

**GREEN AUDIT
REPORT OF SIETK**



**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)**

(Approved by A.I.C.T.E., New Delhi & Affiliated to J.N.T.U.A, Ananthapuramu)

(Accredited by NAAC with 'A' grade)

(Accredited by NBA for CIVIL, EEE, MECH, ECE & CSE Courses)

SIDDHARTH NAGAR, NARAYANAVANAM ROAD, PUTTUR – 517 583

CHITTOOR DIST., A.P., INDIA

7.1.6.1. The institutional environment and energy initiatives are confirmed through the following

1. GREEN AUDIT

➤ **OVERVIEW**

Siddharth Institute of Engineering and Technology (Autonomous), Puttur Andhra Pradesh was started in the year 2001 under the ambit of Jaya Education Society, Puttur. Since then, it has grown with time. At present, the Institute runs 12 UG programmes in Bachelor of Engineering (BE) and 7 Post Graduate programmes, Several Post graduation courses Master of Business Administration and Master of Computer Application with an annual intake of 1,320. Siddharth Institute of Engineering and Technology 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 30 % of the total area is occupied by open land and plantation that generates a better and sustainable campus environment.

➤ **GREEN AUDIT**

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. It aims to analyze environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. Green audit can be a useful tool for a college to determine how and where they are using the most energy or water and other resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. If self enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self enquiry is a natural and necessary outgrowth of a quality educational institution. Thus it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue 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 crises. 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. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures

➤ OBJECTIVES OF GREEN AUDITING

The objective of Green Auditing is its most imperative component. A well-defined objective enables the Green Auditor as well as his Team to conduct the auditing without deviating from the focus. Achievement in terms of Carbon Footprint reduction needs to be assessed in both quantitative and qualitative terms.

Objectives

- ❖ To assess whether the measures implemented by Siddharth Institute of Engineering and Technology (Autonomous), Puttur Andhra Pradesh have helped to reduce the Carbon Footprint
- ❖ To assess whether investments made in increasing awareness among students regarding electricity, biodiversity and environment have helped the Institution achieve the required carbon dioxide emission and absorption in the campus
- ❖ To assess whether non-academic activities of the Institution support the collection, recovery, reuse and recycling of solid wastes that harm the environment
- ❖ To identify gaps and suggest recommendations to improve the Green Campus status of the institution.

The Green Audit of campus, in recent past, is conducted by faculty and students (Table 1) of Civil and Electrical and Electronics Engineering.

Table 1: Audit Participants

Name	Designation/ Department
Dr. S Ramesh Raju	Prof &HOD, Dept of EEE, SIETK
Prof. C. Siva Kumar Prasad	Prof &HOD, Dept of CE, SIETK
Dr. D. Munirajasekhar	Prof, Dept of BSH, SIETK
Mr. B. Anandan	NSS Coordinator, SIETK
Mr. K N Suri Babu	Physical Director, SIETK
Mr. Ashok Naidu	Garden Supervisor, SIETK

➤ LOCATION AND AREA:

The Siddharth Institute of Engineering and Technology (Autonomous) was Located in the Puttur, which is 1 Km from the Puttur Railway Station. The Campus area is 29 acres with a built area of 10 acres (Table 2). The institution has excellent infrastructural facilities like

spacious classrooms, laboratories, workshops, libraries, faculty rooms, conference halls, auditoriums administrative block and other units. The campuses have aesthetically designed buildings, surrounded by gardens making it highly conducive for learning. The campus also houses separate hostels for men and women.

The campus has beautiful landscape, nurtured gardens and lawns. Dustbins have been provided along all major corridors for collection and disposal of waste. Water services have been provided both for gardening and drinking. Fire utility services have been installed all around the campus as per the regulatory norms suggested during the approval for the building plans. A separate engineering division (Building Section) in the institute ensures the maintenance of the campus with sufficient human resources. The campus provides the facilities such as Rain Water Harvesting, lawn and well grown trees to take institute environment eco-friendly. The land use data Siddharth Institute of Engineering and Technology (SIETK), Puttur Andhra Pradesh – 517583

Table 2: Land use data of SIETK

CATEGORIES OF LAND USE	AREA IN ACRES
OPEN SPACE	12
PLANTATION	7
BUILT UP AREA	10
TOTAL AREA	29

➤ CARBON FOOT PRINT REPORT OF SIETK CAMPUS

PREFACE

Environmental assessment at institutional level is very important towards the development of the quality of higher education. Apprehension about environmental deprivation and understanding the values of environment are coherent concerns of scholarly research, teaching and learning process. In its expedition for refining the environmental quality and to maintain a primeval environment for the future generation of students, Siddharth Institute of Engineering and Technology (Autonomous) has made a self-assessment on its environmental quality in the campus with the agenda of maintaining the greenery, health and heritage through promoting the environmental auditing process which also brings in awareness to everyone on the campus.

