7.1.6 Quality audits on environment and energy are regularly undertaken by the institution

Aditya College of Engineering has adopted eco-friendly environment and it has taken initiatives to environment and energy audit regularly by the Godavari Eco Welfare Association along with the College ECO Club. The institute committed to utilize solar power plants for providing alternative sources of energy. The institute met **56%** of its total requirement of power consumption by the institute from renewable sources. The institute also participated in Swachhta ranking awards conducted by MHRD, AICTE 2019 and got 98 points out of 100.The institute also got the certificate from ISO 9001. The Institute organized many activities related to clean and green, village adoption under swachh bharat and environment promotional activities by the various committees under NSS, ECO Club and Leadership Foundation.

Green audit	Energy audit	Environment audit	Clean and green campus recognitions/awards	Beyond the campus environmental promotional activities
Yes	Yes	Yes	Yes	Yes

S.No	Proof of Documents
1	Green audit
2	Energy audit
3	Environment audit
4	Clean and green campus recognitions/awards
5	Beyond the campus environmental promotional activities

ADITYA COLLEGE OF ENGINEERING • SURAMPALEM •

PRINCIPAL

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Aditya College of Engineering
SURAMPALEM-533 437

GREEN AUDIT REPORT

2019-2020

ADITYA COLLEGE OF ENGINEERING (ACoE)

ADITYA COLLEGE OF ENGINEERING
AICTE NAAC JNTUK

Prepared BY

Global Green Solutionz
Greening the globe

Global Green Solutionz
509, Block A, Emerald Heights, Annojiguda, Hyderabad-500088
Tel: +91-7331134789; Email: globalgreensolutionz@gmail.com

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Acknowledgement

Global Green Solutionz (GGS) is thankful to the management and staff of Aditya College of Engineering for awarding Green Audit for their college at Surampalem, East Godavari, Andhra Pradesh.

The Study team members of Global Green Solutionz would sincerely like to thank all the Department Heads and support staff members of Aditya College of Engineering for providing the necessary support in order complete the green audit.

For Global Green Solutionz.

Srikanth Meesa

INTRODUCTION

The term “Green” means eco-friendly or not damaging the environment. This can acronymic ally is called as “Global Readiness in Ensuring Ecological Neutrality” (GREEN). Green audit was initiated in the beginning of 1970s with the motive of inspecting the work conducted with in the organizations whose exercises can cause risks to the health of inhabitants and the environment. It exposes the authenticity of the proclamations made by multi-national companies, armies and national governments with the concern of health issues as the consequence of environmental pollution Green Audit is one of the systematic audits to assess the impact of the institutions on the environment with respect to land, air, water, solid waste, noise etc. In order to conduct the green audit a systematic identification, recording, reporting and analysis is essential. The objective is to analyze environmental practices within and outside of the concerned facilities, which will have an impact on the eco-friendly ambience. Green audit is one of the useful tools for a college to determine how and where they are using the vital resources such as energy, water etc. Thus, it provides the opportunity to identify the potential options to conserve these precious natural resources. the college can then consider how to implement changes and make savings. It also includes the determination of various types of wastes and how to manage them effectively without polluting the environment. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding and encourages them to cultivate the green practices in the campus. It is the need of the hour for the colleges to evaluate its own contributions toward a sustainable future. Environmental sustainability has become one of the pressing issues for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological impacts. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric carbon-di-oxide from the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report.

OBJECTIVES:

The main objective of the green audit is to promote the Environment Management and Conservation in the College Campus. In recent time, the Green Audit of an institution has been becoming a paramount important for self-assessment of the institution which reflects the role of the institution in mitigating the present environmental problems. The college has been putting efforts to keep our environment clean since its inception. But the auditing of this non-scholastic effort of the college has not been documented. Therefore, the purpose of the present green audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards.

The main objectives of carrying out Green Audit are:

- To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use of the campus
- To map the Geographical Location of the college
- To record the meteorological parameter of Surrepalem where college is situated.
- To estimate the Energy and water requirements of the college
- To document the Waste disposal system
- To document the ambient environmental condition of air, water and noise of the college
- To introduce and aware students to real concerns of environment and its Sustainability.

METHODOLOGY:

It is the duty of the originations to carry out the green audits of their on-going process for various reasons such as; to make sure whether they are performing in accordance with relevant rules and regulations, to improve the procedure and ability of materials, to analyze the potential duties and to determine a way in which can lower the costs and add to the revenue. Through, green audit, one gets a direction as to how to improve the condition of the environment and there are various factors that have determined the growth of carrying the green audit.

Green audit is assigned to the criteria 7 of NAAC, National Assessment and Accreditation council which is a self-governing organization of India that declares institutions as Grade A, Grade B and Grade C, according to the scores assigned at the time of accreditation.

The Intention of Green Audit is to upgrade the environment condition in and around the institutes, colleges, companies and other organizations. It is carried out with the aid of performing tasks like waste management, energy saving and others to turn it into better environmentally friendly institute.

Step Under Green Audit:

- **Plan the audit:** Green auditing was scheduled during the month of February 2020.
- **Select the audit team:** ACoE has hired Global Green Solutionz (GGS) to conduct the green audit. GGS has appointed a is well qualified team that has good knowledge in the field of environment.
- **Schedule the audit facility:** The audit facility is the ACoE campus including the connected hostels.
- **Acquire the background information:** GGS team has interviewed the appointed green audit coordinators from ACoE college. They have submitted the relevant data related to landscaping, built up area, energy and water related data which are part of the report.

Benefits of Green Audit:

- To Shield the environment
- To recognize the cost saving methods through waste minimizing and managing
- To point out the prevailing and forthcoming complications
- Authenticate conformity with implemented laws
- Empower the organizations to frame the better environmental performance
- It portrays the good image of the institution which helps building better relationships with group of stakeholders

ABOUT THE COLLEGE

Aditya College of Engineering, was founded as the premier promoter of quality education in coastal districts of Andhra Pradesh in 2008 under Sarojini Educational Society. Sri N Sesha Reddy, as a founder chairman, promoted the educational institution, with a mission, to offer the best engineering education with unmatched innovations in the process of teaching and learning by aiming at the all-round development of the students.

The College is situated in an eco-friendly area of 11.27 acres with thick greenery at Surampalem, Gandepalli Mandal, East Godavari District, Andhra Pradesh. The College is 15 KM away from Samalkot Railway Station on Howrah-Chennai Railway line in South Central Railway. The College is 35 Km away from Kakinada and Rajahmundry on ADB Road.
The College has Four academic blocks with a total carpet area of 22,183 Sq. Mts. apart from one boys hostel and one girls hostel buildings. The particulars of academic buildings and the departments / offices accommodated are as follows.

S.No	Building Name	Department/Office
1	Srinivasa Ramanujan Bhavan	Administrative Office, Examination Cell, Accounts, Admission Office, ECE, CSE, H&BS, Management Sciences
2	Newton Bhavan	Electrical and Electronics Engineering, Petroleum Technology
3	James watt Bhavan	Civil & Mechanical
4	Mechanical Block	Labs related to Mechanical Engineering

The college proudly offers 6 Under Graduate (B.Tech.) and 4 Post Graduate programmes in Engineering (M.Tech.) and MBA with 12 years of rich standing in the educational era. Besides, the college has added many feathers in its cap which include Ranked 44th India's top 50 Engineering Colleges Ranking 2020 in *The Academic Insights, Achieves National Rank Band 51-75 in ARIIA, AAA Grade by Careers 360, Ranked 146 as per Times Engineering Rankings in India 2020, Ranked 29th among top 100 Engineering Colleges in India 2020 by Silicon India, Ranked 85th South Zone & Ranked 145 All India in The Week Survey.*

These distinct recognitions speak volumes of the institute's objective to promote engineering excellence. The total student strength is 2600 with faculty strength of 198 thus giving rise to healthy faculty student ratio.

It is approved by AICTE, recognized by Govt. of Andhra Pradesh, permanently affiliated to Jawaharlal Nehru Technological University Kakinada (JNTUK). The college also received UGC recognition under Sections 2(f) and 12 (B) of the UGC Act.

Aditya College of Engineering will do its best to offer an innovative environment wherein your dreams will be realized: dreams for higher knowledge, dreams for scientific inquiry, dreams for technology creation, dreams for co-curricular activities, and dreams to change the world.

Under Graduate Courses:

- B.Tech Civil engineering
- B.Tech Electrical and Electronics Engineering
- B.Tech Mechanical Engineering
- B.Tech Electronics and Communication Engineering
- B.Tech Computer Science and Engineering
- B.Tech Petroleum Technology

Post Graduate Courses:

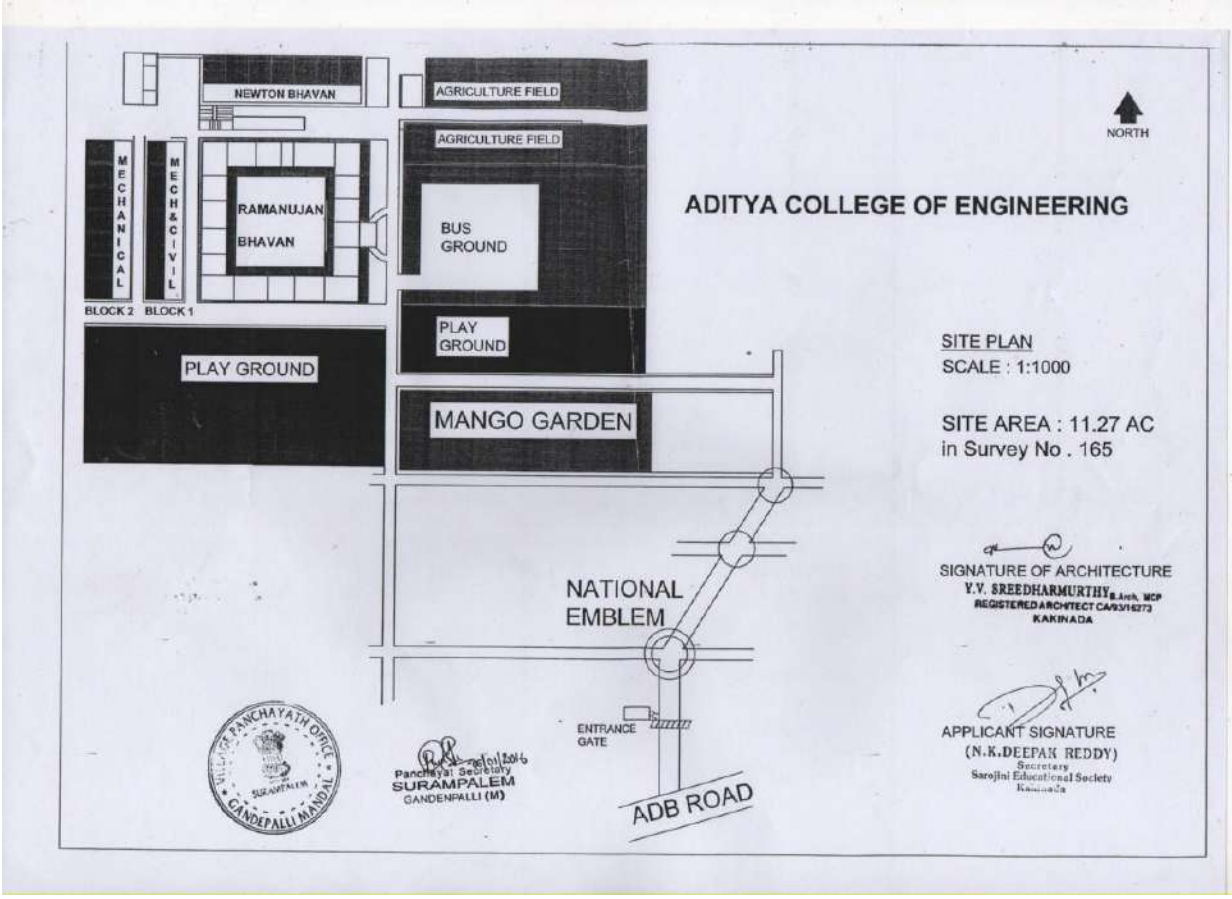
- M.Tech VLSI Design
- M.Tech Embedded Systems
- M.Tech Computer Science & Engineering
- M.Tech Power Electronics & Drives
- M.B.A Master of Business Administration

LAND USE ANALYSIS, ACoE COLLEGE, SURAMPALEM, ANDHARA PARADESH (As on February 2020)

GENERAL OVERVIEW OF THE CONCEPT OF LANDUSE:

Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods. It refers the activities and the various uses which are carried on and derived from land. Viewing the earth from space, it is now very crucial in man's activities on natural resource. In situations of rapid changes in land use, observations of the Earth from space give the information of human activities and utilization of the landscape (Howarth 1981).

The collection of remotely sensed data facilitates the synoptic analyses of earth system, functions, patterning, and change in the local, regional as well as at global scales over time. Satellite imagery particularly is a valuable tool for generating land use map using google maps.



