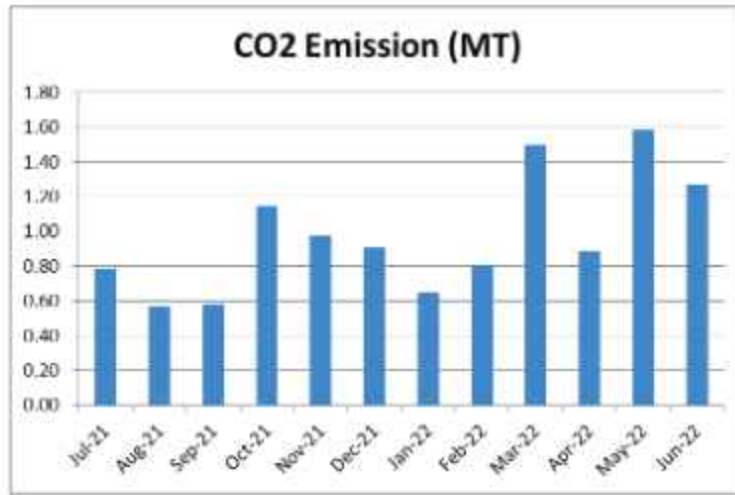


Figure 4.1: Month wise CO2 Emission

5. Study of utilities

5.1 Study of Lighting

In the facility, the lighting system can be divided mainly in to parts, indoor lighting and outdoor lighting. There are 56 LED bulbs and 77 LED tubes in indoor lighting. There are 9 No of LED street lights.

5.2 Air-conditioners

In the facility, there are about 01 Nos. of 1.5 Tr old Air-conditioners. It is recommended to replace these Old ACs with BEE STAR Rated ACs. There is 1 star rated new AC of 1.5Tr capacity.

5.3 Ceiling Fans

At building facility, there are about 94 Nos Old Ceiling Fans, which consumed about 65 W of Electrical Energy. It is recommended to replace these old Fans with BEE STAR Rated Ceiling Fans.

5.4 Water Pumps

There are in total 1 Water pumps with 1.5HP capacity.

6. Study of usage of LED lighting

In this chapter we study the lighting system of college and compute the percentage of total load catered by LED lighting.

Table 7.1: Total lighting load

No	Particulars	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	0	40	0
	LED lighting load			
1	LED tube	77	20	1.54
2	LED bulb	56	12	0.672
3	LED street lights (100W)	4	100	0.4
4	LED street lights (50W)	5	50	0.25
	Total LED lighting load			2.862
	Total Lighting load			2.862

It can be seen that out of total lighting load 100% load is LED lighting load.

7. Energy conservation proposals

7.1 Replacement of old fans with STAR Rated fans

During the Audit, it was observed that there are 94 no of fans. It is recommended to replace these old fans with STAR Rated fans.

In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of Old Ceiling Fan fittings	94	Nos
2	Energy Demand of Old Ceiling Fan fitting	65	W/Unit
3	Energy Demand of STAR Rated Fan	52	W/Unit
4	Reduction in demad	13	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	4.888	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	1222	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	13442	Rs/Annum
11	Cost of STAR Rated Ceiling Fan	2174	Rs/unit
12	Investment required	204356	Rs lump sum
13	Simple Payback period	182	Months

7.2 Replacement of 1.5 TR Old ACs with STAR Rated ACs

During the Audit, it was observed that there are 1 Nos, of 1.5 TR old ACs. It is recommended to replace these old ACs with STAR Rated ACs.

In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of 1.5 TR Old ACs	1	Nos
2	Energy Demand of Old 1.5 TR AC	2.15	kW/Unit
3	Energy Demand of New AC	1.15	kW/Unit
4	Reduction in demad	1	kW/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	4	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	1000	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	11000	Rs/Annum
11	Cost of STAR Rated 1.5 TR AC	52875	Rs/unit
12	Investment required	52875	Rs lump sum
13	Simple Payback period	58	Months

7.3 Installation of 1 kW Solar PV panel

It is recommended to install 5kW solar PV panel. In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Installation of 5kW PV unit	5	kW
2	Energy saving	7500	kWh/Annum
3	Rate of electrical energy	11	Rs
4	Annual monetary savings	82500	Rs/ Annum
5	Investment required	250000	Rs lump sum
6	Simple payback period	36	Months

7.4 Summary of Savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 94 Nos Old Ceiling Fans with STAR rating fans	1,222	13,442	204,356	182
2	Replacement of 1 Nos Old 1.5 TR Acs with STAR rating Acs	1,000	11,000	52,875	58
3	Installation of 5kW grid connected PV panel	7,500	82,500	250,000	36
	Total	9,722	106,942	507,231	57

CCTV CAMPUS AREA



CCTV CAMPUS AREA Use of LED bulbs/Power efficient Equipment



SOLAR ENERGY



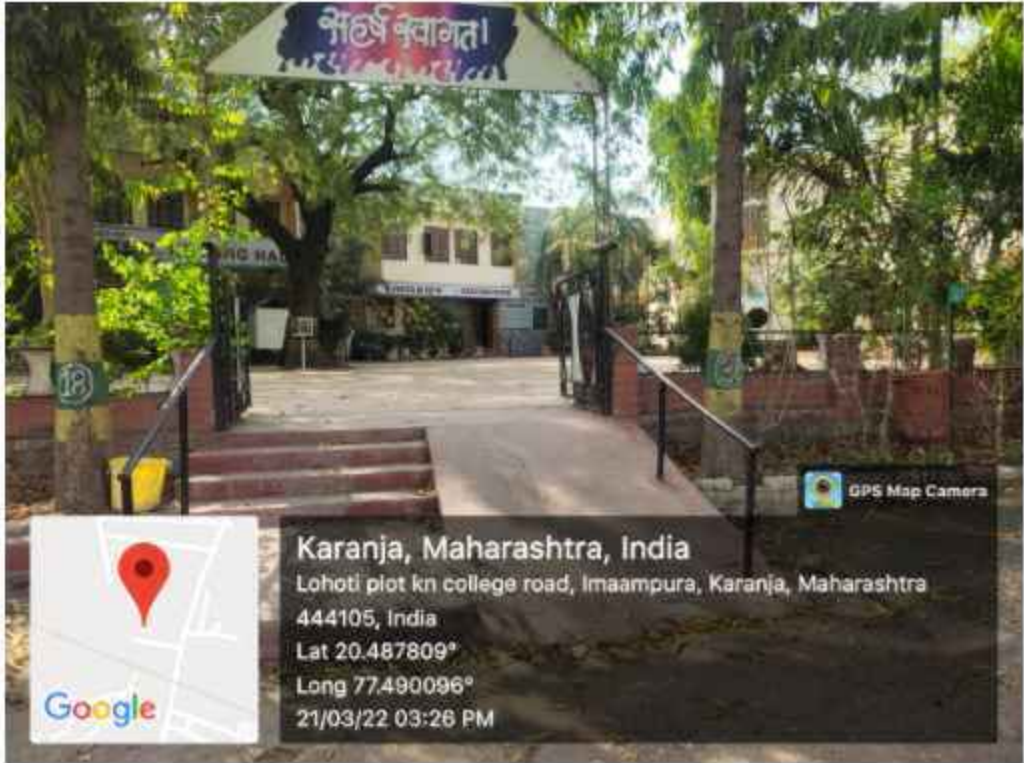
Water conservation facilities available in the Institution



Green campus Initiatives include









The Institution has disabled-friendly, barrier free environment
Built environment with ramps/lifts for easy access to classrooms.





Officiating Principal
Shri H. N. Goenka College
Karanja Lad