7.1.3: Quality audits on environment and energy regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following

Green ,Energy and Environment Audits

INDEX

PRINCIPAL
Avanthi Institute of Engg. & Tech
Gunthapally (V), Abdullapurmet (M), R.R.Dist

AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

(Gunthapally (V), Abdullapurmet(M), RR Dist, Hyderabad -501512.)

2022-2023

Green, Environment and Energy Audit

On 13 JULY 2022

Prepared By:

Dr. D. Seshikala, Dept . of Environment Science,

Dr. A. Vijaya Bhasker Reddy, Dept of Botany,

Dr. A.Nageswara Rao ,Dept of Zoology,

DEPARTMENT OF ENVIRONMENTAL SCIENCE
OSMANIA UNIVERSITY - HYDERABAD.

CERTIFICATE
(GREEN, ENERGY and ENVIRONMENT AUDIT)

This is to certify that Environmental, Energy and Green Audit has been conducted at the Avanthi Institute Of Engineering & Technology, Hayathnagar, RR Dist *by the Green Audit Committee, Department of Environmental Science of Osmania University, Hyderabad. The Committee has verified the Green initiatives carried out by the College and the College has successfully demonstrated knowledge on Energy Conservation, Water Conservation, Bio Diversity, Waste Management and Carbon footprint.*

The Green Audit Committee is pleased to declare the following grades in the following categories for their satisfactory performance and is valid from **2022** *to* **2023**

Green Initiatives	*'A' Grade*
Energy Conservation	*'A' Grade*
Environmental Protection	*'A' Grade*

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GREEN & ENVIRONMENT AUDIT REPORT

2022 – 2023

AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

AUDIT TEAM:

Dr. D. Seshikala, Dept . of Environmenrt Science,
Dr. A. Vijaya Bhasker Reddy, Dept of Botany,
Dr. A.Nageswara Rao, Dept of Zoology.

AS EXTERNAL AUDITORS

&

Chairman	**Dr. G. Ramchandra Reddy, Principal, AIET**
Vice Chairman	Mr. Swamy Rao Kulkarni, IQAC Co-ordinator
Special Invitee	Dr. Shaik Rusthum, Principal, Brilliant Institute of Engineering & Technology
Co-ordinator	Dr.T.Kranti Kumar,HOD of EEE
Members	1. Dr.Y.Ramesh Babu, HOD of MECH 2. Dr. Ramakrishna ,Faculty of Pharmacy 3. Mrs.B.Srilakshmi, Faculty of Chemistry
Invitee	Dr. Anwar, Dept. of Health
Student Members	1. Md.Soheel 2. V.Sandeep

As In house Team

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LIST OF ABBREVIATIONS USED

AIET	: Avanthi Institute of Engineering and Technology
AICTE	: All India Council for Technical Education
TSSRTC	: Telangana State Road Transport Corporation
B. Tech	: Bachelor of Technology
C	: Carbon
CSE	: Computer Science & Engineering
EEE	: Electrical & Electronics, Engineering
MBA	: Master of Business Administration
BS & H	: Basic Sciences and Humanities
PW P	: lastic Waste
Ca	: Calcium
CAD	: Computer Aided design
CAM	: Computer Aided Manufacturing
CO3	: Carbonates
DO	: Dissolved Oxygen
E waste	: Electrical & Electronic Waste
EC	: Electrical Conductivity
EKL	: Enviro Kamka3r LLP
Fig.	: Figure
Fe	: Ferrous ion
GHRDC	: Global Human Resource Development Centre
ha	: Hectare
HCO3	: Bicarbonates
Hp	: Horse Power
HSD	: High Speed Diesel
HW	: Hazardous Waste
ISO	: International Standards Organization
JNTUH	: Jawaharlal Nehru Technological University Hyderabad
K	: Potassium
kg	: Kilo Grams
KL	: Kilo litres
KLD	: Kilo litres Day
km	: Kilo Meters
Kvah	: Kilo volts amps per hour
KW	: Kilo Watts
LPG	: Liquefied Petroleum Gas
lph	: Litres per hour
M Tech	: Master of Technology
Mg	: Magnesium
MSW	: Municipal Solid Waste
Na	: Sodium
NAAC	: National Assessment and Accreditation Council

NBA	: National Board of Accreditation
NCC	: National Cadet Corps
NSS	: National Service Scheme
pH	: Potential of Hydrogen
PW	: Plastic Waste
RO	: Reverse Osmosis water plant
SO Carbon	: Soil Organic Carbon
sq m	: Square meter
TA	: Total Alkalinity
TDS	: Total dissolved solids
TH	: Total Hardness
UGC	: University Grants Commission

1. PREAMBLE

Avanthi Institute of Engineering and Technology (AIET) is a pioneer institution in main streaming "Environment and Sustainable development: in all its academic, administrative and extension programs, and aligned these with national missions on the environment, and climate change and complies with AICTE, NAAC, and university policies. AIET has initiated Green and Environmental Audits since the academic year 2020-2021, and with the inclusion of a third-party professional, **DEPARTMENT OF ENVIRONMENTAL SCIENCE, OSMANIA UNIVERSITY - HYDERABAD**, and gained experience in the Green and Environment Audits. This report deals with "Green and Energy Audit " for the academic year (AY) 2022 – 2023 and is a third consecutive annual audit.

The past two audit years have witnessed several perturbations in the functional modes of all the educational institutions because of the impacts of the Covid pandemic and thereby, the audit processes and the findings provided limited implications. However, they helped in streamlining the management systems related to Environmental education, awareness, natural resources, and energy conservation aspects. AIET has developed its own Environmental Policy in AY 2021-2022, based on which all green and environmental activities are being planned, implemented, reviewed, and verified. This AY 2022 – 2023 attempted to report the progress and conformity with the Environment Policy of AIET.

With a focus on academic excellence and holistic development, the institute aims to equip its students with the necessary skills and knowledge to excel in their respective fields. Over the years, AIET has garnered a reputation for its commitment to quality education and continues to play a significant role in shaping the future of engineering professionals in the region and beyond.

2. ABOUT AIET

Avanthi Institute of Engineering and Technology (AIET), an institution of the Avanthi Educational Society, established in 2005 is engaged in providing quality education and 1 contributing to the development of engineers for over 17 years. The founder of the institutions, Sri M. Srinivasa Rao, a philanthropist, has contributed to the development of these institutions with a vision to provide fair access to higher education to the students of the Telangana . The main campus of AIET (Fig.1) is located at Gunthapally, a semi-urban area situated near Abdullapurmet, Ranga Reddy district. Telangana, and is equidistance to most places of the region.

AIET offers various undergraduate and postgraduate programs in engineering and technology, and is affiliated with Jawaharlal Nehru Technological University, Hyderabad; approved by the All-India Council for Technical Education (AICTE), has been offering high-quality engineering education. It also accredited by the NAAC. In the year 2018, it received a B++ grade and a score of 3.00 scale points out of 4 in its NAAC accreditation. AIET also provides students with a holistic development experience through various activities such as Games & Sports, NCC, NSS, and other technological pursuits. With a spacious and an equipped for both outdoor and indoor games, the college offers excellent facilities for sports and recreational events.

Fig.1: AIET Campus Main Block

2.1. Campus Community:

AIET Campus community can broadly be considered under four categories: (a) Students and Research scholars; (b) Teaching Staff; (c) non-teaching staff; and (d) Associate 2 personnel. Of these four categories, Associates are such members who are associated with such activities like material suppliers; service providers, contractors, etc. More than 95% of the AIET members are Day comers. Thus, during Sundays and holidays campus activities will be at their low, including the requirement of essential resources. The distribution of the different sectors of the community is illustrated in Fig. 1, which indicates that during this AY students accounted for 2086 and their strength has increased from the previous year when it was 1990. In the case of the size of the other three sectors of the community, there was no change in their numbers from the previous year.

3. SCOPE OF GREEN AUDIT

The plans and activities of the AIET being implemented to realize the goals and objectives of AIET's Environment Policy shall be the broad scope of the Green Audit. The policy envisages that the AIET campus be made a "Green Campus" making it comply with a Net Zero emission campus (Fig.2). Further, encourage the participation of

all its members in environmental activities, more particularly in the conservation of natural resources, Energy, and minimization of waste. Towards this, the Environmental Management Cell of the AIET, and the Green Auditors, Dr. D. Seshikala, Dept . of Environmenrt Science, Dr. A. Vijaya Bhasker Reddy from Dept of Botany, Dr. A.Nageswara Rao from Dept of Zoology, have evolved documentation. Different methods including the documentation.

Implementation status of the GA recommendations of the previous year is included to enable a review of management systems for realizing the Environmental Policy's goals and objectives. Overall, the scope of the GA encompasses the management of natural resources, waste generation, adherence to green building norms, carbon footprint assessment, and ensuring active participation of all members, including the management.

Fig.2: Swachh Bharath Clean & Green Programme

4. METHODS ADOPTED

The Principal AIET had constituted an Internal Audit team (Table 1) to assist the External auditor and the team was constituted on 2nd June 2022. All the Heads of the departments and other wings of the institute were informed for cooperating with the audit team and the process.

Table 1: Internal Green , Environment & Energy Audit Team for the AY year 2022 – 2023.

Chairman	**Dr. G. Ramchandra Reddy, Principal, AIET**
Vice Chairman	Mr. Swamy Rao Kulkarni, IQAC Co-ordinator
Special Invitee	Dr. Shaik Rusthum, Principal, Brilliant Institute of Engineering & Technology
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Student Members	1. Md.Soheel 2. V.Sandeep

The Audit was carried out in three stages, each stage comprising of different activities as shown in Table. 2.

Table,2. Stages and Activities of the Green Audit of AIET for AY 2022 -2023

Pre Audit Stage	**•Appointment to external Audit Agency** **•Constitution of Audit team** **•Scoping of audit and finalization of methods** **•Initiating the Audit**
Audit Stag	•Units interactions •Documents Scrutinise •Collection and Validation of audit evidences. •Finalization of audit findings •Submission of Audit recommendations
Post Audit Stage	•Recommendation wise discussion and planning for improving the managements and other practices. 56

The external auditors from **Osmania University** and the Internal Audit team have met several times and revisited the audit protocols, interaction schedules, documentation of collected audit evidence, and inspections of conformities and started 2nd Stage of the process. Validation of the audit evidence was carried out by the External auditor using the standard methods for validation. The audit findings of each unit were shared with the concerned unit before their finalization.

5. GREEN AUDIT

Implementation of the audit recommendations of the AY 2021 - 2022, was first reviewed and the observations reveal that "though the implementation was slow in pace, the progress made is significant in the sense that the overall objectives of the policy goals can be achieved. The implementation status of the audit recommendations of the AY 2021 – 2022 is presented in table (3) below:

Table 3. Implementation Status of 2021-2022 Green Audit Recommendations:

R.No	Recommendation	Present Status.
1	AIET's EMC should develop an implementation plan for realizing the Environmental policy goals and objectives;	Objective wise plans are under progress with sub-committees constituted.
2	AIET has several high energy consumption electrical equipment and should have a time bound plan for their replacement with the energy efficient equipment or gadgets;	A sub-plan is being prepared and is a part of response to Recommendation 1
3	Although the resources consumptions appear to be high compared to the previous Audit Year, the present audit year the number of working days was almost twice to that of the previous year, as pandemic period was very short during this year. However, scope for further reduction in the consumption is high;	Strategies for reduction in resources consumption is being developed and is a part of response to Recommendation 1
4	The scope for enhancing Solar power generation is to be explored;	Noted and under consideration.
5	The scope for improving the biodiversity and carbon stocks in the vegetation also is high.	Is a part of response to Recommendation 1.
6	AIET should incorporate its Environmental Policy and the Green activities in its web site.	Complied with.

Over all, the implementation was successful and of the eight recommendations, two were already complied with, while the remaining are in different stages of their completion. The status of the different Green components for the AY 2022 – 2023 are as follows:

5.1.Land Use and Land Utilization:

AIET Campus at Gunthapally Village, near Abdullapurmet, has a spread of 4.15 ha of semi-urban land surrounded by rural green cover of (Fig.3). In this area, there was no change in the Land Use and Land utilization from the status of AY 2021-2022.