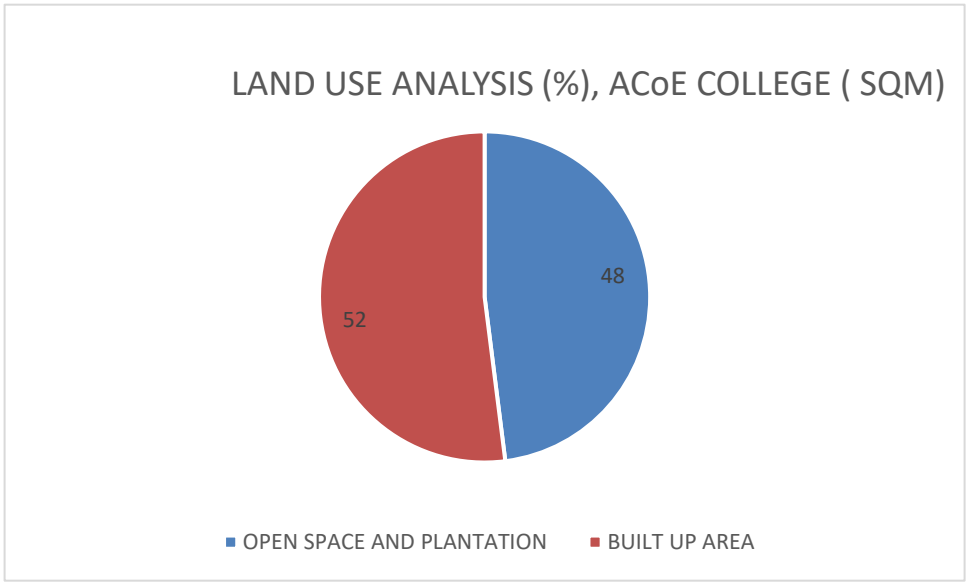
Site layout map of Aditya College of Engineering (ACOE)

METHODOLOGY ADOPTED FOR LAND USE MAPPING

Three types of data that are GPS points, field survey data and Google earth data for Georeferencing have been used in this study. Land use map of the study area have been prepared using the above three types of data with the help of google maps.

LAND USE DATA OF ACoE COLLEGE, ACoE, Surampalem

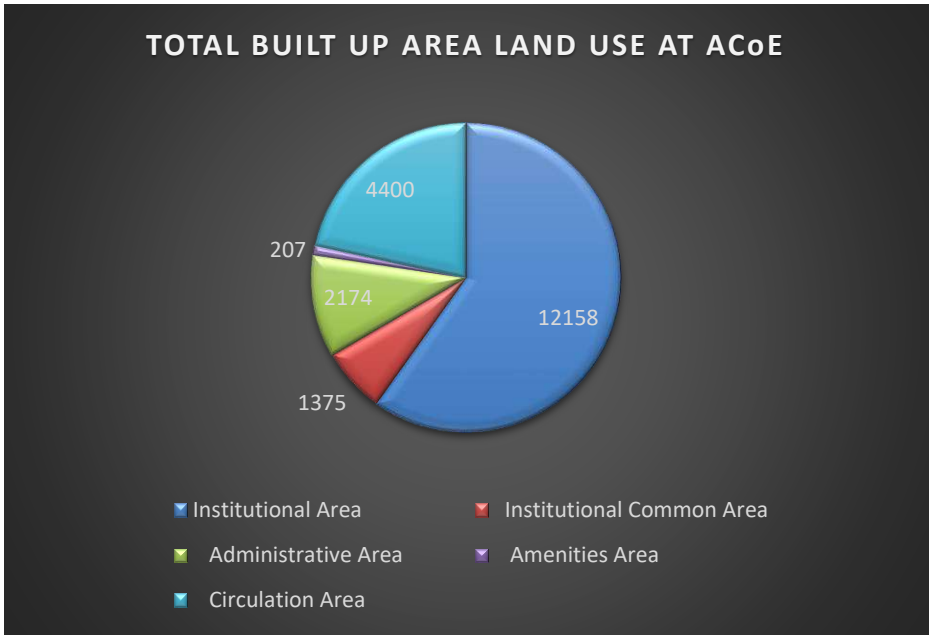
CATEGORIES OF LAND USE	AREA IN SQ METRES
OPEN SPACE AND PLANTATION	16186
BUILT UP AREA	22183
TOTAL AREA	33369



The total area of ACoE College is 33,369 sq. meters out of which the built-up area is 52% (i.e., 22183 sq. meters) and open space & plantation area is 48% (i.e., 16186 sq. meters).

LAND USE (BUILT UP AREA) ANALYSIS:

CATEGORIES OF LAND USE (BUILT UP AREA)	AREA IN SQ METRES
Institutional Area	12158
Institutional Common Area	1375
Administrative Area	2174
Amenities Area	207
Circulation Area	4400
TOTAL AREA	**22183**



The institutional area sums up to 12158 sq. meters, followed by institutional common area is 1375 sq. meters. Administrative Area is 2174 sq. meters. The amenities occupy about 207 sq, meters and circulation area is about 4400 sq. meters.

ACoE College, which was established in the year 2008, has an eco-friendly environment. It has a long legacy of healthy environmental practices including periodic plantation, their preservation and maintenance. Its land use is such that about 42 % of the total area is occupied by open land and plantation that generates a better and sustainable campus environment.

TREE DIVERSITY OF ACoE COLLEGE, Surampalem

ACoE College is within the geo-position between latitude 17.0895° N, and longitude 82.0668° E at Surampalem, 30 Km from Kakinada city India. It encompasses an area of about 180 acres of greenery in Surampalem. The area is immensely diverse with a variety of tree species performing a variety of functions. Most of these tree species are planted in different periods of time through various plantation programmes organized by the college management and have become an integral part of the college.

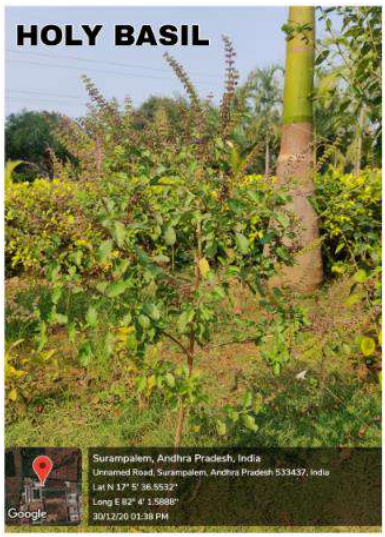
The trees of the college have increased the quality of life, not only the college fraternity but also the people around of the college in terms of contributing to our environment by providing oxygen, improving air quality, climate amelioration, conservation of water, preserving soil, controlling climate by moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool in summer. We often make an emotional connection with these trees and sometime become personally attached to the ones that we see every day. Thus, the college has been playing a significant role in maintaining the environment and its surrounding areas.

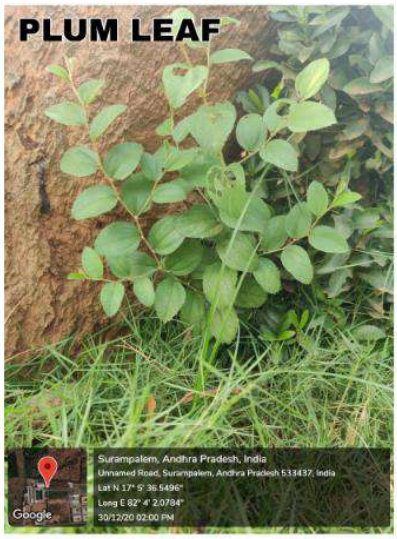
ACOE campus is having total green area of **16,186 m^2**

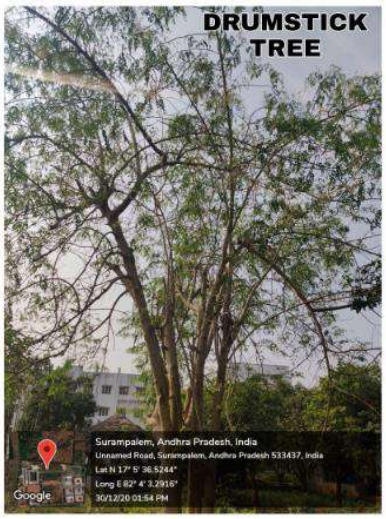
S.No.	component	Area in m^2
1	Lawn	6000
2	Tree cover	4000
3	Potted plants	2186
4	Shrubs and hedges	4000

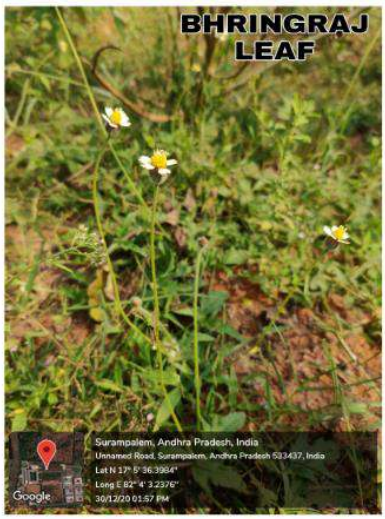
Below stated information is provided by the college management team:

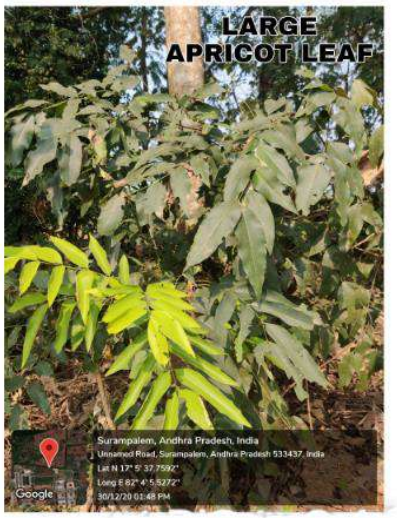
- Totally 25 crotams plants, 19 flower plants, and 49 herbal plants are there in campus
- ACoE campus has Herbal Garden on 1000 square meter area. The garden has different sections in which specific types of plants are planted with respect to their medicinal importance and Vedic reference. Boards are displayed for each section and plants names. Sprinkler system is provided in herbal garden.
- Large trees and potted plants were seen in the campus. Plantation improves aesthetics and helps as buffer in reducing noise level, maintaining temperatures of the area. As informed by the garden supervisor, around 80 trees are present in the campus.
- Garden is managed by gardener. Organic fertilizers and pesticides are used for plants if necessary.









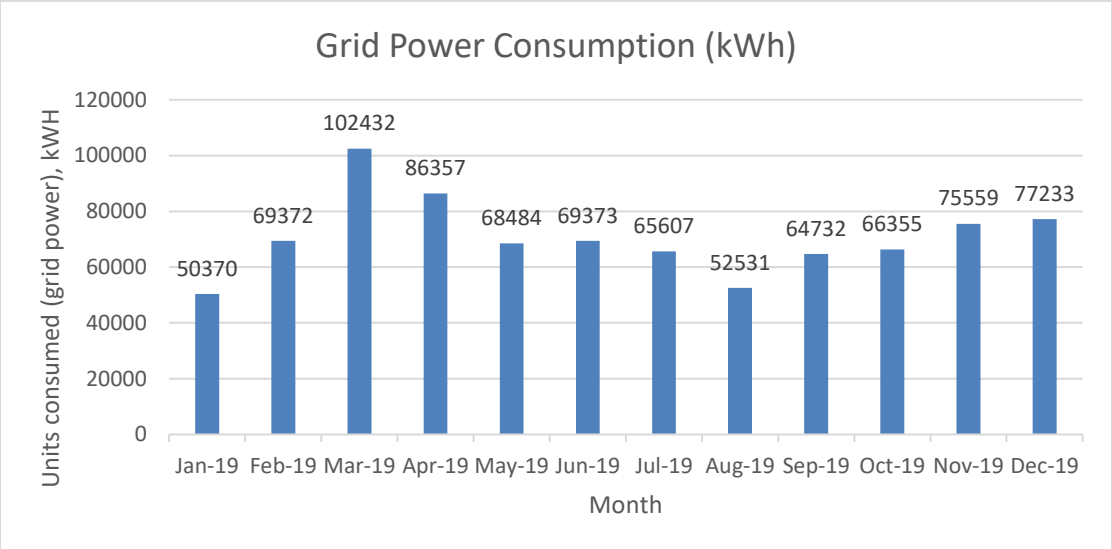


ELECTRICAL POWER CONSUMPTION AT ACoE COLLEGE

Total Energy consumption: At ACoE College, being one of the reputed colleges in the Andhra Pradesh consumes on an average 100,564.25 kWh (units) of electricity per month which turns out to be 1206771 kwh per year only to maintain its volumetric activities throughout the year. 512008 kwh of this power is produced by the solar power plants. In terms of percentage, this solar power generation is almost 43%.

S.NO	MONTH	APSEB CONSUMED UNITS (A)	BILL UNITS	BILL AMOUNT	SOLAR EXPORT UNITS (B)	PRESENT SOLAR GENERATE UNITS (D)	COLLEGE SOLAR CONSUMPTION E= (D-B)	TOTAL COLLEGE UNITS CONSUMPTION (A+E)	RMD KVA	BILL KVA
1	Jan-19	50370	33341	368381	17029	48111	31082	81452	196	240
2	Feb-19	69372	49424	524668	19948	53586	33638	103010	253	253
3	Mar-19	102432	92045	876038	10387	49079	38692	141124	284	284
4	Apr-19	86357	74810	737567	11547	36254	24707	111064	286	286
5	May-19	68484	48762	520722	19722	48632	28910	97394	260	260
6	Jun-19	69373	59071	590080	10303	34519	24216	93589	237	240
7	Jul-19	65607	58880	585343	6727	19902	13175	78782	241	241
8	Aug-19	52531	53943	476508	8589	48401	39812	92343	260	260
9	Sep-19	64732	62107	634070	2626	35780	33154	97886	298	298
10	Oct-19	66355	55186	581083	11170	41855	30685	97040	291	291
11	Nov-19	75559	58052	585397	17508	52656	35148	110707	241	241
12	Dec-19	77233	59148	592707	18086	43233	25147	102380	240	240
		848405	**704769**	**7072564**	**153642**	512008	**358366**	**1206771**		

Variation in the grid power consumption per month is provided in the below graph:



Renewable energy: There is a Rooftop solar PV System of 300 KW capacity has been installed to cater to the energy needs of the college.