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 programme's organized by the authority 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, and supporting animal species, 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. Many animals are dependent on these trees mainly for food and shelter. Flowers and fruits are eaten by monkeys and nectar is a favorite of birds and many insects. Leaf – covered branches keep many animals, such as birds and squirrels, out of reach of predators. Different species display a seemingly endless variety of shapes, forms,

texture and vibrant colors. Even individual trees vary their appearance throughout the course of the year as the seasons change.

The strength, long lifespan and regal stature of trees give them a monument – like quality. They also remind us the glorious history of our institution. We often make an emotional connection with these trees and sometime become personally attached to the ones that we see every day. A thick belt of large shady trees in the periphery of the college have found to be bringing down noise and cut down dust and storms. Thus, the college has been playing a significant role in maintaining the environment of the entire campus and its surrounding areas.

SUMMARY OF THE GREENERY ON CAMPUS

The SIETK campus has a beautiful and serene atmosphere ideally suited for technical education. The infrastructure and facilities available on campus are amongst the very best. It is a wholly self-contained campus comprising of everything that students on campus would ever require. In order to take care of aesthetic dimensions of the campus, considerable efforts have been made in the recent past to beautify the campus.

Greenery in terms of the grass, permanent green plants, trees and flowers have been laid down all over the campus. Horticulture maintenance and development has been meticulously monitored to keep up with the changing weather. About 45% of the campus is covered with greens (Fig.1). The campus has an average population of 4000 every year including students, teaching faculty and non-teaching staff. Campus policies include sustainability as one of its main aims.



Figure 1: Greenery in the campus

TOTAL GREEN COVER IN SIETK CAMPUS

There are a wide range of greens in and outside the campus compound wall. For instance there are different species of flora and fauna on the campus. Currently there are six huge building blocks, five hostel buildings, one shed and one playground and one bus parking ground. Grasses, herbs, shrubs, crotons and semi grown fully branched trees and tall woody trees (Fig. 2) are prevailing on the campus covering all these buildings, lawns and grounds. On an approximate count, the total number of plants and trees on the campus are around 1200 (Table 3) and the grasses in the campus will be around millions and they play a significant role in carbon reduction. Also they add into the greenery and water holding capacity of the soils when it rains. Factually all these green plants and trees act as lungs for the campus through breathing in carbon dioxide and giving out fresh oxygen to the campus.

Table 3: Total green cover on campus (Approx.)

S No	TYPE OF GREENERY	NUMBERS (APPROX.)
1	Tall Woody trees	55
2	Semi grown complex branched trees	160
3	Shrubs (Crotons, flowering and non-flowering)	840
4	Herbs (Crotons, weeds, flowering and non-flowering)	145
	Total	1200



Figure. 2: Various types of Trees in the campus

CARBON ABSORPTION BY THE GREENS IN THE INSTITUTION

Horticultural experts from NC State University stated that a tree can absorb as much as 48 pounds of carbon dioxide per year and can sequester 1 ton of carbon dioxide by the time it reaches 40 years old.

Hence the carbon absorption capacity of one full-grown tree = 21.8 kg CO₂ per year which means a tree can sequester up to 0.06 kg per day. Therefore the carbon absorption capacity of 180 full-grown trees per day in the campus will be $(180 \times 0.06 \text{ kg CO}_2) = 10.8 \text{ kg}$ per day which is equivalent to 3924 kg or 3.9 tons of CO₂ per year.

The carbon absorption capacity of 99 semi-grown trees is approximately 50% of that of full-grown trees because these semi grown trees have more branches and leaves which can absorb bigger amounts of carbon. Hence, the carbon absorption will be 1962 kg or 1.9 tons of CO₂ per year.

There are 840 shrubs and 145 herbs and weeds of various species being raised around all the building blocks in the campus. All these shrubs and herbs are either bushy or wide leaved. Carbon absorption of bush plants varies widely according to the species. Certain bushes absorb as high as 49,000 g CO₂ per plant, whereas some others absorb as low as 150g CO₂ per plant. In the absence of a detailed scientific study and botanical survey, the per-plant carbon absorption was assumed to be 200g. Based on this, the total carbon absorption of 985 plants was calculated to be $985 \times 200 \text{ g} = 197000 \text{ g}$ or 197 kg or 0.19 tons of CO₂ sequestration per year.