However, the constructed area has been improvised for better utilization by the addition of several indoor plants. A significant portion within the constructed area was allocated for different blocks which are discrete in distribution

Table 4. Distribution of Land use types in AIET as on August 2022.

LAND USE	Area (sq m)
Constructed Area	15,855
Pavements & Paths	8,096
Play Grounds	12,144
Under Greens	20,241
TOTAL LAND AREA	41520.746

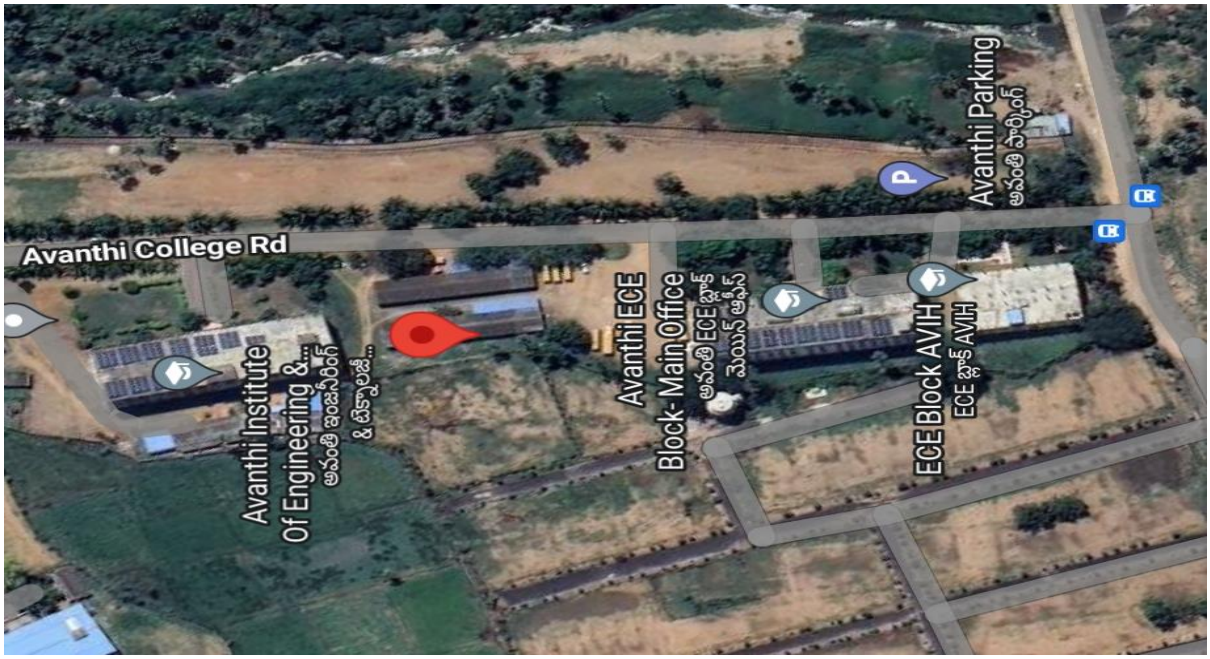

Fig. 3 . Satellite Image showing AIET Boundary and Greenery of the area.

About 24% of the constructed area, and around 14-16% of the land has been allocated for major departments like mechanical and electrical engineering and for laboratories (Fig. 4). These labs provide students with hands-on learning experiences and equip them with practical skills in their respective fields

The Electrical department building occupies 16% of the land, providing a dedicated space for academic and research activities related to Electrical engineering. Similarly, the administrative building, known as the Main Block, covers 14% of the land, serving as the central hub for administrative functions and student services.

5.2. Vegetation & Biodiversity:

The AIET campus has a spread of 4.15 ha of land, of this the green areas account for nearly 58% and supports over 38 different species of higher plants (Fig.4). Amongst these, the campus had 363 matured trees, while another 160 trees were in developing stages.

Fig.4: **Different varieties of trees and plants**

A. FLORA & PLANT DIVERSITY:

The flora of the campus comprises 38 species belonging to 34 genera and 17 families. Of these 17 were tree species and 19 were herb species, while shrubs were recorded with only two species. Among herbs and shrub species, exotic ornamental species were not taken into account. The list of plant species recorded is presented in Table (5).

Table 5: Flora species of AIET during 2022-2023

No	Family	Species	Habit	Common/Telugu Name
1	Acanthaceae	Peristrophepaniculata(Forssk). Brummitt	H	Cheburu
2	Amaranthaceae	Achyranthes aspera L.	H	Uttareni
3	Amaranthaceae	Alternanthera paronychioidesSt.	H	Ponnaganti
4	Amaranthaceae	Alternanthera sessilis	H	Ponnaganti
5	Amaranthaceae	Amaranthus virdis L.	H	Chilaca thotakura
6	Asteraceae	Ageratum conyzoides L.	H	PokaBanthi
7	Euphorbiaceae	Euphorbia hirtaL.	H	Nanubalu
8	Fabaceae	Cassia obtusifoliaL.	H	Tagirasa
9	Fabaceae	Crotalaria calycinal	H	
10	Fabaceae	Tephrosia purpurea (L.) Pers	H	Vempali
11	Malvaceae	Sida acuta BurmF.	H	
12	Piperaceae	Piper Betle	H	
13	Malvaceae	Sida cordifolia L.	H	
14	Nyctaginaceae	BoerhaviaeAIETtaL.	H	Punarnava
15	Fabaceae	Acacia Aneura	T	Mulaga
16	Fabaceae	Acacia catechu (L.f.) Willd	S	
17	Fabaceae	Hibiscus rosa-sinensis L	S	Mandara
18	Anacardiaceae	Mangifera indica	T	Mango
19	AAIETaceae	Borassus flabellifer	T	Thati
20	AAIETaceae	Cocos nucifera	T	Coconut
21	AAIETaceae	Wodyetiabifurcata	T	Foxtail palm
22	Combretaceae	Conocarpus eAIETtus	T	Conocorpus
23	Combretaceae	Terminalia catappa	T	Badam
24	Fabaceae	Acacia leucophloea(Roxb.) Willd.	T	Tellathumma
25	Fabaceae	Caesalpinia pulcherrima	T	Gulmohor
26	Fabaceae	Tamarindus indica	T	Chintha
27	Lamiaceae	Tectona grandis	T	Teak
28	Meliaceae	Azadirachta indica	T	Neem
29	Moraceae	Ficus benghalensis	T	Marri
30	Myrtaceae	Syzygiumcumini	T	Neeredu
31	Rubiaceae	Neolamarckiacadamba	T	Kadambari
32	Moraceaae	Artocaarpus Heterophyllus	T	Panasa/Jackfruit
33	Fabaceae	Saraca Asoca	T	Ashoka trees
34	Moraceaae	Ficus Religiosa	T	Raavi
35	Sapotaceae	Sapodilla	T	Sapota

36	Poaceae	Cynodon doctylon	H	Gariki
37	Poaceae	Aeluropus lagopoides	H	Gaddi
38	Malvaceae	Sida acuta	H	

H = Herb S = Shrub T – Tree

There were eight fruit bearing species and the overall Maximum Possible Diversity of the campus was at 3.664 bits as per the Shannon-Weiner Index. The Actual Species Diversity of tree species was at 2.609 bits with a Species Evenness of 0.903, indicating good distribution.

B. TREES ENUMERATION & BIOMASS:

There was no significant change in the population of the matured trees in the AIET campus as compared to the state in the previous AY 2021-2022. However, due to the Tree plantation activities during the year (Fig.5), the number of trees in the developing stages were recorded at 160, and within three years most of them will be contributing to the tree cover. Presently, 363 matured trees are existing in the campus. For the purpose of Trees biomass, only the matured trees were taken into consideration. Based on the girth and height of the trees enumerated, by using the standard ecological methods, the biomass of the trees for the 18 species was estimated and the total Tree Biomass was at 31.04 tons in the AY 2022-2023 (Table 6). This is 4.69 tons greater than the record of the previous audit year.

Fig.5:**Tree plantation activities during the year**

C. CARBON STOCKS:

The Carbon stocks in the trees of AIET campus were estimated using standard stock assessment methods. The general default value of 48% of the Dry weight recommended for tropical trees was adopted and thus the C stocks from the tress arrived at 14.898 tons. Added to this, another 47 tons of C was present in the soils. Thus, the total C stock in the AIET Campus was estimated at 62 tons.

Table 6. Tree Enumeration and Biomass Stock at AIET Campus during AY 2022-2023.

S No	Species	Mean GBH (cm)	Mean Ht (m)	Population	Total BM (Tons)
1	Mangifera indica L.	**40.5**	**7**	**18**	**1.491**
2	Borassus flabellifer L.	**40**	**9**	**44**	**4.572**
3	Cocos nucifera L.	**31**	**8**	**19**	**1.054**
4	Wodyetia bifurcate A.K. Irvine)	**38**	**6**	**62**	**3.876**
5	Conocarpus Erectus L	**27**	**7**	**23**	**0.847**
6	Terminalia catappa L.	**43**	**9**	**16**	**1.921**
7	Acacia leucophloea (Roxb.) Willd.	**28**	**6**	**3**	**0.102**
8	Caesalpinia pulcherrima (L.) SW.	**36**	**6**	**29**	**1.627**
9	Tamarindus indica L.	**40**	**6**	**22**	**1.524**
10	Tectona grandis L. f	**30.5**	**11**	**11**	**0.812**
11	Azadirachta indica A. Juss	**27**	**9**	**13**	**0.616**
12	Ficus religiosa L.	**39**	**7**	**1**	**0.077**
13	Syzygiumcumini L. Skeels	**59**	**6**	**12**	**1.809**
14	Neolamarckiacadamba (Roxb.) Bosser	**53**	**8**	**7**	**1.135**
15	Artocaarpus Heterophyllus	**37.5**	**6**	**4**	**0.244**
16	Acacia Aneura	**30.5**	**6**	**29**	**1.168**
17	Saraca Asoca	**22**	**7**	**40**	**0.978**
18	Sapodilla	**22.2**	**6**	**10**	**0.213**
	TOTAL				**24.067**

D. FAUNA:

The fauna records were almost the same as in the year 2021-2022, and therefore the same was reported for this year also. The campus vegetation at AIET serves as a habitat for various animal species, providing a home for diverse wildlife. During a single day's inventory, over 24 species were observed, as listed in Table 7. The most common

bird species found on campus is the Common Myna, while the presence of numerous butterfly species adds to the enchantment. In addition to these natural inhabitants, the campus supports a range of other fauna.

Table 7. List of major faunal species recorded in AIET Campus

S.No	Common name	Scientific Name	Type
AMPHIBIAN			
1	Common frog	Rana spp	Frog
REPTILES			
1	Tree Gecko	Hemidactylus sp	Lizard
2	Wall lizard	Hemidactylus prashadi	Lizard
3	Garden Lizard	Calotes versicolor	Lizard
BIRDS			
1	Red-vented bulbul	Pycnonotus cafer	Diurnal Birds
2	House Sparrow	Passer domesticus	Diurnal Birds
3	Common Myna	Acridotheres tristis	Diurnal Birds
4	Crow	Corvus corvidae	Diurnal Birds
5	Common Cuckoo	Cuculuc canorus	Diurnal Birds
6	Cattle Egret	Bubulcus ibis	Diurnal Birds
7	Rose ringed Parakeet	Psittacula krameria	Diurnal Birds
8	Black Drongo	Dicrurus marcrocerucus	Diurnal Birds
9	King fisher	Alcedinidae	Diurnal Birds
10	Eagle	Accipitridae	Diurnal Birds
11	Butterfly	Rhopalocera	Diurnal Birds
12	Dragonfly	Anisoptera	Diurnal Birds
MAMMALS			
1	Squirrel	Sciuridae	Squirrel
2	House Rat	Rattus rattus	Rat
BUTTERFLIES			
1	Plain Tiger	Danaus chrysippus	Insects
2	The Gram Blue	Euchrysopscnejus	Insects
3	Common Baron	Euthaliagaruda	Moth
4	Common Cerulean	Jamidesceleno	Moth
5	Common sailor	Neptishylas	Moth
6	The Blue Tiger	Tirumala limniace	Moth

5.3. Water Resources Management:

The total water consumption of the AIET can be classified into THREE use categories:

1. Academic and administration
2. Transportation and Other Utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are Two borewells existing in the campus (Fig.6), each connected to a separate overhead tank located at various academic, and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 15 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 6 KLD. All gardens and green zones used about 7 KLD of water, of which 6 KLD is sourced from RO reject waters. Overall, AIET utilizes 22 KLD of groundwater on all working days.