WEATHER DATA OF Kakinada: ACoE COLLEGE

Table 1: Month-wise weather data of Kakinada City (30 Km from Surampalem ACoE) For the year 2020

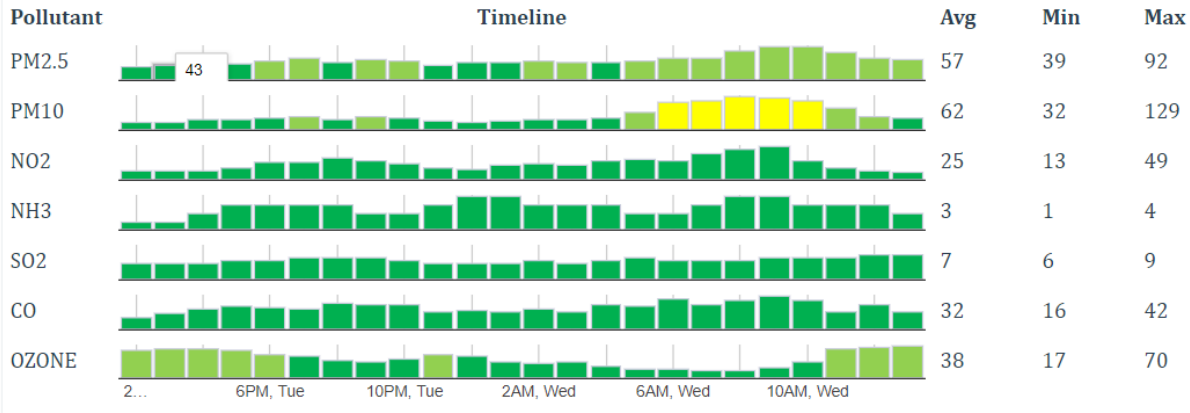
Month	Max Temp (C^0)	Min Temp (C^0)	Precipitation (mm)
January	34.6	20.3	12.6
February	37.8	21.7	10.3
March	40.0	24	7.5
April	42.8	26.2	16.4
May	46.9	27.8	42.3
June	47.4	27.3	122.8
July	41.7	26.2	175.4
August	38.4	25.9	176.9
September	37.9	25.9	199.4
October	37	24.8	243.
November	35.9	22.5	98.8
December	34	20.3	10.7

From the above table, it is evident the temperature is high in the month of June and low in the month of December. The rain fall is high during the month of September and low in the month of February.

AIR QUALITY IN KAKINADA: ACoE COLLEGE

The climate of ACoE college campus located at Surampalem near Kakinada city outskirts. It was noticed the college is away from the bustling city Kakinada and the campus is fully green with many trees and plantations.

Air Quality determination
Satisfactory: Air quality index (OVERALL 62) in **Rajamahendravaram weather station (34 km from Surampalem), India**



The air quality index is found 62 as per the publicly available data for the month February 2020. This air quality index indicates that the air quality of the site is satisfactory.

Indoor Air Quality:

The interviews with the college staff have revealed the below:

- During day- time Air Quality Index (AQI) of 45-60 because of campus greenery
- In kitchens present in Cafeteria, LPG is used for cooking which is a clean fuel.
- In classrooms the mode of ventilation is natural draft (through windows) and is enhanced by fans. Large windows and cross-ventilation are observed in corridors. Air conditioners are used in some offices, computer laboratories and computer server room.
- Exhaust fans are provided in chemistry laboratory and all kitchens.

WATER ANALYSIS REPORT OF ACoE COLLEGE

ACoE consumes the ground water which is stored in the sumps. This bore water is again treated using the Reverse Osmosis (RO) to ensure the good quality of treated water with less TDS. This water is consumed by the staff and the students. In order to cater to drinking water and other lab related water requirements, a 1000 Liters per hour of Reverse Osmosis plant to installed. It has a 20 KLD sump to cater to the water needs of the ACoE. It was noticed the RO plant is working well.

Green audit team noticed that the drinking water quality was found good and potable.

Green audit team has noticed that there is a water harvesting pit where the RO reject is used to recharge the ground water. Approximately 40% of the water entering the RO water gets rejected which is used to recharge the ground water.

Wastewater: Wastewater is mainly generated from toilet flushing and kitchens. Wastewater generated from academic blocks as well as hostels is collected in septic tanks and passed to surrounding trees and plants through canals.

The rainwater is fed into the surface pond nearby the college. The picture of the pond is provided below.

The pond water is used for gardening needs of the college.

NOISE LEVEL IN THE SURROUNDING OF ACoE COLLEGE

Our site visit observations, revealed that the noise levels were found satisfactory and within the permissible limits.

WASTE MANAGEMENT AT ACoE COLLEGE

Management of solid waste is an important driver in Green Audit. Solid waste not properly managed leads to the degradation of the environment which, in turn, affects the flora and fauna. Keeping this in mind, the College has been strictly implementing scientific solid waste management to maintain the green status of the campus.

The present Prime Minister of India Sri Narendra Modi launched 'Swachh Bharat Abhiyan' (Clean lndia Mission) on 2nd October, 2014. In this mission, the proper use of dust/waste bins is one of the major priorities. For the implementation of this mission, collective mass effort is necessary. For proper segregation and management. proper use of waste bins is the only solution for waste management purpose in the college campuses.

Waste Management includes the management and handling of all types of wastes. This waste types include the following:
Wet Waste: Wet waste includes the organic waste such a food waste, kitchen waste after peeling the vegetables and garden waste etc.

Dry Waste: Dry waste can be categorized into different wastes such as plastic waste, E- Waste, bio-medical waste, Construction & demolition waste and hazardous waste.

Paper Waste:

In order to reduce the paper waste, the management started digitization. It has implemented good practices such as prints and photocopies are taken on both sides of the pages. Further, the campus has E-book facility since 2018 all the book are available on the college website for the students at any time. Further, records of books and e-books are well kept and were available for review.

Internal notices and communications are through E-mail/SMS. AIET has Learning Management System (LMS) where notices are sent, exam results are displayed and attendance is recorded digitally.

Other good practices followed by ACoE are provided below:

- Biometric attendance is provided for ACOE staff.
- Paper notices are displayed on the notice boards. The dissertation reports, journals, and answer papers are stored as per the University rules.
- Around 10 kg paper waste is being generated by ACOE each year. Old papers and books are given to the recycler Aditya Notebooks
- ACOE encourage students to use eco-friendly material and recycle old papers/ scrap for decoration purpose during college festivals.

Solid Waste:

Being an institute with residential facility, considerable quantity of wet (food/ organic) waste is generated in the premises.

Below information is obtained from the college:

- Daily around 20 kg wet waste and 10 kg dry waste is generated in ACoE campus.
- Biodegradable wet waste is mostly generated from kitchens. Food waste generated in kitchens is sent to pig farm where it is processed and used as food for pigs.
- In other areas like classrooms, mostly paper waste and plastic wrappers are generated.
- Dustbins are provided on each floor, in staff rooms, laboratories, washrooms, cafeteria, kitchens and in campus area.
- Segregation of wet and dry waste is not practised in the campus except in kitchen areas.
- Signages for creating awareness on minimizing food wastage were seen in two hostel dining room areas. There is no signage for promoting segregation of wet and dry waste.
- ACOE is planning to install sanitary napkin disposal facility.

E-Waste:

Being one of the progressive colleges in India, ACoE has also moved to on-line learning system through it's e-courses. This includes classrooms, library, internal mails etc. All 52 classrooms are digitized. It also has an E-library, student & staff portal for academic work, biometric attendance system for staff, etc.

The college has provided the below data:

- College has 660 Computers, 20 printers, 10 air conditioners in working condition.
- Old computers are given to a Local vendor (Pavan computers) in Kakinada with whom MOU was made for AMC, while purchasing new computers at discounted price.

Transportation

ACoE is located in surampalem, which is 35 km from Kakinada and 35 km from Rajahmundry. ACoE provides buses and cars for transportation for students/ staff. Most of the staff pool buses and cars and a few staff members travel by private vehicles. ACoE management encourage students and staff to use the college buses (40-50) or public transport system to reduce carbon emissions.

Green Initiatives

Due to minimum consideration for environment & sustainability, the world is facing problems of ozone depletion, climate change, water scarcity and sustainable resource management. ACoE organizes guest lectures on Environmental conservation, biodiversity, etc. every year.

ACoE has a demonstrated consistent commitment towards nature and environment. ACoE started Haritha eco green club, which offers wide spectrum of environmental and nature activities and platforms to enhance awareness and exhibit the relationship with nature. Various activities organized by 'Haritha 'involved guest lectures, nature visits, workshops and competitions.

NSS groups of ACoE organized the green activities and awareness campaigns such as plantation camps in college, rally in nearby villages.

ADITYA COLLEGE OF ENGINEERING

Approved by AICTE, Affiliated to JNTUK & Accredited by NAAC
Recognized by UGC under Section 2(f) of UGC Act, 1956
Aditya Nagar, ADB Road, Surampalem - 533 437, E.G.Dist., Ph: 99631 76662.

Date: 10-06-2019

HARITHA (ECO-CLUB)

Perspective plan for Academic year 2019-20

S.No	Month	Tentative date	Event	Activity
1	July 2019	11-07-2019	World Population day	Awareness program on population increasing
2	August 2019	19-08-2019	Photography Day	Photo Exhibition
3	September 2019	16-09-2019	World Ozone Day	Seminar on importance of Ozone
4	November 2019	16-11-2019	Quit Plastic	Seminar or guest speech by industry experts
5	December 2019	14-12-2019	Natural Energy conservation day	Switch off the electricity for one hour in the campus
6	January 2020	08-01-2020	Swachh Bharath	Cleanliness drive
7	February 2020	12-02-2020	Zero Waste	Awareness program by motivational speaker
8	February 2020	24-02-2020	Drive less live more	Awareness program by transportation Engineers
9	March 2020	20-03-2020	ECO-WAVE	Public rally by ECO CLUB

COORDINATOR-HARITHA
Cc to: All ECO CLUB Members
Cc to: All Departments

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PRINCIPAL
Aditya College of Engineering
SURAMPALEM-533 437

Recommendations/ Suggestions

For Indoor Air Quality

- Indoor plants can be chosen in such a way that they give aesthetic appearance as well as health benefits.
- Information on sources, impacts and mitigation of indoor air pollution to be displayed within ACoE for increasing awareness about indoor air pollution. E.g. Signage can be put in chemistry laboratory for handling fuming chemicals.

Water Conservation

- Provide information on water usage and savings to students/ staff through notices, screen savers in computer laboratories, and encourage reduction/ wastage of water.
- Replace all old water faucets with water saving faucets such as pressmatic taps, aerator taps, jet sprays etc. Installation of such faucets can save water and help in minimizing the water footprint.
- Dual flushing system can be installed for toilet flushing, with appropriate instructions, which will save considerable amount of water.
- Grey water/ sewage recycling system can be installed for flushing toilets. This will reduce the fresh water footprint.
- Signage/ posters should be posted in high water consumption areas in Academic Blocks to increase awareness regarding water conservation.
- As the source of water is borewell, ACoE can install water meter on borewell line to monitor daily borewell withdrawal.
- Implementation of the STP could reduce the dependency on the ground water.

Global Green Solutionz
Greening the globe

Global Green Solutionz

509, Block A, Emerald Heights, Annojiguda, Hyderabad-500088
Tel: +91-7331134789; Email: globalgreensolutionz@gmail.com

February 15, 2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that, we have conducted green audit at M/s Aditya College of Engineering, Aditya Nagar, Surampalem, East Godavari District to identify various green measures to conserve various resources in the institution operations. A copy of the report is submitted to the management.

For Global Green Solutionz

M. Srikanth

Srikanth Meesa,

CEO, Global Green Solutionz

GLOBAL GREEN SOLUTIONZ HYDERABAD

Energy Audit Study

of

ADITYA COLLEGE OF ENGINEERING

Aditya Nagar, ADB Road, Surampalem- 533437

February 2020

Study Conducted and Prepared by:

KR Energy Consultants

Flat No.103, SS Ajay Arcade, Doctors Colony,
Saroor nagar, Hyderabad-500035
Email: krenergy@rediffmail.com,
Mobile: +91-9440234294

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Acknowledgement

KR Energy Consultants (called "KR Energy" hereafter) places on record, its sincere gratitude to the Management of **M/s *Aditya College of Engineering***, for entrusting the prestigious project of Energy Audit of their College located at Surampalem, ADB Road, East Godavari District, AP State.