The two lawns of the campus contain various species of grasses which might primarily be indigenous grass species that are being maintained in the lawn. The total area of the two lawns is around 37,600 sq.ft. The carbon absorption capacity of a 10-sq.ft. area of lawn is 1g CO₂. Hence, 37,600 sq.ft. of lawn captures 3760g or 3.76kg CO₂ per day. This means 1.37 tons per year CO₂ sequestration.

Hence the overall CO₂ sequestration achieved by the greenery in the campus is $(3.9 + 1.9 + 0.19 + 1.37) = 7.36$ tons of CO₂ absorption per year approximately 20.9kg per day. This is how the green plants and trees play a major role in curbing the carbon outputs from the campus (Table 3).

OXYGEN INPUTS BY THE GREENS IN THE INSTITUTION

Trees not only are meant for breathing the carbon but also the providers of human life. Especially oxygen. Single mature tree can absorb carbon dioxide at a rate of 48 pounds/year and release enough oxygen back into the atmosphere to support two human beings. One acre of trees annually consumes the amount of carbon dioxide equivalent to that produced by driving an average car for 26,000 miles. That same acre of trees (Fig. 3) also produces enough oxygen for 18 people to breathe for a year. A 100-foot tree, 18 inches diameter at its base, produces 6,000 pounds of oxygen. On average, one tree produces nearly 260 pounds i.e., 117.6 kg of oxygen each year. Hence the total oxygen emitted by 180 full-grown trees per year $(117.6 \times 180) = 21,168 \text{ kg}$ or 21.16 tons O₂ per year.

Total oxygen emitted by semi-grown branched trees $(58.8 \text{ kg} \times 90) = 5292 \text{ kg}$ or 5.2 tons per year as explained above the oxygen emission also is 50% of that of the full-grown

tree just like carbon capture rate. The total oxygen emitted by 840 shrubs and 145 herbs is calculated based on the following oxygen-inhaling requirement per person per day. A normal human being requires 550 litres of oxygen per day. Taking 400 plants as one unit, the number of units of shrubs and herbs in the campus are $985/400 = 2.46$. Therefore the total amount of oxygen produced by 2.46 units is $(11 \times 550 \text{ litres}) = 1353$ litres of oxygen per day. Thus per year, the amount of oxygen produced is $(1353 \times 365) = 4,93,845$ litres of oxygen, which is approximately 493.84 tons of oxygen per year.

The grass in a lawn of 25-sq.ft. area will supply enough oxygen to support one person for a day. Quantitatively speaking, this area of grass produces 550 litres of oxygen per day. The total area of lawn in the campus is 37,800 sq.ft. In units the value $(37,800/25) = 1512$ units, which produce $(1512 \times 550 \text{ litres of oxygen}) = 831,600$ litres of oxygen per day. Total quantity of oxygen produced by the 37,800 sq.ft. of Lawn per year $(831,600 \text{ Litres/day} \times 365) = 303,534,000$ litres or approximately 303.53 tons oxygen per year. Thus the total amount of oxygen produced by the greens in the institution per year is 843.42 tons and per day is 2.326 tons of oxygen from the entire green cover on the campus (Table 4).

Table 3: Carbon dioxide foot print of SIETK campus

S. NO	TYPE OF GREENERY	TONNES OF CO ₂ SEQUESTERED
1	Tall woody trees	3.9
2	Semi grown complex branched trees	1.9
3	Shrubs (Crotons, Flowering and non-flowering)	0.19
4	Herbs (Crotons, weeds, flowering and non-flowering)	1.37
TOTAL		7.36
S.NO	TYPE OF GREENERY	TONNES OF O ₂ PRODUCED
1	Tall woody trees	21.16
2	Semi grown complex branched trees	5.2
3	Shrubs (Crotons, Flowering and non-flowering)	493.84
4	Herbs (Crotons, weeds, flowering and non-flowering)	303.53
TOTAL		823.73