Fig.6: 7HP Motor capacity was installed near the EEE Block

AIET has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are One RO plants, with a capacity of 1000 liters (2000 liters in total). On all Sundays and general holidays, the water consumption was at 4 KLD, which is less than 20% of the consumption during working days.

Fig.7: RO water plants

Overall, compared to the AY 2021-2022, this audit year has shown a saving of 4 KLD and consequently, the per capita consumption has come down to 9.6 lpd.

AIET has One RO water plant (Fig.7), and it produces 3 litters of wastewater for every 1 liter of treated water. On working days, approximately 6 KLD (Kilo Liters per Day) of water is rejected by RO plant. The rejected water is used for gardens and green areas.

The Pre-monsoon water quality of the two bore wells being used by AIET was analysed for drinking water quality standard IS 10500. The results are presented in Table (7). The results indicate that the water quality was almost the same in the two sources and also there was no significant change from the water quality of the previous AY 2021-2022. The water quality complies with the IS 10500 standard, with the only exception being TDS (Total Dissolved Solids), which is slightly higher than the permissible levels.

Table 7. Pre-monsoon Water Quality of the Ground waters of AIET – 2022-23.

S.No	Parameter*	BW-1	BW-2	IS 10500
1	pH	7.2	7	6.5-8.5
2	EC	243.8	247.8	500
3	TDS	412	412	500
4	TH	212	215	300
5	Ca	62	60	75

6	Mg	22	21.4	30
7	Na	11	14	200
8	k	8	7	10
9	Fe	0.05	0.05	0.3
10	Cl	100	100	250
11	PO_4	1	0.8	10
12	NO_2	0.03	0.03	1
13	F	0.4	0.4	1.2
14	TA	122.5	128.8	200
15	CO_2	36.1	30.2	---
16	HCO_3	229	227	---
17	DO	3	2.9	4.8

* = All parameters are in mg/l, with the exception of pH

5.4.Energy Management:

With the aim to become a model institution for energy efficiency and conservation, AIET has initiated its energy management and the institution conducting exclusive energy audits to assess its energy management practices and efficiency. The findings of these audits, conducted by an accredited consultant, are documented in the energy audit reports. This report provides an overview of the institution's energy utilization and management within the context of the environment, highlighting its significance as a crucial aspect of the overall environmental management in relation to carbon emissions. AIET meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power
4. LPG

Compared to the remaining three sources, the use of LPG was very insignificant. The use of Solar power had a history of Five years.

5.4a. HT Power Consumption:

During the audit year, the Institute consumed a total of 215 KVAh of electricity from the metered connection, with a monthly average of 17.9 KVAh. Monthly variations in consumption were significant, ranging from a low of 15 KVAh in March 2023 to a high of 19 KVAh in September 2022 The annual Mean Power Factor was 0.96. Therefore, the annual consumption is equal to 206.4 KW.

Compared to the previous year, the consumption is very high during the AY 2022-2023 and exceeded by 38% from the previous year. However, the previous year was partly affected by the COVID closures and virtual mode. AIET's Electricity use can be

considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Computers, labs, and Machinery. During the audit year, the use by Air-conditioning sector was the maximum, accounting for 48% of the total load, followed by Computers and Machinery sector accounting for nearly 23% of the total load.

5.4b. Power generated from Solar Systems:

The Institute has installed rooftop power generation systems (Fig.8), with a capacity of 120 KWp, During the audit year, a total of 118211 Units was generated, which is equivalent to 54.96% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.

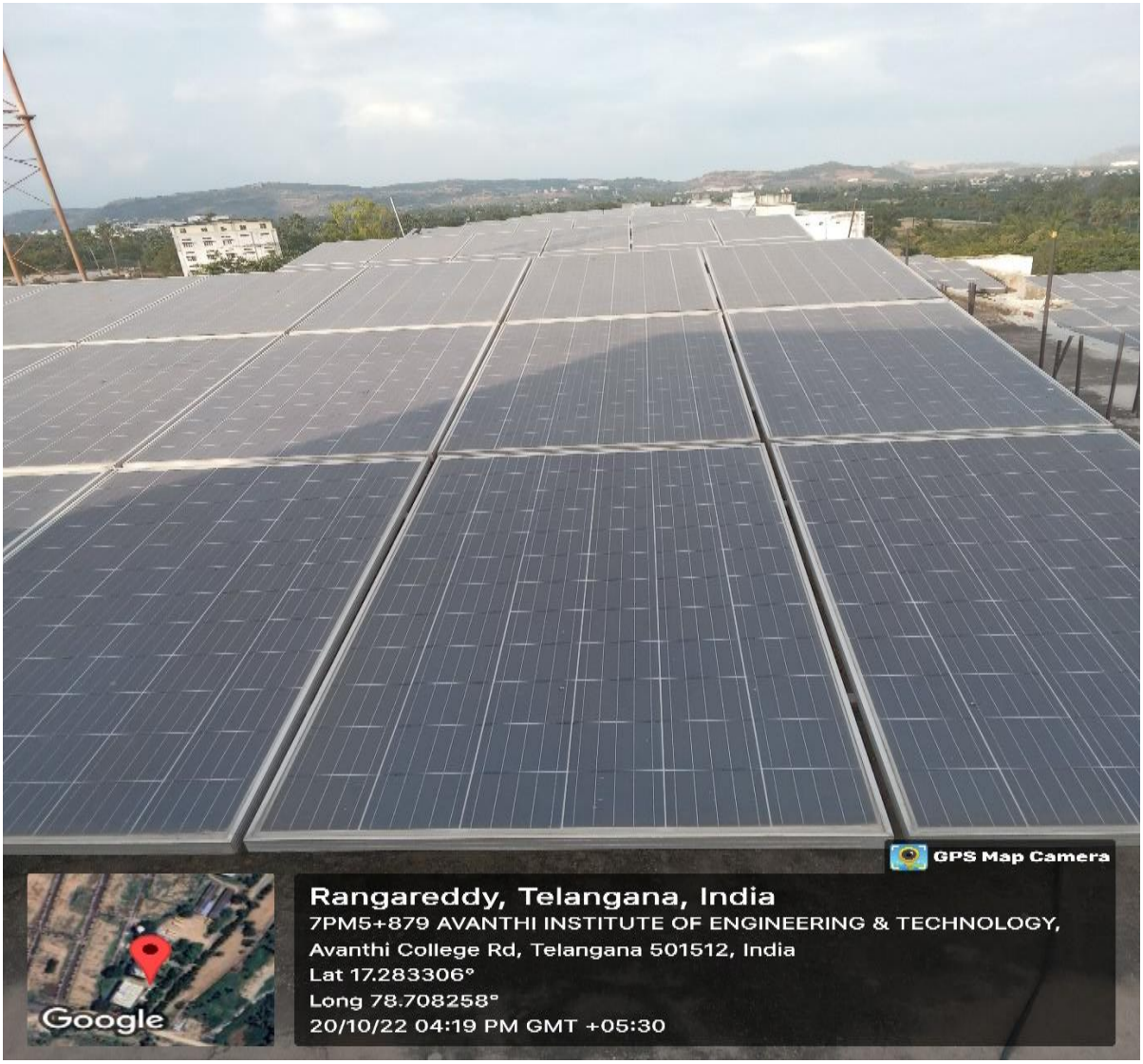

Fig.8: Installed solar panels on roof top of the BLOCK-I & BLOCK-II each having capacity of 60 KW

5.4c. Power Generated from DG Sets:

AIET has one DG set generators (Fig.9) as backup power supply, with capacities of 62.5 KVA. During the audit year, the generator consuming around 600 liters of Diesel oil. The cost of power generated from the DG sets was around Rs. 14.1/KWh.

Overall, the total electricity consumption from all three sources, including the DG sets, was 215097 KVAh.

Fig.9: DG-SET 62.5KVA

5.4d. Energy for Transportation:

AIET being an institution with no residential facility and all the members are dependent on transportation. Thus, Transportation is a major sector demanding high energy consumption.

With its 09 buses fleet, AIET provides transport facility for 35% of its members. The average trip length for the buses was at 72 km /day, and provides the facility for 450 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 69,350 liters. This translates to a per capita consumption of 33.24 liters per annum. The per capita consumption of this AY is l2 liters less than that of the previous year's and is a significant saving. Around 79% of the AIET community members utilize the other modes. This includes 60.57% using public transportation, 8.89% using auto-rickshaws, 9.04% using their own two-wheelers, and 0.5% use four-wheelers.

5.4e. LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 40 non-domestic cylinders (40 X 19 kg) and Four domestic cylinders (4 X 14.8 kg). Thus, the estimate was 819.2 Kg. There was no change in the consumption from the previous year.

5.4f. Abstract of Energy Use:

AIET's total energy use from different sources and for several purposes during the AY 2022-2023 is presented below:

- ➢ HT Power from Grid : 96886 Units
- ➢ HSD Used : 69,950 Litres (Buses + HSDG)
- ➢ LPG : 819.2 Kg
- ➢ Solar Power Generated : 118211 Units

Compared to AY 2021-2022, this AY had high consumption and this is mainly because of the institution was functioning virtually due to pandemic conditions and therefore a great amount of electricity and transportation were not reflected.

Renewable energy generation (Solar Power) was the same during the previous and current years. 5.4g. Energy Use & Carbon Footprint: While meeting its energy needs, AIET could generate nearly 54.96% of its energy needs from renewable source of solar power. However, transportation has become a major contributor to the consumption of HSD and thereby to the pollution loads. The carbon emissions from the energy management during the audit year are presented in Table 7 below, which reveals that the net Carbon emissions from the AIET stands at 246.7 t CO2 e/annum.

Table 7. CO2 Emissions from AIET during the AY 2022 – 2023.

S.No	Emission Source	Annual Consumption	CO2 emission Factor (kg/Unit)	Total CO2 emissions (kg)	Total emissions (t CO2e/ann)
1	**Grid Electricity**	96886 KVAh	0.94	52760.32	53
2	**Diesel Oil**	69,950litres	2.68	108142.36	**109**
3	**LPG**	819.2 Kg	2.252	108143.36	**0**
TOTAL Carbon emissions					**162**
Emission Offset through Solar Power					**52**
NET Carbon emissions					**110**

Compared to the previous year, Net emissions during the AY 2022-2023 have increased by 14.4 t CO2 e. However, if the per capita C02 emissions is considered, the current year had 0.089 t CO2 e/head/annum compared to 0.095 t CO2 e of AY 2021-2022.

5.5. Solid Wastes Management:

Solid Waste Management is one area where AIET is striving to develop suitable models. After initiating Green Audits, the AIET community, particularly students and researchers are focussing on effective segregation and quantification of different wastes. For the purpose of waste management, all the solid waste are classified as per the standard norms. At the first instance, Two Categories are recognized: (1) Wet waste; and (2) Dry Waste. The first category is usually generated from Canteen, Dining Halls, Waiting Rooms, and other areas of gathering places. At identified places, wet waste collection bins were provided.

On the other hand, the second category, Dry Waste was further classified into Five types: (1) Paper & Board; (2) Plastic; (3) Glass & Metallic; (4) E-Waste; and (5) Sanitary Waste. The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E-Waste. The estimates of different wastes and their disposal route are presented in Table(8) below:

Table 8. Solid Wastes generation and Disposal Routes followed by AIET during AY 2022-2023.