We also wish to thank the officers/ Executives & staff of the institute for providing necessary support extended during energy audit study.

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KR Energy Consultants

Hyderabad

Date: 05/02/2020

Executive Summary

M/s KR Energy Consultants has conducted a Detailed Energy Audit of M/s Aditya College of Engineering, Aditya Nagar, Surampalem, EG District, AP in February 2020 to identify energy savings measures for reducing energy consumption and electricity bill.

Electricity and HSD are main energy sources for the institute. Grid electricity supply by TSSPDCL is the main source of electrical energy, which is augmented with power generation from DG Sets during load shedding:

The institute has also solar power plant of 500 kW capacity for captive use for the entire campus requirement

a) Electrical Energy

Table A: Profile of Electrical Energy Consumption

S. No.	Item	Value
1	Contract Maximum Demand (CMD) kVA	300
2	Average recorded demand , kVA	257
3	Average billed demand, kVA	261
4	Demand variation, kVA	196 to 298
5	Solar power plant capacity of the campus, kW	500
6	Solar power generated, kWh	512,008
7	Solar power used for captive requirement, kWh	358,366
8	Solar power export to grid, kWh	153642
9	Annual billed grid electricity consumption, kVAh /year	704,769
	Total electricity consumption of the campus, kWh	1206771
10	Total annual electricity bill, Rs. lakhs/year	12.93
11	Power factor	0.99
12	Average cost of electricity, Rs/kWh (only grid power)	10.1

b) Summary of Recommendations

The Tables below presents the summary of recommended energy saving projects, anticipated energy savings, and monetary savings, investment required, and simple payback period:

Table 1: Summary of Suggested Energy Saving Measures with Cost-Benefit Analysis

Energy Conservation Measure	**Energy savings** (kWh/ year)	**Monetary savings** (Rs. / year)	**Investment** (Rs.)	**Payback period (months)**
Replace old fans with Energy efficient/Super fans(100nos)	6,000	60,000	180,000	36
Install energy savers for ACs	5,580	55,800	105,000	24
Replace conventional CFLs with LED lights	4,838	48,380	64,500	16
Replace old pumps with new efficient pumps(1 no's)	1,800	18,000	50,000	36
Install Solar hot water system for hostel buildings	--	--	--	--
Total	**18,218**	**182,180**	**399,500**	**26**

- *As can be observed from the above Table, the total electrical energy savings are estimated at 18,218 kWh/year and the corresponding monetary savings are Rs.1.82 lakh/year. The investment required is Rs.3.99 lakhs which will be paid back in **26** months.*

- *Equivalent CO2 reductions due to energy savings would be 15 tCO2/ yr*

- *Initially, the fans, ACs and tube lights operated for more hours in a day/year can be selected for replacement for maximum benefit.*

- *Solar hot water system required for 250 students is around 5,000 liters/day capacity.*

CHAPTER 1
Introduction

1.1 About Aditya College of Engineering

Aditya, the premier promoter of quality education in the coastal districts of Andhra Pradesh for the past two decades, leads various institutions ranging from K.G to P.G besides professional colleges like Engineering, Pharmacy and Nursing. Sri Nallamilli Sesha Reddy as a founder chairman, promoted the educational society in the name of Aditya Academy at Kakinada in the year 1984, with a vision and mission to create a platform for holistic growth and success to students at all levels.

Aditya has made its entry into the educational arena with a public school to meet the needs of primary and secondary education. In succession and with rapid strides, the academy established a number of Junior Colleges, Degree Colleges, PG Colleges, Engineering Colleges, Pharmacy Colleges, Nursing Colleges, Teacher Training Institutions.

The silver-jubilee educational group with 50,000+ students in 50+ institutions with 5000+ staff across three districts in Andhra Pradesh has become the standard bearer for quality education. In every stream, Aditya has become a spring-board for success through its powered vision, constant innovation and professional excellence.

The College is situated in an eco-friendly area of 180 acres with thick greenery at Surampalem, Gandepalli Mandal, East Godavari District, Andhra Pradesh. The College is 15 KM away from Samalkot Railway Station on Howrah-Chennai Railway line in South Central Railway. The College is 35 Km away from Kakinada and Rajahmundry on ADB Road.

The College has four academic Buildings with a total carpet area of 44,524 Sq. Mts. apart from two boys hostels and one girls hostel buildings. The particulars of academic buildings and the departments / offices accommodated are as follows.

The dreams of its bounding fathers took shape in 2004 in the form of Sri Sai Aditya Institute of Science and Technology which is now renamed as Aditya College of Engineering and Technology under G.O.RT.NO:92 with approval of AICTE in the aegis of Sarojini Educational Society, Kakinada and permanently affiliated to JNTU Kakinada. The college has two academic buildings apart from two boy's hostels and one girl's hostel buildings.

The campus is centrally located between Kakinada and Rajahmundry. It is situated in an eco-friendly area with thick greenery at Surampalem, Gandepalli Mandal, East Godavari District, AP. ACET offers various under graduate and post graduate courses in engineering, science and management and has state of laboratories and well stocked library and one of the best computing facilities. With an ideal teacher-taught ratio we strive for academic excellence through personalized attention. Since its inception ACET has achieved national

standing in terms of academic performance, co-curricular and extra-curricular activities. Known for its creative dynamism and flexibility the college offers varied programs blending skill development and value orientation to shape the career of students.

Aditya College of Engineering has started during the year 2008 and college is offering the following courses as furnished below:

Under Graduate Courses:

- B.Tech Civil engineering
- B.Tech Electrical and Electronics Engineering
- B.Tech Mechanical Engineering
- B.Tech Electronics and Communication Engineering
- B.Tech Computer Science and Engineering
- B.Tech Petroleum Technology

Post Graduate Courses:

- M.Tech VLSI Design
- M.Tech Embedded Systems
- M.Tech Computer Science & Engineering
- M.Tech Power Electronics & Drives
- M.B.A Master of Business Administration

No. of students – studying all branches and classes

The college has a total strength of 2284 students, about 2189 students are in B Tech, 24 students pursuing M Tech and 81 students in MBA.

Table 1: *Details of students in different courses*

S.No	Course	No. of Students
1	B.Tech	2189
2	M.Tech	24
3	MBA	81
Total		2294

1.2 Energy Conservation Efforts made by the Management

The committee of the institute recognizes its responsibility to conserve and manage energy in all its operations.

- ✓ Make every effort to commit organizational resources towards energy management
- ✓ Minimize energy costs and give priority to energy efficiency (EE) by utilizing available resources more efficiently

Towards this objective, the management has installed LED lighting and Solar Power Plant of 500 kW for captive use of power for the entire campus covering for all colleges of the group institutions.

The management wants to explore further scope for energy conservation and energy cost reduction in the campus and thus entrusted the job of Energy audit to KR Energy Consultants.

1.3 Objectives of the Energy Audit

The key objectives of the Energy audit is to identify, prioritize, and recommend a set of proven, customized, low-cost, and implementable measures for reducing the consumption of electrical energy in the campus and emission reductions.

1.4 Scope of Work

The Energy audit has laid emphasis on performance assessment of electrical utilities comprising the following equipment/ areas for identification of cost-effective energy saving solutions:

1) Energy Consumption and Analysis
2) Pumps(Utility)
3) Air Conditioners
4) Fans
5) Lighting
6) DG sets

1.5 Methodology Adopted for conducting the Energy Audit study

KR Energy Consulting has conducted Energy audit field studies at the institute in February 2020. As a part of the Energy audit KR Energy Consulting audit team has visited campus for data collection, on-site measurements, and performance monitoring of various equipment using portable Energy audit instruments. KR Energy Consulting has adopted the following methodology for conducting the Energy audit:

- Kick-off meeting with the concerned personnel to finalize field action plan
- Inventory of all the electrical appliances installed by physical verification like air conditioners, luminaries, computers, and others. Physical inspection of the electrical distribution system.
- Monitoring of electrical parameters such as voltage, amps, kW, power factor etc. for individual equipment's and feeders
- Monitoring of harmonics at the identified DB's, feeders UPS with power and harmonic analyzer
- Collection of photocopies of monthly electricity bills for the past one year
- Critical analysis of data collected/ measured and assessment of energy efficiency and energy losses
- Identification of energy saving measures and assessment of energy saving potential
- Submission of the report

The approach/ methodology adopted for Energy audit is presented pictorially below in Figure 1.

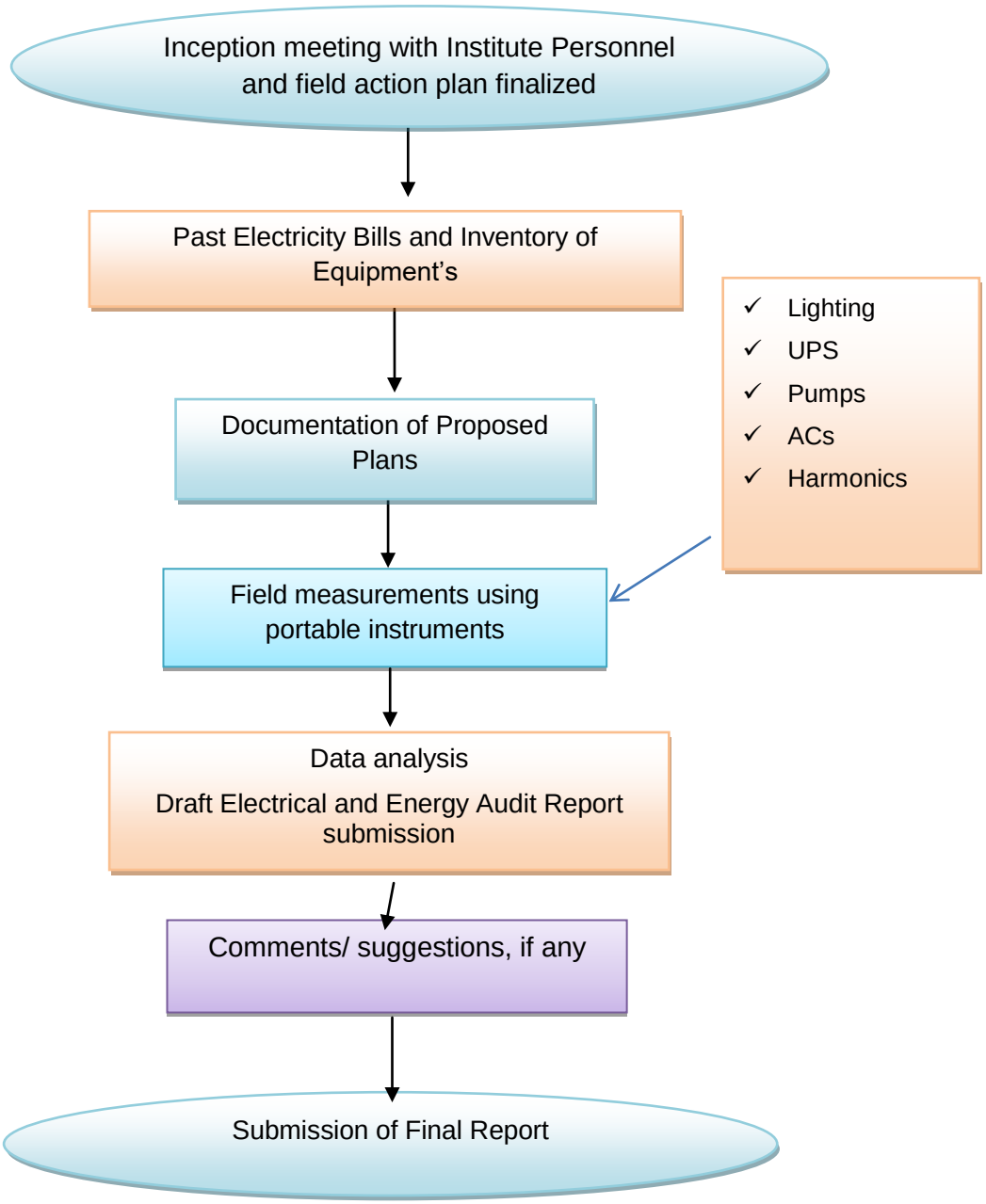


Figure 1: *Approach/ methodology adopted for conducting Energy Audit of Aditya College of Engineering, Surampalem, ADB Road, East Godavari District, AP State*

1.6 Measuring Instruments used for the Electrical and Energy Audit

KR Energy Consulting has used portable, micro-processor based, state-of-the-art, calibrated instruments for on-field monitoring of equipment performance during Energy audit. The list of portable instruments used in the study is as follows:

- Nanovip Plus Load Manager
- Harmonic Analyzer
- Lux meter
- Temperature measuring instruments
- Thermal Imager

CHAPTER 2

Energy Consumption & Analysis

The chapter presents the description of various energy inputs used in the Institute, their consumption trends & analysis, annual energy costs, and share of different energy inputs in total energy cost.

2.1 Energy Inputs

Energy sources for the hotel utilities are:

- Electricity
- HSD

Electricity is major energy source for the institute for lighting, fans, motors etc.

DG Sets are used as standby to grid power and will run during load shedding. HSD is the fuel for DG Sets.

The campus has a roof top solar power plant also of 500 kW and electricity generated is used for captive purpose for the entire campus and all colleges power requirement.