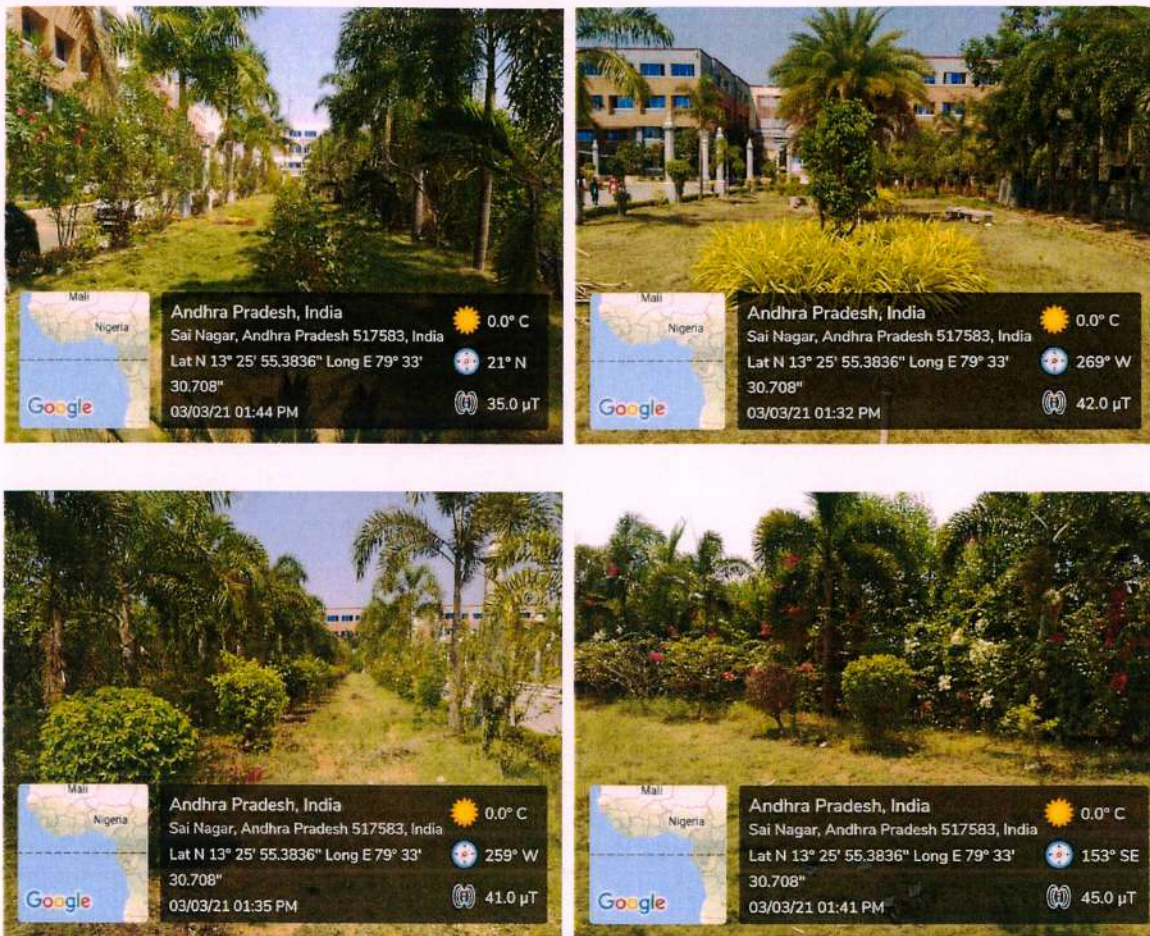


Figure. 3: Various types of Greens in the campus

➤ WATER

- Facilities of raw water intake through bore wells supply.
- Facility for waste water treatment through Sewage Treatment Plant (STP), recycled water utilized for lawns and plantations within the campus.
- Rain water Harvesting (RWH) facility which is located inside the campus is constructed to increase ground water level for summer usage.

➤ NOISE LEVEL in campus, Puttur

- Majority of the students comes from local city, are advised to utilize the college bus facilities.
- If students are using their own vehicles are strictly advised to minimize the speed limit and not to horn inside the campus.
- Also students are advised to not to use vehicles within the campus to minimize the air pollution. The vehicles are parked outside the college campus to make the campus free from the smoke.
- Using electrical vehicles (Fig. 4) in inside the campus.

- Even though Kadapa – Chennai highway runs beside the campus, no noise pollution harms the learning environment, as the buildings are nearly about 500mts away from the road and also the tall trees inside the campus acts as obstrucals for noise transmission.