S.No	Waste Type	Waste Type	Qty	Disposal
1	Wet Waste	DiningHalls, Messes& Canteen	3 kg/day	To Compost
2	Paper & Board	Administrative & Academic	2.3 kg/day	Authorized Collectors
3	Metallic	All	negligible	IC/Authorized Collectors
4	Plastic	All	0.12 kg/day	IC/Authorized Collectors

In terms of solid waste management, AIET has implemented various initiatives through its Innovation Centre. Metallic, plastic, and e-wastes are examined by the members of the Innovation Club to explore opportunities for reuse, repair, recovery, or reduction, fostering innovation among the students. Overall, AIET's waste management practices aim to minimize waste generation, promote recycling and composting, and encourage innovative approaches to waste reduction and reuse.

6. GREEN AUDIT: OBSERVATIONS & RECOMMENDATIONS

1. All students need to be involved in enhancing and appreciating the campus biodiversity. This on one hand helps in the total inventory of the flora and fauna, and on the other enables the students to realize Biodiversity as the Natural Capital for the sustainable development;
2. Recommended to replace at least 20% of the electrical and electronic gadgets which are not certified for energy efficiency;
3. Improvement in the Carbon stock in the Greens is commendable.;
4. The scope for enhancing Solar Power generation is to be explored;
5. The Institute's website should have a separate link for Green and Environment activities and need to be monitored and updated by the EMC.

PROCEEDINGS OF THE COMMISSIONER OF COLLEGIATE EDUCATION: TELANGANA STATE, HYDERABAD

Present: Sri. Navin Mittal, IAS

Sub: CCETS – Quality Initiatives of GDCs –Green Audit for all GDCS – Constitution of State Level Committee – Reg.

Ref: Proceedings of CCE File No. CCE-AC/QLTY/NAAC/1/2021-Academic Cell;Dt.23.04.2121

As part of the quality initiatives of Government Degree Colleges and to facilitate the GDCs to secure a better grade in NAAC accreditation, it is decided to conduct Green Audit for all Government Degree Colleges in the state. A proactive and enlightened Green Audit helps to keep the environment on the campus, pollution free, neat & clean.

For administrative convenience, it is decided to constitute a two tier Audit Committee i.e., State level and College level. Vide reference read above, the Commissioner of Collegiate Education has constituted college level 'Green Audit' Committee to audit various categories of green audit, like Water Audit, Energy Audit, Trees & Plants Audit, Environmental Audit, e-Waste Audit, Carbon Foot Print etc. The College Level Committee should audit these various categories of green audit within the college campuses.

The State Level Committee examines the College level audit reports of various colleges and thoroughly scrutinizes the documents submitted by the Principals of GDCs. Based on the recommendations of the State Level Audit committee, the colleges shall be issued audit certificates. The audit period is valid for Two Years from the date of issue of certificate.

The composition of State Level Audit Committee consists of the following:

i. Dr. Ghanshyam, Academic Guidance Officer, O/o CCE – Chairman
ii. Dr.D.Seshikala, Asst. Professor, Dept. of Environmental science, University College of Science, O.U, Hyderabad– External Member
iii. Dr. A. Vijaya Bhaskar Reddy, Asst. Professor, Department of Botany, Nizam College, O.U - External Member
iv. Dr. Amanchi Nageswar Rao, Asst. Professor, Dept. of Zoology, Nizam College O.U - External Member
v. Sri. T.Suresh Kumar, Academic Officer, O/o, CCE - CCE Member
vi. Dr. P.Rachana, Academic Officer, O/o CCE - CCE Member
vii. Sri. P. Ravi Chandra, Academic Officer, O/o CCE - CCE Member

Further, the colleges would be provided all the required audit documents and the college level audit committee should complete the auditing process for all kinds of audit by following the guidelines issued in this regard and submit the same to the O/o CCE. The External audit team will assess and evaluate the internal audit report and after thorough verification certificate along with grade will be issued to the concerned GDCs.

For assessment and evaluation of Green Audit, the following grading system shall be followed.

GRADING FOR GREEN AUDIT

S.NO	COMPONENTS FOR ASSESSMENT	MARKS	GRADES
1	Energy audit	**20**	**A+ : 91-100** **A : 81-90** **B+ : 71-80** **B : 61-70** **C : 51 - 60**
2	Waste audit	**15**	
3	Water audit	**15**	
4	Landscape or Environment audit	**15**	
5	Carbon footprint & Oxygen emission audit	**15**	
6	Green activities (conduction of seminars/conferences/workshops/student competitions/awareness programmes/observation of environmental related days etc.	**10**	
7	Student clubs (Environmental club/Green club/Nature club/Biodiversity club/ ECO Club/Friends and Fauna Club/Science club etc.) activity annual report	**10**	
Total		**100**	

Hence, all the Principals of Government Degree Colleges are here by directed to conduct Green Audit by following all the guidelines issued in this regard and submit the periodical compliance report to the O/o CCE.

Signature Not Verified

Digitally signed by NAVIN MITTAL IAS
Date: 2021.05.22 16:08:08 IST
Reason: Approved

Commissioner of Collegiate Education

Copy to all the Principals of Government Degree Colleges

AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

(Gunthapally (V), Abdullapurmet(M), RR Dist, Hyderabad -501512.)

2021-2022

Green, Environment and Energy Audit

On 24 June 2021

Prepared By:

Dr. D. Seshikala, Dept . of Environment Science, OU.

Dr. A. Vijaya Bhasker Reddy, Dept of Botany, OU.

Dr. A.Nageswara Rao ,Dept of Zoology, OU.

DEPARTMENT OF ENVIRONMENTAL SCIENCE
OSMANIA UNIVERSITY - HYDERABAD.

CERTIFICATE
(GREEN, ENERGY and ENVIRONMENT AUDIT)

This is to certify that Environmental, Energy and Green Audit has been conducted at the Avanthi Institute Of Engineering & Technology, Hayathnagar, RR Dist *by the Green Audit Committee, Department of Environmental Science of Osmania University, Hyderabad. The Committee has verified the Green initiatives carried out by the College and the College has successfully demonstrated knowledge on Energy Conservation, Water Conservation, Bio Diversity, Waste Management and Carbon footprint.*

The Green Audit Committee is pleased to declare the following grades in the following categories for their satisfactory performance and is valid from 2021 *to* 2022

Green Initiatives	*'A' Grade*
Energy Conservation	*'A' Grade*
Environmental Protection	*'A' Grade*

Dr. D. Seshikala
Dept. of Environ.Scelnce
OU, Hyderabad

Dr. A. Vijaya Bhasker Reddy
Dept. of Botany
Nizam College, OU, Hyd.

Dr. A. Nageswara Rao
Dept. of Zoology
Nizam College, OU, Hyd.

GREEN & ENVIRONMENT AUDIT REPORT

2021 – 2022

AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

AUDIT TEAM:

Dr. D. Seshikala, Dept . of Environmenrt Science,
Dr. A. Vijaya Bhasker Reddy, Dept of Botany,
Dr. A.Nageswara Rao, Dept of Zoology.

AS EXTERNAL AUDITORS

&

Chairman	**Dr. G. Ramchandra Reddy, Principal, AIET**
Vice Chairman	Mr. Swamy Rao Kulkarni, IQAC Co-ordinator
Special Invitee	Dr. Shaik Rusthum, Principal, Brilliant Institute of Engineering & Technology
Co-ordinator	Dr.T.Kranti Kumar,HOD of EEE
Members	1. Dr.Y.Ramesh Babu, HOD of MECH 2. Dr. Ramakrishna ,Faculty of Pharmacy 3. Mrs.B.Srilakshmi, Faculty of Chemistry
Invitee	Dr. Anwar, Dept. of Health
Student Members	1. D.Shiva 2. J.Kiran

As In house Team

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LIST OF ABBREVIATIONS USED

AIET	: Avanthi Institute of Engineering and Technology
AICTE	: All India Council for Technical Education
TSSRTC	: Telangana State Road Transport Corporation
B. Tech	: Bachelor of Technology
C	: Carbon
CSE	: Computer Science & Engineering
EEE	: Electrical & Electronics, Engineering
MBA	: Master of Business Administration
BS & H	: Basic Sciences and Humanities
PW P	: lastic Waste
Ca	: Calcium
CAD	: Computer Aided design
CAM	: Computer Aided Manufacturing
CO3	: Carbonates
DO	: Dissolved Oxygen
E waste	: Electrical & Electronic Waste
EC	: Electrical Conductivity
EKL	: Enviro Kamka3r LLP
Fig.	: Figure
Fe	: Ferrous ion
GHRDC	: Global Human Resource Development Centre
ha	: Hectare
HCO3	: Bicarbonates
Hp	: Horse Power
HSD	: High Speed Diesel
HW	: Hazardous Waste
ISO	: International Standards Organization
JNTUH	: Jawaharlal Nehru Technological University Hyderabad
K	: Potassium
kg	: Kilo Grams
KL	: Kilo litres
KLD	: Kilo litres Day
km	: Kilo Meters
Kvah	: Kilo volts amps per hour
KW	: Kilo Watts
LPG	: Liquefied Petroleum Gas
lph	: Litres per hour
M Tech	: Master of Technology
Mg	: Magnesium
MSW	: Municipal Solid Waste
Na	: Sodium
NAAC	: National Assessment and Accreditation Council

NBA	: National Board of Accreditation
NCC	: National Cadet Corps
NSS	: National Service Scheme
pH	: Potential of Hydrogen
PW	: Plastic Waste
RO	: Reverse Osmosis water plant
SO Carbon	: Soil Organic Carbon
sq m	: Square meter
TA	: Total Alkalinity
TDS	: Total dissolved solids
TH	: Total Hardness
UGC	: University Grants Commission

1. PREAMBLE

Avanthi Institute of Engineering and Technology (AIET) is a pioneer institution in main streaming "Environment and Sustainable development: in all its academic, administrative and extension programs, and aligned these with national missions on the environment, and climate change and complies with AICTE, NAAC, and university policies. AIET has initiated Green and Environmental Audits since the academic year 2020-2021, and with the inclusion of a third-party professional, **DEPARTMENT OF ENVIRONMENTAL SCIENCE, OSMANIA UNIVERSITY - HYDERABAD**, and gained experience in the Green and Environment Audits. This report deals with "Green and Energy Audit " for the academic year (AY) 2021 – 2022 and is a Second consecutive annual audit.

The past one audit year have witnessed several perturbations in the functional modes of all the educational institutions because of the impacts of the Covid pandemic and thereby, the audit processes and the findings provided limited implications. However, they helped in streamlining the management systems related to Environmental education, awareness, natural resources, and energy conservation aspects. AIET has developed its own Environmental Policy in AY 2021-2022, based on which all green and environmental activities are being planned, implemented, reviewed, and verified. This AY 2021 – 2022 attempted to report the progress and conformity with the Environment Policy of AIET.

With a focus on academic excellence and holistic development, the institute aims to equip its students with the necessary skills and knowledge to excel in their respective fields. Over the years, AIET has garnered a reputation for its commitment to quality education and continues to play a significant role in shaping the future of engineering professionals in the region and beyond.

2. ABOUT AIET

Avanthi Institute of Engineering and Technology (AIET), an institution of the Avanthi Educational Society, established in 2005 is engaged in providing quality education and 1 contributing to the development of engineers for over 16 years. The founder of the institutions, Sri M. Srinivasa Rao, a philanthropist, has contributed to the development of these institutions with a vision to provide fair access to higher education to the students of the Telangana . The main campus of AIET (Fig.1) is located at Gunthapally, a semi-urban area situated near Abdullapurmet, Ranga Reddy district. Telangana, and is equidistance to most places of the region.

AIET offers various undergraduate and postgraduate programs in engineering and technology, and is affiliated with Jawaharlal Nehru Technological University, Hyderabad; approved by the All-India Council for Technical Education (AICTE), has been offering high-quality engineering education. It also accredited by the NAAC. In the year 2018, it received a B++ grade and a score of 3.00 scale points out of 4 in its NAAC accreditation. AIET also provides students with a holistic development experience through various activities such as Games & Sports, NSS, and other technological pursuits. With a spacious and an equipped for both outdoor and indoor games, the college offers excellent facilities for sports and recreational events.