2.2 Electrical Energy Analysis

Grid electricity is supplied by the Eastern Power Distribution Company Limited of AP voltage of 11kV. The connection meets the entire campus electricity requirement including all colleges of the group in the campus. During grid power shortage/ failure, DG Sets supply the required electricity. The institution has a Contract Maximum Demand (CMD) is 300 kVA for the entire campus and colleges in the name of “Sarojini Devi Educational Society

Data on monthly CMD, recorded MD, billed units, and bill amount for period year from January 2019 to December 2020 is collected, analyzed, and presented in Table 2.1 below:

Table 2.1: *Month-wise CMD, Recorded MD, Billed MD, Billed Units, and Bill Amount*

S.NO	MONTH	APSEB CONSUMED UNITS (A)	BILL UNITS	BILL AMOUNT	SOLAR EXPORT UNITS (B)	PRESENT SOLAR GENERATE UNITS (D)	COLLEGE SOLAR CONSUMPTION E= (D-B)	TOTAL COLLEGE UNITS CONSUMPTION (A+E)	RMD KVA	BILL KVA
1	JAN	50370	33341	368381	17029	48111	31082	81452	196	240
2	FEB	69372	49424	524668	19948	53586	33638	103010	253	253
3	MAR	102432	92045	876038	10387	49079	38692	141124	284	284
4	APR	86357	74810	737567	11547	36254	24707	111064	286	286
5	MAY	68484	48762	520722	19722	48632	28910	97394	260	260
6	JUN	69373	59071	590080	10303	34519	24216	93589	237	240
7	JUL	65607	58880	585343	6727	19902	13175	78782	241	241
8	AUG	52531	53943	476508	8589	48401	39812	92343	260	260
9	SEP	64732	62107	634070	2626	35780	33154	97886	298	298
10	OCT	66355	55186	581083	11170	41855	30685	97040	291	291
11	NOV	75559	58052	585397	17508	52656	35148	110707	241	241
12	DEC	77233	59148	592707	18086	43233	25147	102380	240	240
		848405	**704769**	**7072564**	**153642**	512008	**358366**	**1206771**		

The variation of electricity consumption, recorded demand, billed demand, solar power, and power factor demand is graphically furnished in fig 2.1. 2.2, 2.3, 2.4 and 2.5

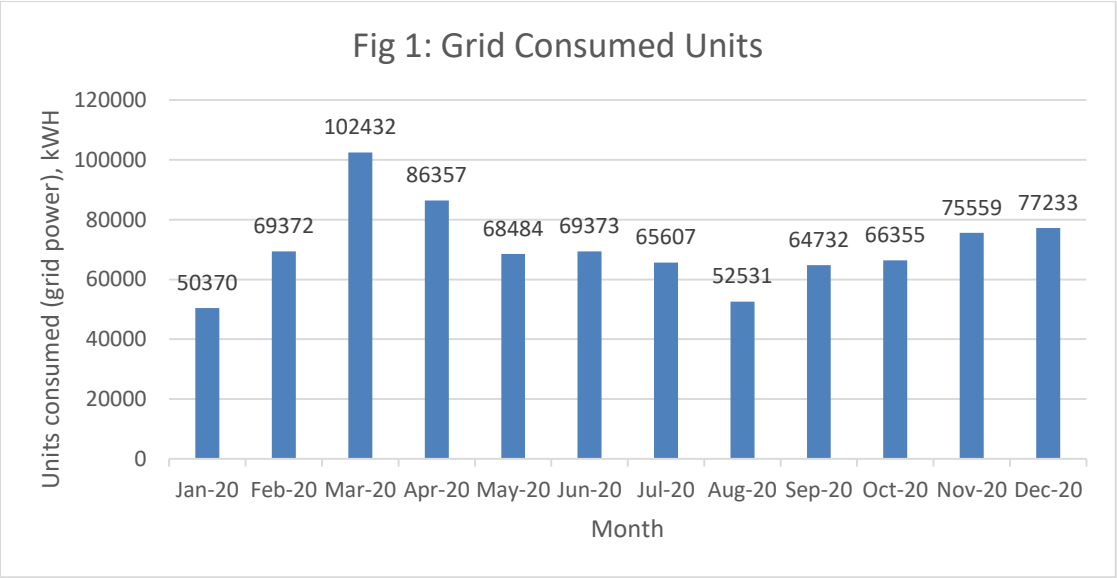


Fig 2.1: Monthly Energy Consumption

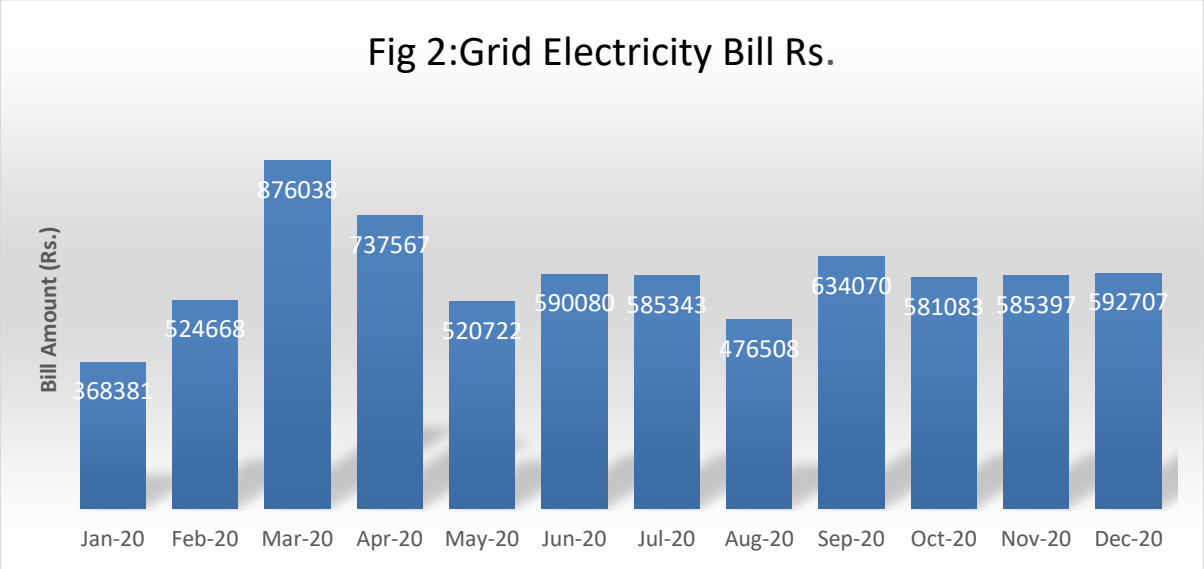


Fig 2.2: Monthly Grid Electricity Bill

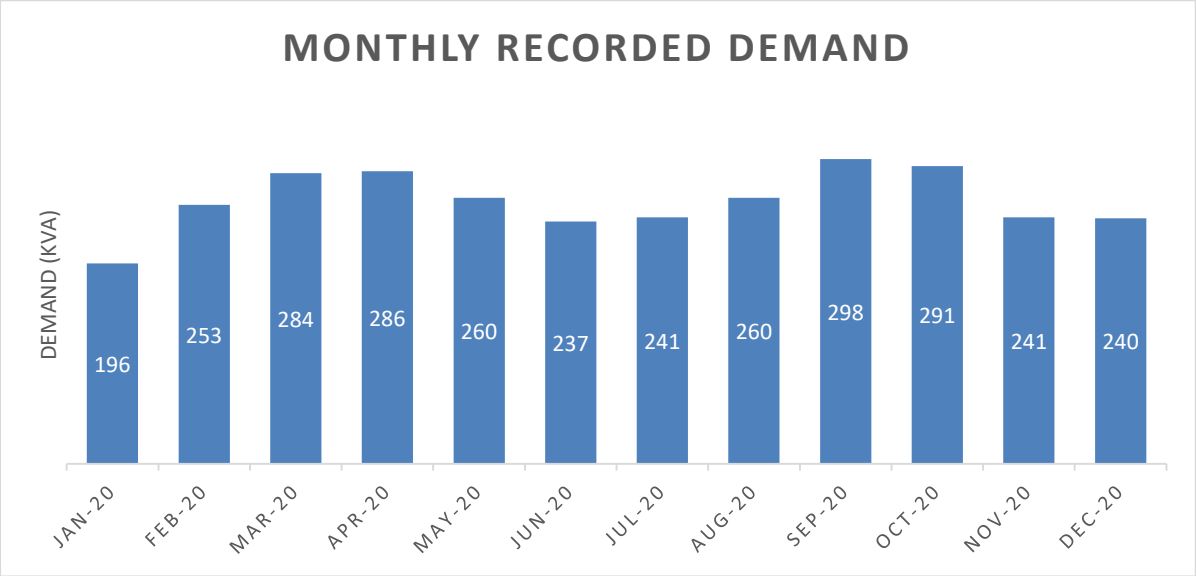


Fig 2.3: Monthly Recorded Demand Variation

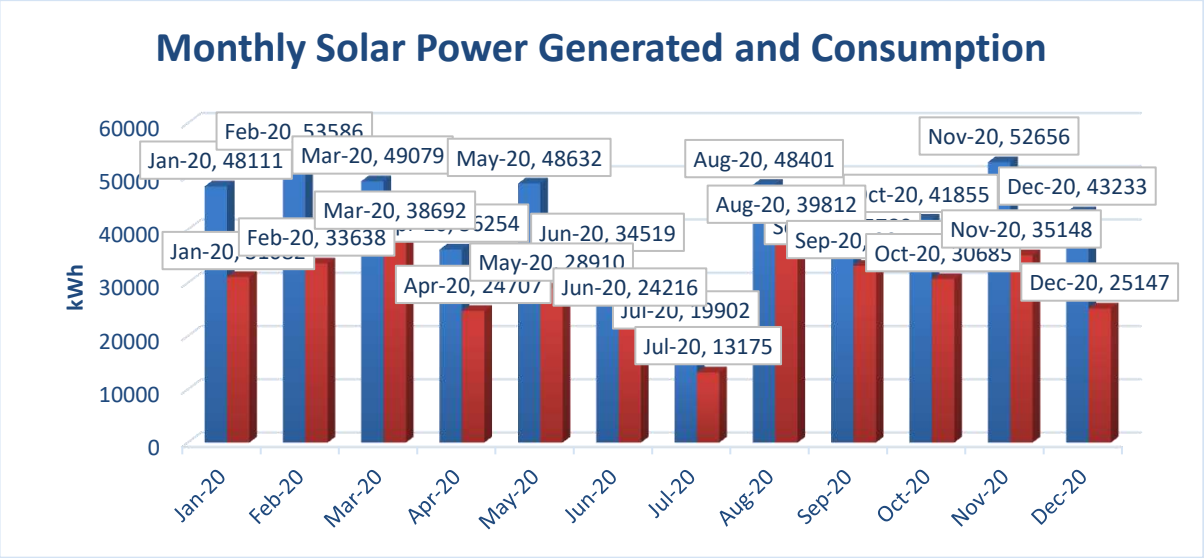


Fig 2.4: Monthly Solar Power Generated and Consumed

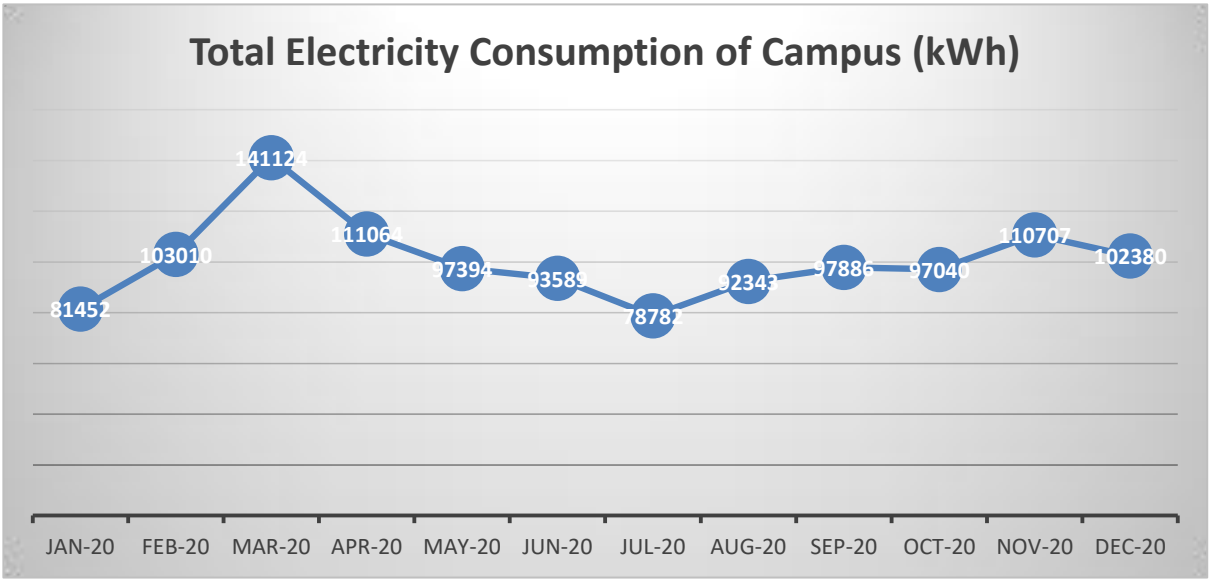


Fig 2.4: Monthly total electricity consumption of the campus

The key observations made from the analysis of the above data are furnished in Table 2.2 below:

Table 2.2: *Summary of Electrical Energy Consumption Data of the entire campus and colleges (Sarojini Educational Society) – January 2020 – December 2020*

S. No.	Item	Value
1	Contract Maximum Demand (CMD) kVA	300
2	Average recorded demand , kVA	257
3	Average billed demand, kVA	261
4	Demand variation, kVA	196 to 298
5	Solar power plant capacity of the campus, kW	500
6	Solar power generated, kWh	512,008
7	Solar power used for captive requirement, kWh	358,366
8	Solar power export to grid, kWh	153642
9	Annual billed grid electricity consumption, kVAh /year	704,769
	Total electricity consumption of the campus, kWh	1206771
10	Total annual electricity bill, Rs. lakhs/year	12.93
11	Power factor	0.99
12	Average cost of electricity, Rs/kWh (only grid power)	10.1

Considered Rs 10.00/kWh for electrical energy savings in the report

2.3 GHG Emissions

The major energy form used for the institute is grid electricity supplied by Telangana State Southern Power Distribution Company Ltd: The emission factor for grid electricity is 0.82 kgs of CO2/kWh and is calculated month wise and is furnished below in Table 2.3

Table 2.3: *GHG emissions due to grid electricity use*

Month & Year	Monthly units (kWH)	Monthly GHG Emissions (tCO2)
Jan-20	33341	27.37
Feb-20	49424	40.58
Mar-20	92045	75.57
Apr-20	74810	61.42
May-20	48762	40.03
Jun-20	59071	48.50
Jul-20	58880	48.34
Aug-20	53943	44.29
Sep-20	62107	50.99
Oct-20	55186	45.31
Nov-20	58052	47.66
Dec-20	59148	48.56
Total	**704769**	**578**

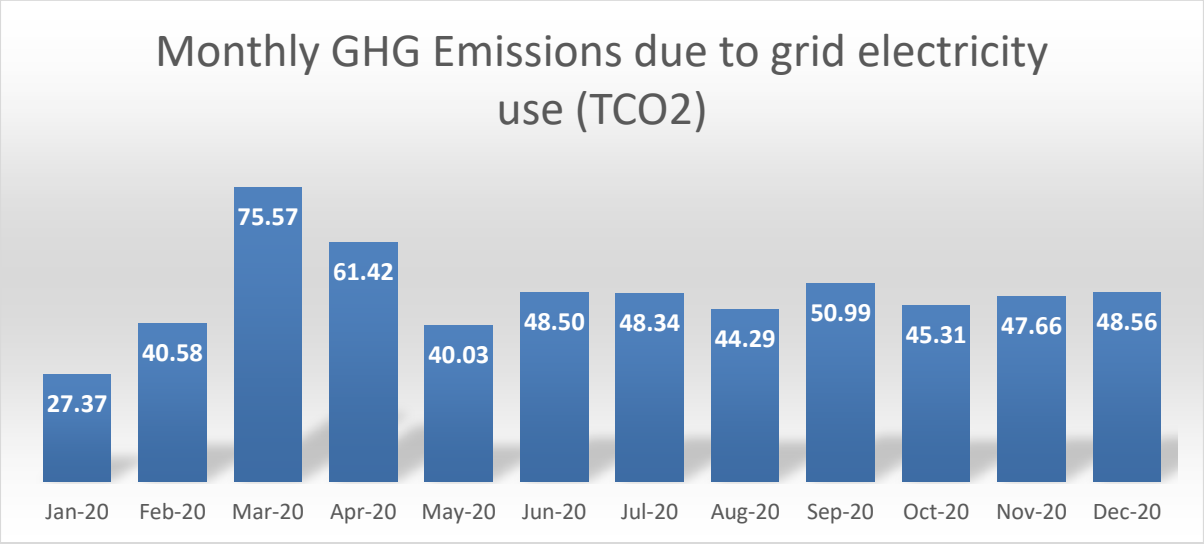


Fig 2.6: Monthly Carbon dioxide Emissions due to grid electricity use

2.4 Solar Power Plant GHG Emissions Reduction

The management has installed a roof top SPV Power plant as an initiative to offset GHG emissions to the world. The capacity of the SPV power plant is 500 kW with net metering facility.

So far, about 512 MWh has been generated from January 2020 to December 2020, the solar power is used for captive requirement for the campus, the power is also exported to grid during holidays and is about 153 MWh. Due to solar power plant, about 420 tons of CO2 is avoided to the climate every year.

2.5 Power Factor and Maximum Demand

Power factor, billing demand and recorded MD for period from January 2020 to December 2020 is collected and presented in Table 2.4 below:

Table 2.4: *Monthly Power Factor and Recorded Maximum Demand*

Month	CMD (kVA)	Recorded Demand (kVA)
Jan-20	300	196
Feb-20	300	253
Mar-20	300	284
Apr-20	300	286
May-20	300	260
Jun-20	300	237
Jul-20	300	241
Aug-20	300	260
Sep-20	300	298
Oct-20	300	291
Nov-20	300	241
Dec-20	300	240
	Average	**257**

(a) Contract Demand

- Contract Maximum Demand is 300 kVA and average recorded demand is 257 kVA
- The highest maximum demand recorded during the last 12 months is 298 kVA.
- The maximum demand is OK for the present utilization and is satisfactory.

- The minimum billing demand is 80% of the CMD and is 240 kVA

(b) Power Factor

The average monthly power factor was 0.99 as noted and as per electric bills. The power factor is well maintained and is OK.

2.7 Harmonics

This term refers to a wide variety of electromagnetic phenomena that characterize the voltage and current at a given location of a power system any power problem manifested in voltages, current, or frequency deviations those results in failure or malfunctioning of customer equipment. Power quality has become increasingly important for industrial and commercial electric power customers, particularly as today control processes rely on computerized equipment which is sensitive to power system interruptions and disturbances.

As harmonic levels increase, the likelihood of experiencing problems also increases. Typical problems include:

- Malfunctioning of microprocessor-based equipment by disruptions of operations.
- Heating effects in power handling equipment's such as motors, transformers, overheating in neutral conductors. There by reduces the operating life
- Deterioration or failure of power factor correction capacitors.
- Erratic operation of breakers and relays.
- Pronounced magnetic fields near transformers and switchgear.

The harmonics were measured for the selected panels and UPS. The Voltage & Current harmonics are ranged as below:

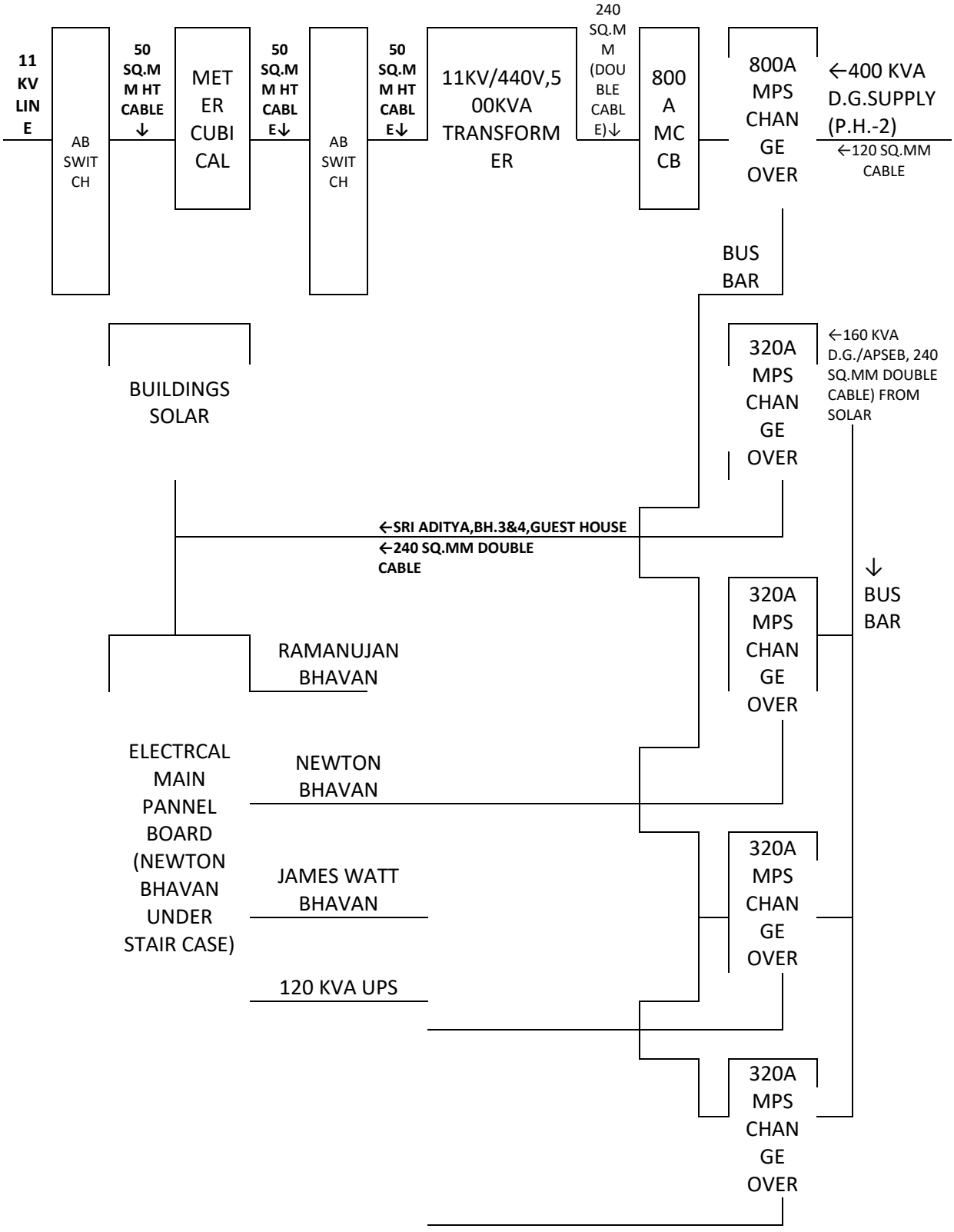
Table 2.4 *Harmonics Measurements values for Panel by Harmonic Analyzer*

Reference	***$THD_{rms,v}$***	***$THD_{rms,i}$***
Main panel	0.42% to 1.25% Voltage Harmonics within the limits	5.04% to 18.0% 5^{th} Harmonic-6.5% 7^{th} Harmonic-7.04% 5^{th} and 7^{th} harmonics are predominant.
Recommendation	No Harmonics exists and harmonics are within the limits	

2.6 DG Sets

The institution has three DG sets for total campus load of 400 kVA (1 no's) and 160 kVA (2 no's). The DG sets are operated as per the requirement and during grid power failures. The total DG sets capacity is 720kVA, which is sufficient to cater the load of the entire campus loads.

Fig 2.7. POWER SINGLE LINE DIAGRAM ADITYA COLLEGE OF ENGINEERING COLLEGE(Sarojini educational society)



CHAPTER 3

Fans & Air conditioners

This chapter presents the type of air conditioners and fans used, their energy performance, and cost-effective energy conservation measures for reducing energy consumption in air conditioners and fans.

Hostels

The institution has four main buildings and two hostels for boys and girls separately.

S.No	Hostel Block	Rooms	Students	Fans	C.F.L	Tube Lights	Geysers	AC
1.	**Block A**	**128**	**238 (Male 193+Female 45)**	**323**	**349**	**324**	**4**	**10**

There are 128 rooms in the hostel and residing 193 males and 45 females. The main electrical equipment's/gadgets used are fans. Tube lights, geysers, ACs and others etc.

3.1 Details of Fans

The ceiling fans are installed, and the inventory of the fans and connected load is given below in Table 3.1:

Table 3.1: *No. of Fans installed and Wattage*

S.No.	Name of the Building	Fans each 50Watt
1	Ramanujan Bhavan	593
2	Newton Bhavan	114
3	James Watt Bhavan	125
4	Mechanical labs Block	28
5	Hostel blocks	323

3.2 Fans- Observations & recommendations

- ✓ Fans are provided with fixed and running capacitor. The speed drops if the value deteriorates with time. Timely replacement of capacitor is necessary.
- ✓ Presently, in many rooms conventional electrical regulators are installed and it is suggested to replace old conventional regulators with new electronic type regulators.
- ✓ In majority of the rooms, the fans are consuming more power than rated.

a) Cost benefit Analysis of Replacing old Ceiling Fans with new efficient fans

Energy savings can be achieved by replacing the existing old ceiling fans with 5 Star Rating (BEE) energy efficient ceiling fans.