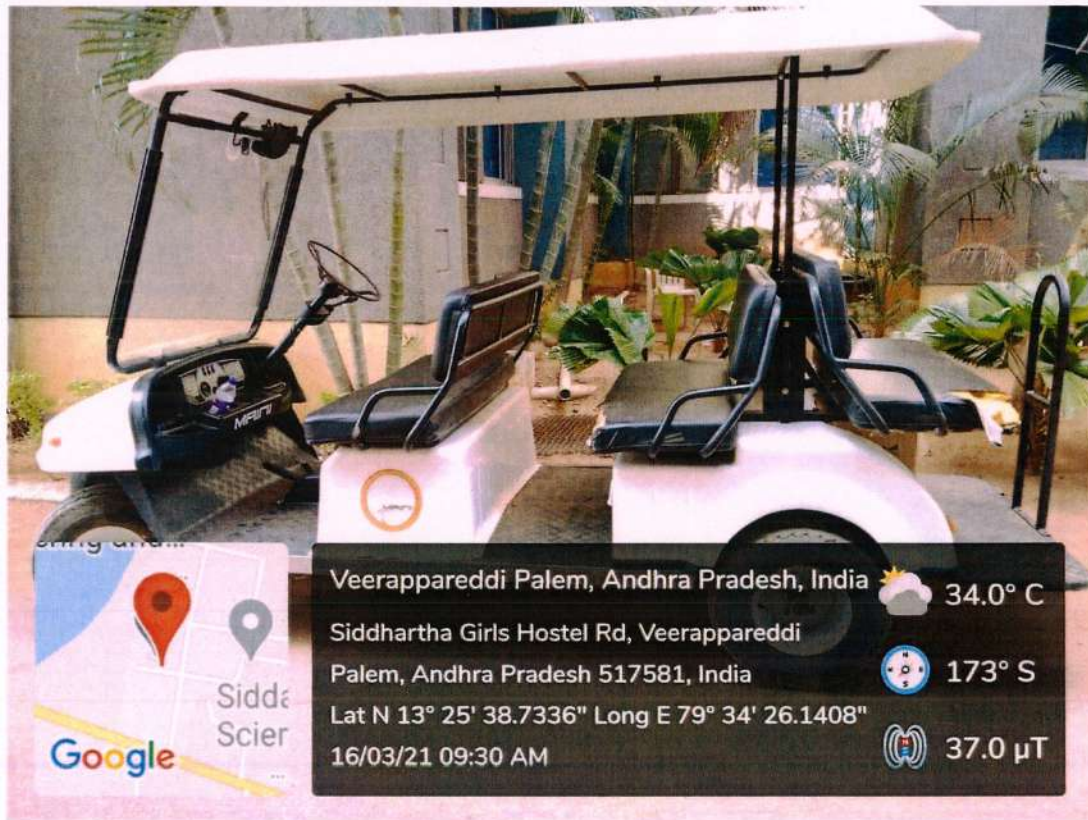


Figure. 4 electrical vehicles

➤ WASTE DISPOSAL

With smart initiatives like our Think Green Campus Model, Waste Management is helping colleges and universities achieve a higher level of environmental performance. By reusing or recycling we are: Contributing to the conservation of natural resources, saving energy, helping to protect the environment, Reducing landfill. We will also reduce our impact on the environment by minimizing the carbon emissions associated with both disposing of old products and obtaining new ones. SIETK adopts environment friendly practices and takes necessary actions such as – energy conservation, waste recycling, carbon neutral etc. The biological reusable waste generated are processed as organic manure for the plants available in the college campus and the other solid waste generated in the college campus is taken to the community bin for recycling and disposal

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5. BEYOND THE CAMPUS ENVIRONMENTAL PROMOTIONAL ACTIVITIES

The college provides dust bins in near villages and towns (outside the campus) which is used to store the E- waste and Solid wastes like waste papers, Blue books, vegetable matter and miscellaneous are systematically dumped into a earthen pit for natural decomposition instead of burning, thereby reduction in co2 has achieved. And also SIETK College adopting some of the villages, distribute the plants for each and every family and wants to growing trees. Also, the majority of the students and staff comes from local and villages are advised to utilize the APSRTC bus facilities.

- Also students and staff are advised to not to use vehicles unnecessarily outside the campus to minimize the air pollution.



Figure. 1 Trees planted at Kasimmitta village



Figure. 2 Dust bin provided at Kasimmitta village



Figure. 3 Awareness programme on plantation of trees



Figure. 4 Plants planted at Kasimmitta village

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