Fig.1: AIET Campus Main Block

2.1. Campus Community:

AIET Campus community can broadly be considered under four categories: (a) Students and Research scholars; (b) Teaching Staff; (c) non-teaching staff; and (d) Associate 2 personnel. Of these four categories, Associates are such members who are associated with such activities like material suppliers; service providers, contractors, etc. More than 95% of the AIET members are Day comers. Thus, during Sundays and holidays campus activities will be at their low, including the requirement of essential resources. The distribution of the different sectors of the community is illustrated in Fig. 1, which indicates that during this AY students accounted for 1988 and their strength has increased from the previous year when it was 1651. In the case of the size of the other three sectors of the community, there was no change in their numbers from the previous year.

3. SCOPE OF GREEN AUDIT

The plans and activities of the AIET being implemented to realize the goals and objectives of AIET's Environment Policy shall be the broad scope of the Green Audit. The policy envisages that the AIET campus be made a "Green Campus" making it comply with a Net Zero emission campus (Fig.2). Further, encourage the participation of

all its members in environmental activities, more particularly in the conservation of natural resources, Energy, and minimization of waste. Towards this, the Environmental Management Cell of the AIET, and the Green Auditors, Dr. D. Seshikala, Dept . of Environmenrt Science, Dr. A. Vijaya Bhasker Reddy from Dept of Botany, Dr. A.Nageswara Rao from Dept of Zoology, have evolved documentation. Different methods including the documentation.

Implementation status of the GA recommendations of the previous year is included to enable a review of management systems for realizing the Environmental Policy's goals and objectives. Overall, the scope of the GA encompasses the management of natural resources, waste generation, adherence to green building norms, carbon footprint assessment, and ensuring active participation of all members, including the management.

Fig.2: Swachh Bharath Clean & Green Programme

4. METHODS ADOPTED

The Principal AIET had constituted an Internal Audit team (Table 1) to assist the External auditor and the team was constituted on 24th June 2021. All the Heads of the departments and other wings of the institute were informed for cooperating with the audit team and the process.

Table 1: Internal Green , Environment & Energy Audit Team for the AY year 2021 – 2022.

CHAIRMAN	**DR. G. RAMCHANDRA REDDY, PRINCIPAL, AIET**
Vice Chairman	Mr. Swamy Rao Kulkarni, IQAC Co-ordinator
Special Invitee	Dr. Shaik Rusthum, Principal, Brilliant Institute of Engineering & Technology
Co-ordinator	Dr.T.Kranti Kumar,HOD of EEE
Members	1. Dr.Y.Ramesh Babu, HOD of MECH 2. Dr. Ramakrishna ,Faculty of Pharmacy 3. Mrs.B.Srilakshmi, Faculty of Chemistry
Invitee	Dr. Anwar, Dept. of Health
Student Members	1. D.Shiva 2. J.Kiran

The Audit was carried out in three stages, each stage comprising of different activities as shown in Table. 2.

Table,2. Stages and Activities of the Green Audit of AIET for AY 2021 -2022

Pre Audit Stage	**•Appointment to external Audit Agency** **•Constitution of Audit team** **•Scoping of audit and finalization of methods** **•Initiating the Audit**
Audit Stag	•Units interactions •Documents Scrutinise •Collection and Validation of audit evidences. •Finalization of audit findings •Submission of Audit recommendations
Post Audit Stage	•Recommendation wise discussion and planning for improving the managements and other practices. 56

The external auditors from **Osmania University** and the Internal Audit team have met several times and revisited the audit protocols, interaction schedules, documentation of collected audit evidence, and inspections of conformities and started 2nd Stage of the process. Validation of the audit evidence was carried out by the External auditor using the standard methods for validation. The audit findings of each unit were shared with the concerned unit before their finalization.

5. GREEN AUDIT

Implementation of the audit recommendations of the AY 2020 - 2021, was first reviewed and the observations reveal that "though the implementation was slow in pace, the progress made is significant in the sense that the overall objectives of the policy goals can be achieved. The implementation status of the audit recommendations of the AY 2020 – 2021 is presented in table (3) below:

Table 3. Implementation Status of 2020-2021 Green Audit Recommendations:

R.NO	RECOMMENDATION	PRESENT STATUS.
1	The plantation of Trees is a continual process which is under implementation the total green area coverage is 06.25 acres which is mandatory for mitigating the Global warming ;	Implimented Objective wise plans are under progress with sub-committees constituted.
2	The Campus is having 120 KWp Grid Connected Solar PV Plant, it is recommended to enhance further 50 KWp capacity	A sub-plan is being prepared
3	It is recommended to rectify / repair the leaky taps and construct the water harvesting pits	Replaced With new Taps and Water harvesting pits Constructed
4	Paper waste is collected in dust bins and disposed to scrap merchant	Implemented.
5	It is implemented to Ban/ discourage the usage of plastic water bottles inside the campus	Conducted Awareness Programme “On NO Plastics”

Over all, the implementation was successful and of the eight recommendations, two were already complied with, while the remaining are in different stages of their completion. The status of the different Green components for the AY 2021 – 2022 are as follows:

5.1.Land Use and Land Utilization:

AIET Campus at Gunthapally Village, near Abdullapurmet, has a spread of 4.15 ha of semi-urban land surrounded by rural green cover of (Fig.3). In this area, there was no change in the Land Use and Land utilization from the status of AY 2020-2021.

However, the constructed area has been improvised for better utilization by the addition of several indoor plants. A significant portion within the constructed area was allocated for different blocks which are discrete in distribution

Table 4. Distribution of Land use types in AIET as on 2021.

LAND USE	Area (sq m)
Constructed Area	15,855
Pavements & Paths	8,096
Play Grounds	12,144
Under Greens	20,241
TOTAL LAND AREA	41520.746

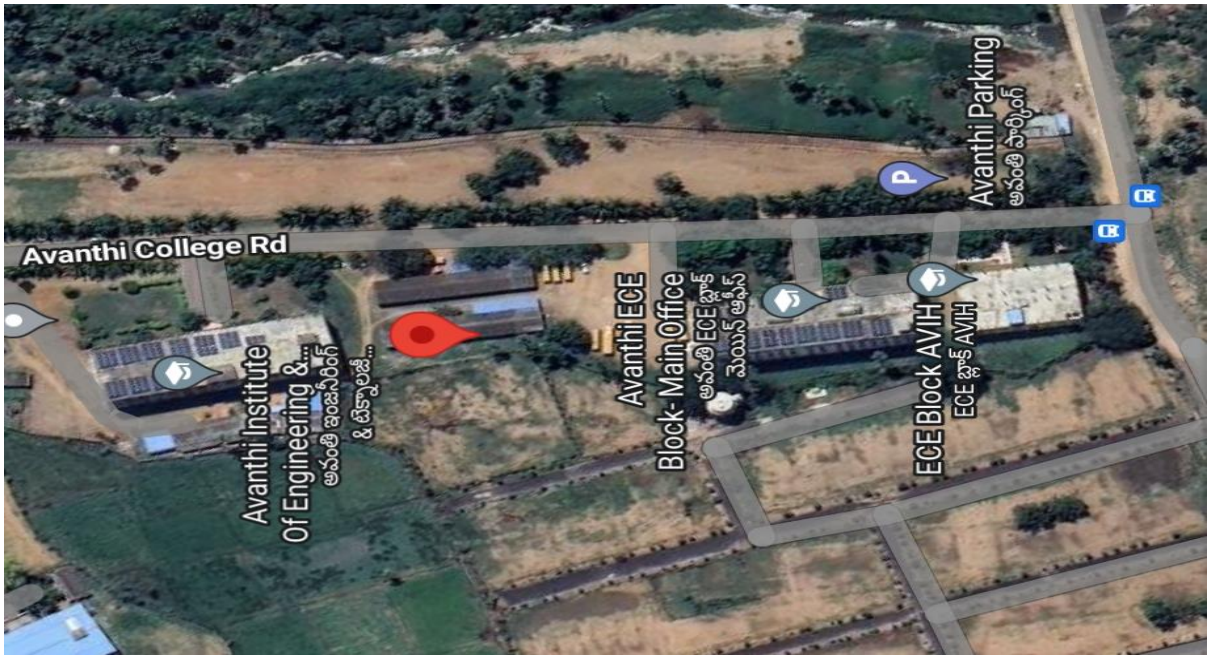

Fig. 3 . Satellite Image showing AIET Boundary and Greenery of the area.

About 24% of the constructed area, and around 14-16% of the land has been allocated for major departments like mechanical and electrical engineering and for laboratories (Fig. 4). These labs provide students with hands-on learning experiences and equip them with practical skills in their respective fields

The Electrical department building occupies 16% of the land, providing a dedicated space for academic and research activities related to Electrical engineering. Similarly, the administrative building, known as the Main Block, covers 14% of the land, serving as the central hub for administrative functions and student services.

5.2. Vegetation & Biodiversity:

The AIET campus has a spread of 4.15 ha of land, of this the green areas account for nearly 58% and supports over 38 different species of higher plants (Fig.4). Amongst these, the campus had 363 matured trees, while another 160 trees were in developing stages.

Fig.4: **Different varieties of trees and plants**

A. FLORA & PLANT DIVERSITY:

The flora of the campus comprises 38 species belonging to 34 genera and 17 families. Of these 17 were tree species and 19 were herb species, while shrubs were recorded with only two species. Among herbs and shrub species, exotic ornamental species were not taken into account. The list of plant species recorded is presented in Table (5).

Table 5: Flora species of AIET during 2021-2022

No	Family	Species	Habit	Common/Telugu Name
1	Acanthaceae	Peristrophepaniculata(Forssk). Brummitt	H	Cheburu
2	Amaranthaceae	Achyranthes aspera L.	H	Uttareni
3	Amaranthaceae	Alternanthera paronychioidesSt.	H	Ponnaganti
4	Amaranthaceae	Alternanthera sessilis	H	Ponnaganti
5	Amaranthaceae	Amaranthus virdis L.	H	Chilaca thotakura
6	Asteraceae	Ageratum conyzoides L.	H	PokaBanthi
7	Euphorbiaceae	Euphorbia hirtaL.	H	Nanubalu
8	Fabaceae	Cassia obtusifoliaL.	H	Tagirasa
9	Fabaceae	Crotalaria calycinal	H	
10	Fabaceae	Tephrosia purpurea (L.) Pers	H	Vempali
11	Malvaceae	Sida acuta BurmF.	H	
12	Piperaceae	Piper Betle	H	
13	Malvaceae	Sida cordifolia L.	H	
14	Nyctaginaceae	BoerhaviaeAIETtaL.	H	Punarnava
15	Fabaceae	Acacia Aneura	T	Mulaga
16	Fabaceae	Acacia catechu (L.f.) Willd	S	
17	Fabaceae	Hibiscus rosa-sinensis L	S	Mandara
18	Anacardiaceae	Mangifera indica	T	Mango
19	AAIETaceae	Borassus flabellifer	T	Thati
20	AAIETaceae	Cocos nucifera	T	Coconut
21	AAIETaceae	Wodyetiabifurcata	T	Foxtail palm
22	Combretaceae	Conocarpus eAIETtus	T	Conocorpus
23	Combretaceae	Terminalia catappa	T	Badam
24	Fabaceae	Acacia leucophloea(Roxb.) Willd.	T	Tellathumma
25	Fabaceae	Caesalpinia pulcherrima	T	Gulmohor
26	Fabaceae	Tamarindus indica	T	Chintha
27	Lamiaceae	Tectona grandis	T	Teak
28	Meliaceae	Azadirachta indica	T	Neem
29	Moraceae	Ficus benghalensis	T	Marri
30	Myrtaceae	Syzygiumcumini	T	Neeredu
31	Rubiaceae	Neolamarckiacadamba	T	Kadambari
32	Moraceaae	Artocaarpus Heterophyllus	T	Panasa/Jackfruit
33	Fabaceae	Saraca Asoca	T	Ashoka trees
34	Moraceaae	Ficus Religiosa	T	Raavi
35	Sapotaceae	Sapodilla	T	Sapota

36	Poaceae	Cynodon doctylon	H	Gariki
37	Poaceae	Aeluropus lagopoides	H	Gaddi
38	Malvaceae	Sida acuta	H	

H = Herb S = Shrub T – Tree

There were eight fruit bearing species and the overall Maximum Possible Diversity of the campus was at 3.664 bits as per the Shannon-Weiner Index. The Actual Species Diversity of tree species was at 2.609 bits with a Species Evenness of 0.903, indicating good distribution.