- ➥ Option 1: 5 Star rated Fans
- ➥ Option 2: Super Fans

Initially, it is recommended to replace old fans of 100 nos. and after successfully achieving the savings, other fans can be replaced in a phased manner. The cost benefit analysis made for a sample of replacement of 100 fans under two Options are furnished below:

i) Option (1) Replace old fans with 5 Star Rated Fans

Star Rating	Min. Air Delivery (AD) m^3/ min	Input Power in Watts	Service Factor (SV=AD/ Power) m3/min/Watt	Cost (Rs)
5 Star	215-225	50-53	>=4	1,850-2,200

A few good brands of the 5 Star rated Fans are Ortem, Relaxo, Orient, Usha, Crompton Greaves, Bajaj, and Havells. Normally, these fans come with a warranty of two years.

ii) Option 2: Super-Efficient Ceiling Fans

Features of Super-Efficient Ceiling fans are:

- ➥ Energy savings, more than 50% savings, lower electricity bill
- ➥ Remote control, no regulator needed, saves space on switchboard
- ➥ High air delivery
- ➥ Inverter/UPS friendly – Runs twice longer, no extra noise, no speed drop
- ➥ No speed change due to supply variations or low voltage
- ➥ Power factor better than 0.9
- ➥ Service value of more than 6 - more air per watt
- ➥ BLDC Motor runs cool - No heat generated

- LED Indication for remote operation
- Attractive colors and designer leaves
- 5 years warranty
- Cost Around Rs 3,200 per Fan

Presently, Super fan is the company, which manufactures these types of fans.

The comparison of ordinary fan, 5 star fan, and super fan in terms of design and operational aspects are furnished below in Table 3.2:

Table 3.2: *Comparison between Ordinary Fan, 5 Star Rated fan & Super Fan (1200mm)*

S.No	Parameter	Ordinary fan	5 Star rated Fan	Super fan
1	Rated Power, Watt	60-90	40	30
2	Min. Air Delivery, m^3/min	210-215-220	215-220	220
3	Service Factor, m^3/min/Watt	3.35-3.73	4.0-5.0	6.28
4	Cost, Rs/Fan	1200-1300	1800	2500
5	Life, Years	10-12	10-15	15
6	Warranty, Years	1	2	3-5

The cost-benefit analysis of replacing the existing ordinary fans with (i) 5 star rated fans and (ii) super-efficient fans is provided in Table 3.3:

Table 3.3: *Cost Benefit Analysis of Replacing Fans with 5 Star Rated & Super-Efficient Fans*

Description	Unit	Option1: 5 Star Rated Fans	Option2: Super-Efficient Fans
Number of Fans (*considered 100 Nos. as sample for case study*)	Nos.	100	100
Actual power consumed	Watts	70	70
Power consumption of new Fan	Watts	40	30
Average operation	hours/day	8	8
	Days/year	250	250
Annual energy savings	kWh/yr.	6,000	10,000
Cost of energy	Rs/kWh	10	10
Total Annual saving	Rs	60,000	1,00,000
Cost of new Efficient fans	Rs/Fan	1,800	2,500
Investment	Rs	1,80,000	2,50,000
Simple Payback period	Months	36	30

Note: Price is subjective and be further reduced if taken on bulk quantity. The average life of fans is 10 years.

Initially, the management can replace 50 nos in first phase and after successfully achieving savings and recurring savings, all the fans can be replaced for power savings.

3.3 Air conditioners

The air-conditioning systems available at Institute are of split air conditioners. There are total of 21 air conditioners in the hostel and college administration block. The rated capacity of Acs are 1 TR and 1.5 TR and total capacity is 26 TR.

3.4 Air conditioners -Observations & Recommendations

(a) Observations

- It is beneficial to install 5 Star rated ACs in future as 5 star rated ACs will consume less power than 3 star rated, and additional investment is less as compared to the savings. Air conditioners over 10 years can be replaced with new 5 star rated ACs.

(b) Recommendations

(i) Install Energy Saver for ACs

Airtron is the most advanced AC SAVER with all the controls of a Precision AC.

Airtron's dual sensors reference the Room and Coil Temperature and working in tandem with its multiple algorithms in a “closed -loop circuit" ensure the high savings and adapts your AC to Ambient Temperatures and Climatic changes, by maintaining room temperature while compressor run time is substantially reduced.

Airtron allows to program the AC to climate & geographical locations and automatically adjusts itself to change the ambient conditions to save electricity. AIRTRON is available with a Remote for setting the Room Temperature and in Non-Flammable Polycarbonate Enclosure with SMPS Power Supply, to tolerate wide Voltage and Current fluctuations, Surges, Spikes and Sags.

Airtron has been validated on all ACs- Inverters, 5 Star, Splits, Multi-Splits, Packages, Ductable, Windows, Cassettes from 1.0 - 20.0 TR.

The salient features of Airtron AC saver are:

- ✓ Most advanced AC saver
- ✓ Display Room & Coil Temperature
- ✓ Automatically adapts AC to changes in ambient temperature & Climate
- ✓ Easy to install
- ✓ Applicable on ACs from 1.0 to 20TR, saves equally on inverters & 5 Star/ 1-Star AC's
- ✓ Energy saving up to 15 to 20%

Table 3.5: *Cost-benefit Analysis - Installation of AC Saver*

Description	Unit	Split AC
Total number of ACs	Nos.	21
Total AC load	kW	31
No. of hours of operation/ day	Hours/day	6
No. of days per annum	Days/year	200
Annual Energy Consumption	kWh/year	37,200
Power saving due to AC Saver @15%	kWh/year	5,580
Annual monetary savings(*@Rs.10.0 per kWh*)	Rs.	55,800
Investment for AC Savers *(@Rs.5,000 x 21 no's*	Rs.	105,000
Payback period	Months	24

3.4.1 Best Practices for Efficient Operation Air Conditioners

- *Proper Insulation*: Good quality insulation must be maintained in the air conditioned rooms by keeping all doors and windows closed properly so as to prevent cool air go out and hot air come in.
- *Curtains*: Always keep curtains on windows to prevent direct sunlight inside the room to avoid heating of cooled air. This reduces AC load significantly.
- *Maintenance*: Proper maintenance and cleaning of ACs is required at regular intervals to make it work at highest efficiency. Any dirt in filter may reduce efficiency of ACs very significantly.
- *Operation*: ACs should be switched on 15 minutes before actual use and should be switched off before leaving the room
- Outdoor units need to be kept under shady area and direct expose to sunlight will increase the power consumption of the compressor
- AC false ceiling to be provided for the AC rooms, for better air conditioning and reduction of room area and reducing heat losses

By adopting the above measures, a minimum of 10% to 15% of electricity consumption by ACs can be reduced.

CHAPTER 4

Lighting

4.1 Details of Lighting

Lighting system was assessed through visual observation and technical specification data were noted. The inventory data of the luminaries was provided by the department. The total lighting load of the unit is considerable of the total electrical load of the unit and hence, lighting needs equal emphasis along with other energy consuming areas. The plant has the following types of luminaries as under:

- LED Tube Lights
- LED Street Lights
- CFLs

Table 4.1: *Lighting load details*

S.No.	Name of the Building	C.F.L (10 W)	Tube Lights (20 W)
1	Ramanujan Bhavan	87	287
2	Newton Bhavan	21	78
3	James Watt Bhavan	183	23
4	Mechanical labs Block	5	24
5	Hostel	349	324
	Total	**645**	**736**

Majority of the tube lights LED tube lights in the institution, and some are CFLs. The total connected load of lighting is 21.17 kW. It is suggested to replace the CFLS with LEDs bulbs or lights. The cost benefit analysis is furnished below:

Table 4.1: *Cost benefit Analysis of replacing CFLs with LEDs.*

Description	Unit	CFLS
Total number of CFLs	Nos.	645
Wattage	W	10
No. of hours of operation/ day	Hours/day	6
No. of days per annum	Days/year	250
Annual Energy Consumption	kWh/year	9,675
Power saving due to LEDs @50%	kWh/year	4,838
Annual monetary savings(*@Rs.10.0 per kWh*)	Rs.	48,380
Investment for AC Savers *(@Rs.100/- per bulb or light*	Rs.	64,500
Payback period	Months	16

CHAPTER 5

Miscellaneous

5.1 Pumps-Observations & recommendations

There 4 no's of pumps of catering to water requirements of the Institute, all pumps are non-star rated and it is suggested to replace the non-star rated pumps with 5 star rated pumps for energy savings. These pumps can be replaced on phase wise, as and when required when pumps will be problem.

Cost benefit analysis of replacing existing old pumps with new efficient star rated pumps provided in table 5.1 below for a 3 HP Pump:

Table 5.1: *Cost benefit analysis of replacing old Pumps with EE pumps*

Description	Unit	Value
Capacity of the pump	kW	5.6
Efficiency	%	45
Efficiency of 5 star rated pump	%	60
Savings	%	30
Power savings	kW	1.5
No. of hours of operation/ day	Hours/ day	4
No. of days per annum	Days/ year	300
Power saving due to Energy efficient 5 star rated Pumps	kWh/ year	1800
Annual monetary savings (*@Rs.10 per unit)*	Rs	18,000
Investment for pump	Rs	50,000
Payback	Months	36

5.2 General Observations

All Class Rooms, hostel rooms and laboratories to have Display Messages or Posters regarding optimum use of electrical appliances in the room like, lights, fans, computers, and projectors. Few sample posters is furnished below:

(a) Sample Posters for Awareness towards Energy Conservation

Also have stickers/labels of slogans/lines for energy saving in Class rooms/ Common areas

- Energy saved is energy produced.
- Switch of Lights/ Fans if not used
- Conservation: It doesn't cost. It saves.
- Spare a Watt; Save a Lot
- Save Today. Survive Tomorrow
- Energy misused cannot be excused

(b) Safety posters

5.3 Solar Hot Water System

Presently, in the hostel buildings, water heaters are used for hot water requirement for bathing. As the roof area is abundantly available in the hostel buildings, it is suggested to install solar hot water system for hot water generation required for bathing purpose.

A solar water heater is a system that utilizes solar energy (or the energy from sunlight) to heat water. It has a system that is installed on a terrace or open space where it can get sunlight and the energy from the sun is then used to heat water and store it in an insulated tank. The system is not connected to electricity supply and thus does not have an on-off switch, but it uses the sunlight throughout the day to heat the water and store it in the storage tank. Most of the solar water heater on a sunny day can provide heater water at about 68° ±5° C temperature. Water from the storage tank can then be used for any application as desired.

One can feed this heated water to the electric geyser so that when sunlight is not enough, it uses electric energy to heat the water to the desired set temperature. This is also called Hybrid Water Heater but no one is marketing it and it has to be designed for your requirement by the solar water installer by laying a separate pipe to your geyser.

Solar water heating systems advantages:

a) Solar energy is free and abundant.
b) It's cheaper to install.
c) They lower your level of carbon footprint.
d) It requires no electricity for operation.
e) Reduced overheating risk.
f) Low maintenance.
g) No problems with hard water.

Solar Water Heater – types and benefits

There are 2 types of solar water heaters that are available in the Indian market:

1) FPC (Flat Plate Collectors) system: Flat Plate Collector Systems are metallic systems. They contain an insulated metallic box covered with a toughened glass. The metallic box has a layer of a copper sheet which is good for absorbing heat. The copper sheet is further coated with a black coating which improves heat absorption. The metallic box contains copper tubes arranged vertically and connected at the top and bottom by two horizontal copper pipes called headers. The cold water enters the collector (the metallic box) from the bottom pipe and rises up into the vertical pipes. It gets heated up in the vertical pipes. As it gets heated the water becomes lighter (hot water is lighter than cold water) and it rises up and gets collected in the storage tank via the top horizontal pipe (or header). This water now gets available for use.

These are metallic type systems and have a longer life.

2) ETC (Evacuated Tube Collectors) system: Evacuated Tube Collector systems are made of Glass. It has vertical tubes that are made out of two co-axial glass tubes. The air between the two coaxial tubes is removed to create a vacuum which improves insulation. Additionally,

the surface of the inner tube is coated to provide better heat absorption and insulation. Coldwater is filled up in these glass tubes and it gets heated up due to the sunlight. Hot water is lighter than cold water, and so it rises up and gets collected in the storage tank from where it is available for use. These systems are made up of glass and are fragile.

Both these type of water heaters come with or without a pump. The pump is used to move water from collectors to the storage tank. Those without pump use the thermosiphon principle to move water from collectors to storage tank automatically.

The capacity of the system can be decided as per the roof top area available and quantity of hot water required. A 100 liter system (2 Sq.mtr) will suffice for about 5 to 6 members for bathing purpose. The cost will be around Rs.250 per liter capacity.

"Smart Energy Solutions"

KR Energy Consultants
Flat No. 103, SS Ajay Arcade,
Doctors Colony, Saroornagar,
Hyderabad - 500 035, Telangana State
M : +91 9440234294
Tele Fax : 040-24033294
e-mail : krenergy@rediffmail.com
Website : www.krenergyconsultants.com

February 10, 2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that, we have conducted energy audit at M/s Aditya College of Engineering, Aditya Nagar, Surampalem, East Godavari District to identify various energy saving measures and to reduce GHG emissions in the institution operations. A copy of the report is submitted to the management.