B. TREES ENUMERATION & BIOMASS:

There was no significant change in the population of the matured trees in the AIET campus as compared to the state in the previous AY 2020-2021. However, due to the Tree plantation activities during the year (Fig.5), the number of trees in the developing stages were recorded at 160, and within three years most of them will be contributing to the tree cover. Presently, 363 matured trees are existing in the campus. For the purpose of Trees biomass, only the matured trees were taken into consideration. Based on the girth and height of the trees enumerated, by using the standard ecological methods, the biomass of the trees for the 18 species was estimated and the total Tree Biomass was at 31.04 tons in the AY 2021-2022 (Table 6). This is 4.69 tons greater than the record of the previous audit year.

Fig.5:**Tree plantation activities during the year**

C. CARBON STOCKS:

The Carbon stocks in the trees of AIET campus were estimated using standard stock assessment methods. The general default value of 48% of the Dry weight recommended for tropical trees was adopted and thus the C stocks from the tress arrived at 13.798 tons. Added to this, another 42 tons of C was present in the soils. Thus, the total C stock in the AIET Campus was estimated at 58 tons.

Table 6. Tree Enumeration and Biomass Stock at AIET Campus during AY 2021-2022.

S No	Species	Mean GBH (cm)	Mean Ht (m)	Population	Total BM (Tons)
1	Mangifera indica L.	**40.5**	**6**	**17**	**1.591**
2	Borassus flabellifer L.	**40**	**7**	**43**	**4.572**
3	Cocos nucifera L.	**31**	**7**	**18**	**1.054**
4	Wodyetia bifurcate A.K. Irvine)	**38**	**5**	**61**	**3.876**
5	Conocarpus Erectus L	**27**	**6**	**20**	**0.847**
6	Terminalia catappa L.	**43**	**8**	**17**	**1.921**
7	Acacia leucophloea (Roxb.) Willd.	**28**	**5**	**2**	**0.102**
8	Caesalpinia pulcherrima (L.) SW.	**36**	**5**	**26**	**1.627**
9	Tamarindus indica L.	**40**	**5**	**21**	**1.524**
10	Tectona grandis L. f	**30.5**	**10**	**10**	**0.812**
11	Azadirachta indica A. Juss	**27**	**8**	**12**	**0.613**
12	Ficus religiosa L.	**39**	**8**	**1**	**0.077**
13	Syzygiumcumini L. Skeels	**59**	**5**	**10**	**1.809**
14	Neolamarckiacadamba (Roxb.) Bosser	**53**	**7**	**8**	**1.135**
15	Artocaarpus Heterophyllus	**37.5**	**5**	**5**	**0.244**
16	Acacia Aneura	**30.5**	**8**	**28**	**1.148**
17	Saraca Asoca	**22**	**7**	**41**	**0.978**
18	Sapodilla	**22.2**	**5**	**11**	**0.213**
	TOTAL				**23.044**

D. FAUNA:

The fauna records were almost the same as in the year 2020-2022, and therefore the same was reported for this year also. The campus vegetation at AIET serves as a habitat for various animal species, providing a home for diverse wildlife. During a single day's inventory, over 24 species were observed, as listed in Table 7. The most common

bird species found on campus is the Common Myna, while the presence of numerous butterfly species adds to the enchantment. In addition to these natural inhabitants, the campus supports a range of other fauna.

Table 7. List of major faunal species recorded in AIET Campus

S.No	Common name	Scientific Name	Type
AMPHIBIAN			
1	Common frog	Rana spp	Frog
REPTILES			
1	Tree Gecko	Hemidactylus sp	Lizard
2	Wall lizard	Hemidactylus prashadi	Lizard
3	Garden Lizard	Calotes versicolor	Lizard
BIRDS			
1	Red-vented bulbul	Pycnonotus cafer	Diurnal Birds
2	House Sparrow	Passer domesticus	Diurnal Birds
3	Common Myna	Acridotheres tristis	Diurnal Birds
4	Crow	Corvus corvidae	Diurnal Birds
5	Common Cuckoo	Cuculuc canorus	Diurnal Birds
6	Cattle Egret	Bubulcus ibis	Diurnal Birds
7	Rose ringed Parakeet	Psittacula krameria	Diurnal Birds
8	Black Drongo	Dicrurus marcrocerucus	Diurnal Birds
9	King fisher	Alcedinidae	Diurnal Birds
10	Eagle	Accipitridae	Diurnal Birds
11	Butterfly	Rhopalocera	Diurnal Birds
12	Dragonfly	Anisoptera	Diurnal Birds
MAMMALS			
1	Squirrel	Sciuridae	Squirrel
2	House Rat	Rattus rattus	Rat
BUTTERFLIES			
1	Plain Tiger	Danaus chrysippus	Insects
2	The Gram Blue	Euchrysopscnejus	Insects
3	Common Baron	Euthaliagaruda	Moth
4	Common Cerulean	Jamidesceleno	Moth
5	Common sailor	Neptishylas	Moth
6	The Blue Tiger	Tirumala limniace	Moth

5.3. Water Resources Management:

The total water consumption of the AIET can be classified into THREE use categories:

1. Academic and administration
2. Transportation and Other Utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are Two borewells existing in the campus (Fig.6), each connected to a separate overhead tank located at various academic, and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 15 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 6 KLD. All gardens and green zones used about 7 KLD of water, of which 6 KLD is sourced from RO reject waters. Overall, AIET utilizes 22 KLD of groundwater on all working days.

Fig.6: 7HP Motor capacity was installed near the EEE Block

AIET has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are One RO plants, with a capacity of 1000 liters (2000 liters in total). On all Sundays and general holidays, the water consumption was at 4 KLD, which is less than 20% of the consumption during working days.

Fig.7: RO water plants

Overall, compared to the AY 2020-2021, this audit year has shown a saving of 4 KLD and consequently, the per capita consumption has come down to 9.6 lpd.

AIET has One RO water plant (Fig.7), and it produces 3 litters of wastewater for every 1 liter of treated water. On working days, approximately 6 KLD (Kilo Liters per Day) of water is rejected by RO plant. The rejected water is used for gardens and green areas.

The Pre-monsoon water quality of the two bore wells being used by AIET was analysed for drinking water quality standard IS 10500. The results are presented in Table (7). The results indicate that the water quality was almost the same in the two sources and also there was no significant change from the water quality of the previous AY 2020-2021 The water quality complies with the IS 10500 standard, with the only exception being TDS (Total Dissolved Solids), which is slightly higher than the permissible levels.

Table 7. Pre-monsoon Water Quality of the Ground waters of AIET – 2021-22.

S.No	Parameter*	BW-1	BW-2	IS 10500
1	pH	7.2	7	6.5-8.5
2	EC	243.8	247.8	500

3	TDS	412	412	500
4	TH	212	215	300
5	Ca	62	60	75
6	Mg	22	21.4	30
7	Na	11	14	200
8	k	8	7	10
9	Fe	0.05	0.05	0.3
10	Cl	100	100	250
11	PO_4	1	0.8	10
12	NO_2	0.03	0.03	1
13	F	0.4	0.4	1.2
14	TA	122.5	128.8	200
15	CO_2	36.1	30.2	---
16	HCO_3	229	227	---
17	DO	3	2.9	4.8

* = All parameters are in mg/l, with the exception of pH

5.4.Energy Management:

With the aim to become a model institution for energy efficiency and conservation, AIET has initiated its energy management and the institution conducting exclusive energy audits to assess its energy management practices and efficiency. The findings of these audits, conducted by an accredited consultant, are documented in the energy audit reports. This report provides an overview of the institution's energy utilization and management within the context of the environment, highlighting its significance as a crucial aspect of the overall environmental management in relation to carbon emissions. AIET meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power
4. LPG

Compared to the remaining three sources, the use of LPG was very insignificant. The use of Solar power had a history of Five years.

5.4a. HT Power Consumption:

During the audit year, the Institute consumed a total of 215 KVAh of electricity from the metered connection, with a monthly average of 17.9 KVAh. Monthly variations in consumption were significant, ranging from a low of 15 KVAh in March 2022 to a high of 19 KVAh in August 2021 The annual Mean Power Factor was 0.96. Therefore, the annual consumption is equal to 206.4 KW.

Compared to the previous year, the consumption is very high during the AY 2021-2022 and exceeded by 38% from the previous year. However, the previous year was partly affected by the COVID closures and virtual mode. AIET's Electricity use can be considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Computers, labs, and Machinery. During the audit year, the use by Air-conditioning sector was the maximum, accounting for 48% of the total load, followed by Computers and Machinery sector accounting for nearly 23% of the total load.

5.4b. Power generated from Solar Systems:

The Institute has installed rooftop power generation systems (Fig.8), with a capacity of 120 KWp, During the audit year, a total of 112680 Units was generated, which is equivalent to 54.96% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.

Fig.8: Installed solar panels on roof top of the BLOCK-I & BLOCK-II each having capacity of 60 KW

5.4c. Power Generated from DG Sets:

AIET has one DG set generators (Fig.9) as backup power supply, with capacities of 62.5 KVA. During the audit year, the generator consuming around 600 liters of Diesel oil. The cost of power generated from the DG sets was around Rs. 14.1/KWh.

Overall, the total electricity consumption from all three sources, including the DG sets, was 215097 KVAh.

Fig.9: DG-SET 62.5KVA

5.4d. Energy for Transportation:

AIET being an institution with no residential facility and all the members are dependent on transportation. Thus, Transportation is a major sector demanding high energy consumption.

With its 13 buses fleet, AIET provides transport facility for 35% of its members. The average trip length for the buses was at 74 km /day, and provides the facility for 520 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 68,340 liters. This translates to a per capita consumption of 32.60 liters per annum. The per capita consumption of this AY is l2 liters less than that of the previous year's and is a significant saving. Around 75% of the AIET community members utilize the other modes. This includes 60.20% using public transportation, 7.89% using auto-rickshaws, 6.91% using their own two-wheelers, and 0.5% use four-wheelers.

5.4e. LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 40 non-domestic cylinders (40 X 19 kg) and Four domestic cylinders (4 X 14.8 kg). Thus, the estimate was 819.2 Kg. There was no change in the consumption from the previous year.

5.4f. Abstract of Energy Use:

AIET's total energy use from different sources and for several purposes during the AY 2021-2022 is presented below:

- ➢ HT Power from Grid : 213024 Units
- ➢ HSD Used : 70,150 Litres (Buses + HSDG)
- ➢ LPG : 819.2 Kg
- ➢ Solar Power Generated : 112680 Units

Compared to AY 2020-2021, this AY had high consumption and this is mainly because of the institution was functioning virtually due to pandemic conditions and therefore a great amount of electricity and transportation were not reflected.

Renewable energy generation (Solar Power) was the same during the previous and current years. 5.4g. Energy Use & Carbon Footprint: While meeting its energy needs, AIET could generate nearly 51.82% of its energy needs from renewable source of solar power. However, transportation has become a major contributor to the consumption of HSD and thereby to the pollution loads. The carbon emissions from the energy management during the audit year are presented in Table (7) below, which reveals that the net Carbon emissions from the AIET stands at 246.7 t CO2 e/annum.

Table 7. CO2 Emissions from AIET during the AY 2021 – 2022.

S.No	Emission Source	Annual Consumption	CO2 emission Factor (kg/Unit)	Total CO2 emissions (kg)	Total emissions (t CO2e/ann)
1	**Grid Electricity**	213024 KVAh	0.94	52760.32	54
2	**Diesel Oil**	70,150litres	2.68	108142.36	**112**
3	**LPG**	819.2 Kg	2.252	108143.36	**0**
TOTAL Carbon emissions					**166**
Emission Offset through Solar Power					**52**
NET Carbon emissions					**114**

Compared to the previous year, Net emissions during the AY 2021-2022 have increased by 14.4 t CO2 e. However, if the per capita C02 emissions is considered, the current year had 0.089 t CO2 e/head/annum compared to 0.095 t CO2 e of AY 2020-2021.

5.5. Solid Wastes Management:

Solid Waste Management is one area where AIET is striving to develop suitable models. After initiating Green Audits, the AIET community, particularly students and researchers are focussing on effective segregation and quantification of different wastes. For the purpose of waste management, all the solid waste are classified as per the standard norms. At the first instance, Two Categories are recognized: (1) Wet waste; and (2) Dry Waste. The first category is usually generated from Canteen, Dining Halls, Waiting Rooms, and other areas of gathering places. At identified places, wet waste collection bins were provided.

On the other hand, the second category, Dry Waste was further classified into Five types: (1) Paper & Board; (2) Plastic; (3) Glass & Metallic; (4) E-Waste; and (5) Sanitary Waste. The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E-Waste. The estimates of different wastes and their disposal route are presented in Table(8) below:

Table 8. Solid Wastes generation and Disposal Routes followed by AIET during AY 2021-2022.

S.No	Waste Type	Waste Type	Qty	Disposal
1	Wet Waste	DiningHalls, Messes& Canteen	3 kg/day	To Compost
2	Paper & Board	Administrative & Academic	2.3 kg/day	Authorized Collectors
3	Metallic	All	negligible	IC/Authorized Collectors
4	Plastic	All	0.12 kg/day	IC/Authorized Collectors

In terms of solid waste management, AIET has implemented various initiatives through its Innovation Centre. Metallic, plastic, and e-wastes are examined by the members of the Innovation Club to explore opportunities for reuse, repair, recovery, or reduction, fostering innovation among the students. Overall, AIET's waste management practices aim to minimize waste generation, promote recycling and composting, and encourage innovative approaches to waste reduction and reuse.

6. GREEN AUDIT: OBSERVATIONS & RECOMMENDATIONS

1. AIET's EMC should develop an implementation plan for realizing the Environmental policy goals and objectives

2. AIET has several high energy consumption electrical equipment and should have a time bound plan for their replacement with the energy efficient equipment or gadgets;

3. Although the resources consumptions appear to be high compared to the previous Audit Year, the present audit year the number of working days was almost twice to that of the previous year, as pandemic period was very short during this year. However, scope for further reduction in the consumption is high;
4. The scope for enhancing Solar power generation is to be explored;
5. The scope for improving the biodiversity and carbon stocks in the vegetation also is high.
6. The scope for improving the biodiversity and carbon stocks in the vegetation also is high.

PROCEEDINGS OF THE COMMISSIONER OF COLLEGIATE EDUCATION: TELANGANA STATE, HYDERABAD

Present: Sri. Navin Mittal, IAS

Sub: CCETS – Quality Initiatives of GDCs –Green Audit for all GDCS – Constitution of State Level Committee – Reg.

Ref: Proceedings of CCE File No. CCE-AC/QLTY/NAAC/1/2021-Academic Cell;Dt.23.04.2121

As part of the quality initiatives of Government Degree Colleges and to facilitate the GDCs to secure a better grade in NAAC accreditation, it is decided to conduct Green Audit for all Government Degree Colleges in the state. A proactive and enlightened Green Audit helps to keep the environment on the campus, pollution free, neat & clean.

For administrative convenience, it is decided to constitute a two tier Audit Committee i.e., State level and College level. Vide reference read above, the Commissioner of Collegiate Education has constituted college level 'Green Audit' Committee to audit various categories of green audit, like Water Audit, Energy Audit, Trees & Plants Audit, Environmental Audit, e-Waste Audit, Carbon Foot Print etc. The College Level Committee should audit these various categories of green audit within the college campuses.

The State Level Committee examines the College level audit reports of various colleges and thoroughly scrutinizes the documents submitted by the Principals of GDCs. Based on the recommendations of the State Level Audit committee, the colleges shall be issued audit certificates. The audit period is valid for Two Years from the date of issue of certificate.

The composition of State Level Audit Committee consists of the following:

i. Dr. Ghanshyam, Academic Guidance Officer, O/o CCE – Chairman
ii. Dr.D.Seshikala, Asst. Professor, Dept. of Environmental science, University College of Science, O.U, Hyderabad– External Member
iii. Dr. A. Vijaya Bhaskar Reddy, Asst. Professor, Department of Botany, Nizam College, O.U - External Member
iv. Dr. Amanchi Nageswar Rao, Asst. Professor, Dept. of Zoology, Nizam College O.U - External Member
v. Sri. T.Suresh Kumar, Academic Officer, O/o, CCE - CCE Member
vi. Dr. P.Rachana, Academic Officer, O/o CCE - CCE Member
vii. Sri. P. Ravi Chandra, Academic Officer, O/o CCE - CCE Member

Further, the colleges would be provided all the required audit documents and the college level audit committee should complete the auditing process for all kinds of audit by following the guidelines issued in this regard and submit the same to the O/o CCE. The External audit team will assess and evaluate the internal audit report and after thorough verification certificate along with grade will be issued to the concerned GDCs.

For assessment and evaluation of Green Audit, the following grading system shall be followed.

GRADING FOR GREEN AUDIT

S.NO	COMPONENTS FOR ASSESSMENT	MARKS	GRADES
1	Energy audit	**20**	**A+ : 91-100** **A : 81-90** **B+ : 71-80** **B : 61-70** **C : 51 - 60**
2	Waste audit	**15**	
3	Water audit	**15**	
4	Landscape or Environment audit	**15**	
5	Carbon footprint & Oxygen emission audit	**15**	
6	Green activities (conduction of seminars/conferences/workshops/student competitions/awareness programmes/observation of environmental related days etc.	**10**	
7	Student clubs (Environmental club/Green club/Nature club/Biodiversity club/ ECO Club/Friends and Fauna Club/Science club etc.) activity annual report	**10**	
Total		**100**	

Hence, all the Principals of Government Degree Colleges are here by directed to conduct Green Audit by following all the guidelines issued in this regard and submit the periodical compliance report to the O/o CCE.

Signature Not Verified

Digitally signed by NAVIN MITTAL IAS
Date: 2021.05.22 16:08:08 IST
Reason: Approved

Commissioner of Collegiate Education

Copy to all the Principals of Government Degree Colleges

GREEN AUDIT REPORT ON

AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

(UGC, Affiliated to JNTUH, Gunthapally, Hyderabad-501 512)

On 16 November 2020

Contents:

Introduction of Green Audit

Acknowledgement

The Green audit conducted is an external audit that aims towards creating awareness healthy and sustainable environment. Though nascent, the initiative is taken up to foster the concept of environmental sustainability.

M/s Sri Gayatri Energy Services, Hyderabad places on record its sincere thanks to progressive management of M/s **Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy(dist),** Telangana for entrusting the Green Audit work of their college.

The study team is appreciative of the keen interest and encouragement shown by.

DISCLAIMER

Warranties and Liability:

While every effort is made to ensure that the content of this report is accurate, the details provided "as is" make no representations or warranties in relation to the accuracy or completeness of the information found on it. While the content of this report is provided in good faith, we do warrant that the information will be kept up to date, be true and not misleading, or that this report will always (or ever) be available for use.

While implementing the recommendations site inspection should be done to constitute professional approach and adequacy of the site to be established without ambiguity and we exclude all representations and warranties relating to the content and use of this report.

In no event We will be liable for any incidental, indirect, consequential or special damages of any kind, or any damages whatsoever, including, without limitation, those resulting from loss of profit, loss of contracts, goodwill, data, information, income, anticipated savings or business relationships, whether or not advised of the possibility of such damage, arising out of or in connection with the use of this report.

Exceptions

Nothing in this disclaimer notice excludes or limits any warranty implied by law for death, fraud, personal injury through negligence, or anything else which it would not be lawful for to exclude.

We trust the data provided by the M/**s Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy (dist),** Telangana personnel is true to their best of Knowledge and we didn't verify the correctness of it.

AUDIT STUDY TEAM

Shri ASHOK KUMAR PITTA (Senior Energy Auditor)

Shri. Y.RAMESH BABU HOD (Mechanical Engineering)

Shri. T.KRANTI KUMAR HOD (Electrical & Electronics Engineering)

SRI GAYATRI ENERGY SERVICES

we support you conserve

CERTIFICATE

Date: 25/11/2020

We here by certify that we carried out **Green Audit** in the **M/s Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy (dist),** Telangana during 16th NOV 2020 and following Observations were presented below.

The Management is proactive towards Green Initiative by Solar Energy, Planting Trees, Better water conservation, Harvesting, Waste Management, Carbon Foot Print; a continual improvement in Green Initiative is appreciated.

We appreciate the efforts of the **M/s Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy (dist), Telangana** in this regard.

We also thankful to Mr.Y.Ramesh Babu , HOD(Mechanical Engineering) and Mr.T.Kranti Kumar, HOD (Electrical &Electronics Engineering) for their sincere efforts in completing the Green Audit .

Shri ASHOK KUMAR PITTA
(BEE Certified Energy Auditor)

EXECUTIVE SUMMARY OF OBSERVATIONS

1. A Detailed Green Audit is carried out at the Campus with following observations.
2. The plantation of Trees is a continual process which is under implementation the total green area coverage is 06.25 acres which is mandatory for mitigating the Global warming (Photosenclosed).
3. The Campus is having 120 KWp Grid Connected Solar PV Plant, it is recommended to enhance further 50 KWp capacity.
4. It is recommended to rectify / repair the leaky taps and construct the water harvesting pits.
5. Waste Management is segregated in to three categories like

   i) Bio Degradable Waste (Food Waste)/ (Paper Waste) It is proposed to install a Biogas plant in the campus to generate Bio gas and can be used for cooking in the campus itself.

   ii) Paper waste is collected in dust bins and disposed to scrap merchant.

   iii) Non Bio Degradable Waste (Plastic/ Other) are collected in the dust bins located at various locations in the campus. It is implemented to Ban/ discourage the usage of plastic water bottles inside the campus (Enclose Photos of Dust bins). The Waste is picked up by vendor.

   iv) E Waste Management MOU is signed with GHMC for picking up the E waste generated annually and disposes the E waste in eco- friendly way (Enclose copy of MOU).
6. It can be concluded that the Green Audit initiatives are started and College Management recognized the importance and taking proactive steps towards sustainable environment.

GREEN AUDIT SCOPE OF WORK

The Green Audit is carried out in view of assessing all necessary environmental components and their impact on the campus physically by visiting the premises with reference to following.

1. Identifying the Green Area in total area of the campus and process of planting tress so that Heat /Global warming are mitigated. Creating awareness among staff/Students for planting more tress in the campus. A continual drive is created.
2. Water Conservation/ Efficient Usage / eliminate the water misuse or wastage, Rain Water Harvesting etc.
3. Renewable Energy usage to reduce the fossil fuel dependency, Harvest the Solar Power.
4. Waste Management which includes Bio Waste/ Non-Bio Waste/ E Waste etc.
5. Carbon Foot Print – Transportation of Teaching Staff / Non-Teaching Staff/ Students.

METHODOLOGY

The Green Audit taken up by the college had been divided into two stages:

The Audit Stage: The Audit Stage encompasses of the team selection and the field works to be performed. The Green Audit Team focused on various Issues pertaining to college which have the highest influence on the Green Attributes of the College. The Audit stage also focused on the Methodology adopted. Checklist approach is adopted for transparent evaluation of the topics and increase readability for independent reader.

The Post Audit Stage: The post-audit stage ensures formulation of Draft findings and sent to management response. After getting draft approval, the audit team went for final report formulation.

Project Schedule:

1. . Audit : 1-2 days
2. Report generation: 1 Week

INTRODUCTION OF THE INSTITUTION

Sponsored by the **Avanthi Educational Society**, this **Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy (dist),** came into being in 2005 to provide quality and contemporary education with social relevance in the engineering faculty with an ultimate vision to maintain global standards in higher learning and research. The Institute has the approval of AICTE and recognized by the Government of Telangana. It is an affiliated college of Jawaharlal Nehru Technological University (JNTU), Hyderabad.