For KR Energy Consultants

KR ENERGY CONSULTANTS

T. Krishna
Authorised Signatory
BEE Certified Energy Auditor No.3398
Registrar of Firms Certificate
No.1086 of 2002, dated 27/08/2002

CERTIFICATE *of* POLLUTION FREE CAMPUS ACHIEVEMENT

THIS ACKNOWLEDGES THAT

Pollution free Campus

Aditya College of Engineering
Surampalem, A.P

HAS SUCCESSFULLY COMPLETED THE

Pollution free Campus Evaluation and assessment

Dr Rekhapalli Srinivasa Rao
DIRECTOR
REST PVT LTD, VIJJESWARAM

15, APRIL 2021

Ch. Chiranjeevi
CHIEF EXECUTIVE
NAVEGA ENVIRO ENGINEERS& CONSULTANTS
MOEF &CC RECOGNIZED LABORATORY

DIRECTOR
ENVIRONMENTAL PROTECTION SOCIETY,
KAKINADA, AP

Certificate of Registration

ISO 9001:2015

This is to Certify that
Quality Management System of

ADITYA COLLEGE OF ENGINEERING

ADITYA COLLEGE OF ENGINEERING, ADB ROAD, SURAM PALEM, NEAR KAKINADA, EAST GODAVARI DIST, ANDHRA PRADESH-533437, INDIA

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

IMPARTING EDUCATION FOR DIPLOMA, UNDER GRADUATE, POST GRADUATE PROGRAMS IN ENGINEERING & TECHNOLOGY, MANAGEMENT AND OFFERING PROFESSIONAL CONSULTANCY SERVICES BY THE INSTITUTION.

Certificate No	: **21IQJW12**		
Initial Registration Date	: 25/10/2021	Issuance Date	: 25/10/2021
Date of Expiry*	: 24/10/2024		
1st Surv. Due	: 25/09/2022	2nd Surv. Due	: 25/09/2023

Director

ACCREDITED Management Systems Certification Body MSCB-119

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

AQC MIDDLE EAST LLC

Head Office: Office No. 02, Ground Floor, Sharjah Media City, Sharjah, UAE. e-mail: info@aqcworld.com,
Key Location: A-60, Sector - 2, Noida, Uttar Pradesh, 201301, India.

**Validity of the Certificate is subject to successful completion of surveillance audit on or before of due date. (in case surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawal).*

Certificate Verification: Please Re-check the validity of certificate at http://www.aqcworld.com/activeclients.aspx or www.aqcworld.com at Active Clients.

GOVERNMENT OF ANDHRA PRADESH

ANDHRA PRADESH STATE BIODIVERSITY BOARD

IN ASSOCIATION WITH

GODAVARI ECO WELFARE ASSOCIATION

Letter of Commendation

This Award Certificate is presented to

ADITYA COLLEGE OF ENGINEERING

In recognising towards your institutional efforts in promoting the usage of Eco-Friendly Ganesha & Eco - Immersion in 2019 awareness Campaign.

The efforts rendered by your Institute highly appreciable.

Member Secretary
A.P. State Biodiversity Board

Chairman
A.P. State Biodiversity Board

Ministry of Electronics
and Information Technology
Government of India

mygov
मेरी सरकार

स्वच्छ भारत
एक कदम स्वच्छता की ओर

Ministry of Electronics and Information Technology

Certificate

E-Waste Pledge

This is to certify that

Aditya College Of Engineering

has taken the E-Waste Pledge and will remain committed to keep working towards making India 100% clean of E-Waste.

9354358587

March, 03 2020

Clean and green campus recognitions/awards

Dear AISHE Nodal Officer,

The Swachhata Rankings of Higher Education Institutions is a significant annual exercise as part of the Swachhata drive of the Government. The Rankings are intended to lead towards more hygienic and ecologically responsible campuses through generating healthy competition amongst institutions and awarding the best of them. As compared to last year, the parameters of hygiene have been modified to encompass certain additional features, which are essential in a dynamic environment where cleanliness standards are witnessing new benchmarks. Current year ranking format will also have in-campus and off-campus hygiene parameters. All institutions in the higher education system would be expected to participate in the Rankings exercise and the Centrally Funded Educational Institutions receiving grants, would need to necessarily participate in this activity.

Institutions can apply online between **1st July 2019 to 31st July 2019**. Best institutions in various categories will be selected on the basis of submissions and subsequent inspections of the campuses. Hon'ble Minister of Human Resource Development will present awards to the best institutions at a function at New Delhi around October 2nd 2019.

Please visit http://aishe.gov.in or http://mhrd.gov.in for further details and process of application. All submissions would need to be true and factual. This is an important activity which gives greater visibility to your institution in terms of an essential aspect of campus life. Therefore, please avail yourself of the same.

With Best Wishes,
Senior Economic Advisor, MHRD

Based on this notification by MHRD, Our Institution applied for Swachhata ranking-2019 with following data.

Swachhata Ranking - Inspection - reg.

AICTE South Central Region <scro@aicte-india.org>

Reply all

Yesterday, 5:39 PM

Principal

Sir,

A One Man Inspection Committee is scheduled for Inspection of your Institute on 29th August, 2019, for awarding the best institutions in the respective categories, under Swachhata Ranking, on 2nd October, 2019 by Hon'ble HRM. You are requested to co-operate with the Expert to carry out the Inspection. Please arrange for video recording of the inspection and hand over the same to the Expert in a pen drive.

Date of Inspection	Name of the Institute
29.08.2019	**Aditya College of Engineering ADB Road, Surampalem, E.G.Distsrict**

Regards,

Dr. Amit Vishwasrao Salunkhe
Assistant Director & Regional Officer
AICTE South Central Regional Office
Ameerpet, Hyderabad - 500 038,
Phone: 040-23345071

Swachhta Rankings 2019

Guidelines for Physical Inspection of shortlisted Institutions

Name & Address of the

Institute Aditya college of Engineering

.....

Aditya Nagar, ADB Road, Surampalem, E.G. Dist, AP - 533437

AISHE Code: C-17955 (e.g. U-0000, C-0000 or S-0000)

S. No.	Item	Marks Allotted	Marks Scored
1	No. of toilets in campus	To note 180	
2	No. of buildings in campus	To Note 05	
3	No. of Students & Staff in campus	To Note 2697	
4	Student/toilet ratio in hostels & campus (for non-residential institutions)	**15 marks**	15
5	Available and well-connected network of grey water (recycled water)	**2 marks**	02
6	Availability of Running Water – whether 24 hrs or less.	**10marks** for 24 hrs **8marks** for 20-23 hrs **6 marks** for 15-20 hrs **No marks** for less than 15 hrs	10
7	Modernity level of toilet equipment, flooring and ventilation	**10 marks** for modern **7marks** for fairly modern **5 marks** for semi-modern **No marks** for primitive type	10
8	Total number and Availability of Garbage Clearance Units per building & floor	**10 marks** for adequate **8 marks** for partially adequate **5 marks** for existing but inadequate	10
9	Type of Garbage Disposal and whether any Technology (10)	**8marks** for an efficient system with technique **6marks**for adequate & efficient system **3marks**for existing but manual **No marks** for poor system	06
10	Kitchen sophistication and level of Hygiene in Hostels (15)	**10 marks** for modern with chimneys and good equipment **8 marks**for semi-modern **5marks** for older but well maintained **No marks** for without chimneys and poor maintenance	10
11	Greenery Coverage and Maintenance	**10 marks**for lush green cover of about 30% or more **8 marks** for 20-30% green cover with good maintenance **5marks**for vegetation cover but wild and	10

		unkempt **No marks** for vegetation cover less than 10%	
12	Rainwater Harvesting Systems & Solar Power Use	**5marks** for RWH **5 marks** for Solar Power OR **2 marks** each for being under installation **0 marks** if do not exist	10
13	Overall Ambience, Look & Cleanliness	**10 marks** - Scenic, well painted, well maintained, good green cover, well ventilated and having beautiful appearance. Marks as per judgement of Inspecting Officer	10
14	Adoption and Cleanliness of Off Campus Areas	**5 marks** if adopted village/neighbourhood has achieved ODF or some system is in place for hygiene OR **3marks**, if awareness & other activities have been done by students	05
	TOTAL Marks	100	98

Date: 29/08/2019

29/08/19

H. CHINNA SAIDULU
Signature of Inspecting Official
& name of Organisation
Mobile Number: 9395385333
S.P.A. JNAFAU.
(AICTE-SCRO)

Swachhta Ranking Awards-2019

DIRECTOR Administration Bureau <director.admin@aicte-india.org>

Tue 11/26/2019 11:59 AM

To: Principal <principal@acoe.edu.in>

Sir/Madam

It is intimated that the award ceremony for Annual Swachhta Ranking 2019 will be held on 03rd December 2019 at 11:00 a.m. in AICTE Auditorium, Nelson Mandela Marg, Vasant Kunj, New Delhi – 110070.

Your institute/university is one of the participants in the above competition and stands a bright chance of winning an award.

Hon'ble Minister of HRD Sh. Ramesh Pokhriyal "Nishank" has kindly consented to give away the prizes.

You are cordially invited for the Award ceremony alongwith 2-3 colleagues of your University/Institution A formal invite is being forwarded separately. Necessary travel and accommodation arrangements may please be carried out well in advance at your end. we request you to kindly confirm your presence and also fill-in the details of the 02 or 03 participants from your institute/university in the google form, which link is appended below:

https://forms.gle/7Tu3fkFfs4nE1Lvo8

For further clarifications, please contact the undersigned or

1. Sh. Kranti Singh, Chief Administrative Officer, ph. 7055587007
2. Sh. Sunil Kumar K, Assistant Director, ph. 9487559725

Thanks and Regards

Col. A. Shreenath
Director(Admn.)
AICTE
Ph. 8527084441

Swachhta Ranking Awards- 2019

DIRECTOR Administration Bureau <director.admin@aicte-india.org>

Fri 11/29/2019 3:49 PM

To: Principal <principal@acoe.edu.in>

1 attachments (770 KB)

Invitation.pdf;

Sir/Madam,

Congratulations! Your University/Institution is selected as an awardee of the Annual Swachhta Ranking 2019 which is scheduled to be held on 03rd December 2019 at 11:00 a.m. in AICTE Auditorium, Nelson Mandela Marg, Vasant Kunj, New Delhi – 110070.

Hon'ble Minister of HRD Sh. Ramesh Pokhriyal "Nishank" has kindly consented to give away the prizes, hence your presence is highly solicited.

Therefore, you are cordially invited for the Award ceremony along with 2-3 colleagues of your University/Institution. A formal invite is attached herewith. Necessary travel and accommodation arrangements may please be carried out well in advance at your end. All expenses in this regard will be borne by your establishment. We request you to kindly confirm your presence and also fill-in the details of the 02 or 03 participants from your institute/university in the google form, which link is appended below:

https://forms.gle/7Tu3fkFfs4nE1Lvo8

For further clarifications, please contact the undersigned or

1. Sh. Kranti Singh, Chief Administrative Officer, ph. 7055587007
2. Sh. Sunil Kumar K, Assistant Director, ph. 9487559725

Thanks and Regards

Col. A. Shreenath
Director(Admn.)
AICTE
Ph. 8527084441

Ministry of Human Resource Development
Government of India

You are cordially invited to attend the

Award Ceremony

SWACHH CAMPUS RANKING 2019

OF HIGHER EDUCATIONAL INSTITUTIONS

Presentation of Awards to the Top Ranked Institutions

by

Shri Ramesh Pokhriyal 'Nishank'

Hon'ble Minister of Human Resource Development
Government of India

3rd December, 2019 (11:00 am onwards)

Venue: Prajnan (Auditorium), AICTE,
Nelson Mandela Marg, New Delhi

मानव संसाधन विकास मंत्रालय
भारत सरकार

उच्च शिक्षण संस्थानों की

स्वच्छ परिसर रैंकिंग–2019

के लिए

पुरस्कार वितरण समारोह

शीर्ष रैंकिंग वाले संस्थानों
को

श्री रमेश पोखरियाल 'निशंक'

माननीय मानव संसाधन विकास मंत्री, भारत सरकार

के कर कमलों द्वारा पुरस्कार वितरित
किए जाएंगे

इस समारोह में

आप सादर आमंत्रित हैं

03 दिसम्बर, 2019 (पूर्वाह्न 11:00 बजे से)
स्थान : प्रज्ञान (सभागार), अखिल भारतीय तकनीकी शिक्षा परिषद्,
नेल्सन मंडेला मार्ग, वसन्त कुंज,
नई दिल्ली–110070

Confirmation of Participation for Swachhta Ranking Awards 2019

Please refer to your invitation for the Award Ceremony of Annual Swachhta Rankings 2019, received on mail.
We hereby confirm the attendance of the following personnel from our University/College/Institution, for the function:

* Required

Email address *

principal@acoe.edu.in

Name of the University/College *

Aditya College of Engineering, Surampalem

University/College ID *

1-4023854

Title of first participant *

- [x] Dr.
- [ ] Ms.
- [ ] Mr.
- [ ] Mrs.

Name of first participant *

A. Ramesh

Contact No(first participant) *

9000476662

Title of second participant *

- [x] Dr.
- [ ] Ms.
- [ ] Mr.
- [ ] Mrs.

Name of second participant *

N. Sesha Reddy

Contact No (second participant) *

9989276662

Title of third participant

- [ ] Dr.
- [ ] Ms.
- [x] Mr.
- [ ] Mrs.
- [ ] Other:

Name of third participant

XYZ

Contact No(third participant)

9963176662

SUBMIT

Dr. A.Ramesh, Principal, Aditya College of Engineering receiving an Award for Swachhta campus ranking 2019 of Higher Educational Institutions from MHRD, Govt. of India.

PRINCIPAL

PRINCIPAL
Aditya College of Engineering
SURAMPALEM-533 437

ADITYA COLLEGE OF ENGINEERING
SURAMPALEM