The Institute has come upon 21 acres of green pastures in Gunthapally, about 20km away from the historic city of Hyderabad and presents a picturesque and panoramic view. **Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy (dist)** offers a four-year B.Tech. Programme in the disciplines of CSE, ECE, EEE, CSE (AI&ML), CSE (DS) and ME with a total intake of 540 students and at the postgraduate level, it offers courses like M.Tech. (CSE), M. Tech, (VLSI Design), M.Tech (Power Systems) , M.B.A. in addition to Pharmacy and Courses under the fold of the same Society. Accreditation: Based on its outstanding academic, curricular and co-curricular track record established by it within a period of just seven years, the National Board of Accreditation of the AICTE has for the first time accredited all the four branches of engineering offered by **Avanthi Institute of Engineering and Technology**. The branches include CSE, ECE, EEE, and IT. Wherever students go, the organizations prefer the students from the NBA accredited colleges and treated on par with the students of IITs and NITs.

STATEMENT OF ASSURANCE

The Green Audit conducted for the first time in the college. The Management had taken initiative to carry out the Green Audit externally. As mentioned above it is in the process of improving the awareness towards the renewable energy and sustainable development. The conclusions are based on a comparison of the situations as they existed at the time of the audit. The evidences presented are in support of the conclusions.

GOALS OF THE COLLEGE

In the effort to Enhancing environmentally literate campuses where students can learn the idea of protect of environment and stay healthy. The college Management is proactively working on theseveral facets of "**Green Campus**" including Plantation of more trees, Water Conservation, Efficient water usage by eliminating leaking water taps, Installation of ETP, Water Harvesting Pits and interconnecting them to recharge the Ground Water table. Effective Waste Management which includes Food Waste, Plastic, Paper, Metal Work, Renewable Energy, carbon footprints etc.

1. To create a green campus with focus on above concepts.
2. To Harness Solar Power.
3. To Conserve Water by eliminating the water leakages, wastage, Rain Water Harvesting.
4. To Reduce Waste management through reduction of Food waste generation,Plastic/Paper/Metal waste generation and effective disposal.
5. To Reduce the Carbon Foot Print.
6. Enhancement of college profile.

ENVIRONMENT

Plantation of Trees:

The college management made it a practice to plant trees across the campus to improve greenery. This is a continual ongoing process and every year a target is taken to plant trees and increase the green cover inside the campus. The Following are the objectives kept in mind for increasingthe Green Area coverage inside the campus and internal in the buildings too.

Reducing Climate Change:

If people are good at something, then it is building up excess carbon dioxide in the atmosphere. Harmful CO_2 contributes to climate change, the biggest current problem the world has to deal with. Trees, however, help fight it. They absorb CO_2 removing it from the air and storing it while releasing oxygen.

Annually, an acre of trees absorbs the amount of carbon dioxide equal to driving your car 26000 miles. Trees are our main survival tools; only one tree can produce enough oxygen for four people.

Purifying Air:

Trees do purify the air. They absorb pollutant gases such as nitrogen oxides, ozone, ammonia, sulfur dioxide. Trees also absorb odors and act as a filter as little particulates get trapped in leaves. A matureacre of trees can yearly provide oxygen for 18 people.

Cooling Down the Streets:

The average global temperature grew by 1.4F. This happens as tree coverage declines. Removing trees and replacing them with heat absorbing asphalt roads and buildings makes cities much warmer. Trees are cooling cities by up to 10F by providing shade and releasing water.

Natural Air Conditioning:

Architects and environmentalists came up with the great solution – green roofs. Green roofs are an amazing way to incorporate vegetation to our Premises and provide environmental benefits. Indoor trees do not only have a calming effect, they also act as natural air conditioning.

Saving Water:

Except for cooling, trees also help to save water. Because of the shade they provide, water will evaporate slowly from low vegetation. Trees need about 15 water gallons a week to survive, and theyrelease about 200-450 gallons of water per day.

Our Case: Almost 6.25 acres of Tree plantation out of 21 Acres of the campus is having tree plantationand heading for area of Greenery

RENEWABLE ENERGY

The campus is having enough area to install Grid Connected Solar PV in the campus. The campus installed 120 KWp solar PV to harness Solar Power.

Among all the benefits of solar energy the most important thing is that solar energy is a truly renewable energy source. It can be harnessed in all areas of the world and is available every day. We cannot run out of solar energy source.

Solar System has generated energy, the energy bills will drop. How much you save on bill will be dependent on the size of the solar system and electricity usage. Moreover, not only will you be saving on the electricity bill, there is also a possibility to receive payments for the surplus energy that you export back to the grid. If you generate more electricity than you use (considering that your solar panel system is connected to the grid).

Some of the key benefits of solar energy on the environment include:

- Using less water. Water is one of our most precious natural resources. ...
- Reducing air pollution. ...
- Help to slow climate change…
- Reducing your household's carbon footprint. ...
- Reducing our reliance on fossil fuels…

Our Case: Presently installed 120 KWp Grid Connected Solar PV to Harness the Solar Power.

WATER CONSERVATION, HARVESTING AND MANAGEMENT

Per capita water availability of many river basins in India is declining over the years due to sustained population pressure, agriculture and industrial expansion, besides changing climate scenarios. This is particularly evident from the fact that the per capita availability.

Rainwater harvesting is a technique used for collecting, storing and using rainwater for domestic, agricultural or any other uses. The rainwater is collected from various hard surfaces such as rooftops, runoff from catchments, from streams and water conservation through watershed management or other manmade aboveground hard surfaces. It is an age-old system of collection of rainwater for future use. The harvested water can be stored on surface throughponds and tanks or can be recharged to groundwater.

Protection of Water from Pollution:

If the total fresh water available on the earth remains pollution free, it is sufficient to meet the drinking water needs of the existing population of the world, unfortunately a large portion of fresh water does not remain fit for use of the living world due to increasing economic activities,urbanization etc.

Rational Use of Groundwater:

Groundwater meets 25 per cent of total supply of water in the world, remaining 75 per cent supply is met by surface water sources of rivers, lakes etc. Demand for groundwater goes on increasing in proportion to its available quantity due to which quantity of groundwater goes on decreasing. After exploitation of groundwater, its re-infiltration takes a very long time to complete. Hence, groundwater exploitation should be only in proportion to its recharging capacity.

Increasing Forest Cover:

According to hydrological movements, water is received through rainfall every year different quantities on the surface of the earth. This water flows on the surface and reaches the seas. Some part of rainwater is stored in stable water reservoirs (lakes and tanks), whereas some quantity of water infiltrates into the land and takes the form of groundwater.

Our Case: It is proposed to Construct Water harvesting Pits 2 No's , It is also

proposed to water conserving Toilets , this may result in 6 KL /day.

WASTE MANAGEMENT

1. Bio Waste – Food Waste / Waste Paper Food Waste: The Canteen situated in the campus which cooks food f has daily minimal food wastage. This Food waste can be used to generate Bio Gas which can be reused as a fuel for cooking the Food. It is proposed to install Bio Gas plant in the campus to generate Bio Gas from the food waste, which can be used in the Food Cooking. The Bio gas plant is installed and is functional.

   Waste Paper: Biodegradable paper waste, which can be decomposed by biological processes, is called biodegradable waste. The waste paper is collected in the dust bins anddisposed to scrap merchants on monthly basis.

   Present Status: Dust bins were provided for the waste disposal the same is collected dailyonce and handed over the Municipal corporation.

2. Non- Bio Waste – Plastic Bottles /Sanitary Pads, Non- biodegradable waste, which cannot be decomposed by biological processes, is called non- biodegradable waste. These are of two types - Recyclable: waste having economic values but destined for disposal can be recovered and reused along with their energy value. e g. Plastic, paper, old cloth etc. Non-recyclable: waste which do not have economic value ofrecovery. e.g., Carbon paper, thermo coal, tetra packs etc. Disposal of non-biodegradable waste is a major concern, not just plastic, a variety of waste being accumulated. There are a few ways to help non-biodegradable waste management. The impact of non-biodegradable waste on the environment and also focuses on its safe disposal for sustainable environment.

   Present Status: The plastic bottles are collected in the dust bins and disposed to scrap merchant. The sanitary pads in the Girls Wash rooms are disposed with Incinerators.

E- WASTE MANAGEMENT

Waste Electrical and Electronic Equipment (WEEE) or E-waste is one of the fastest growing waste streams in the world. In developed countries, it equals 1% of total solid waste on an average. In developing countries, it ranges from 0.01% to 1% of the total municipal solid waste generation. In countries like China and India, though annual generation per capita is less than 1 kg, it is growing at an exponential pace.

Present Status: The College is collecting the E waste and disposing once in a year basis to the E Waste disposing agencies, the agency will come and pick up the E waste and dispose it in environmental friendly way.

AUDIT FRAMEWORK AND DETAILED FINDINGS OF THE AUDIT

Objective	Observation/ Present status	Remarks / Recommendation
Green Cover - Plantation of Trees	A Grid Connected Solar PV plant is proposed to increase the capacity.	It is recommended to Increase some more capacity of the solar PV roof top plants to Harness solar energy.

Water Conservation – i) Rain Water harvesting ii) Eliminating LeakingTaps iii) Avoid Misuse/wastage of water	i) It is proposed to construct additional Rain water harvesting pits. ii) A Dedicated Team workingon the repairing the leaking taps across the campus. iii) RO Plant is installed for providing safe drinking water, which generates RO reject water; this water is used for Gardening. iv) Encourage to reduce the water usage by displaying messages v) It is recommended to install Water Sprinkler system installation is initiated to save water.	They will be functional veryshortly. Most of the taps are repaired, it is recommended to install taps with reduced water flow like shower / Mist. Reward the personnel informing Leaky taps, Paste Labels where ever water is expected to be wasted. Process initiated It is recommended to Install a Aqua Conditioner to reduce the RO Reject. Recommended to install Bio Toilets/Water Less Toilets like ECO Look which reduces water usage and generates fertilizer from human waste and Natural liquid from the Urine which can be reused for gardening. Under process.
Waste Management I) Bio Waste	I) The Bio Waste – Food Wastegenerated in the canteen is Proposed to be feed stock forBio Gas plant.	I) Bio gas plant is proposedto be installed very Shortly.

ii) Non-Bio Waste iii) E Waste	ii) Paper Waste is disposed to scrap merchant iii) Non-Bio Waste – Plastic Bottles / Paper Waste Metals waste is being collected in the dust bins placed across the campus. A GWMC team is visiting the campus on weekly basis and collecting the same. iv) E Waste – All Electronic Junkis generated in the campus in the form of Used Computer keyboards/ Mousses/ CPU's/ Damaged Printers etc. is disposed to E Waste agency which collects and disposes in an environmental friendly way.	ii) It is proposed to install plastic bottle crusher, which can be sold as a feed stock for the Plastic industry. iii) Installed Sandy (Sanitarynapkin crusher at ladies Toilet) to avoid choking of toilets and wastage of water. iv) It is recommended to have an MOU with E Waste disposal agency on yearly basis.

CARBON FOOT PRINT

Total students : 1651
Teaching : 136
Non-teaching : 45
Buses : 15

A detailed Carbon foot print calculation is presented in later chapters

Carbon Foot Print

Carbon Foot Print i) Transportation	i) Most staff commute in the College Transport - Buses from City ii) Students commute in the college provided transport - Buses	i) Adequate buses are available for the Staff /Students.

References

1. Plantation of Trees - https://greenpop.org/10-environmental-benefits-planting-tree

2. Bio Toilets -https://www.iwapublishing.com/news/bio-toilets-sustainable-solutionindia%E2%80%99s-sanitation-challenge

3. Bio Toilets: https://www.indiascience.in/videos/bio-toilets-sustainable-solution-for-sanitatione

4. Urban Green Guide Lines –2014, Min. of Urban Development, Govt. Of India

5. Roof top Rain Water harvesting Guidelines – IS 15797 – 2008

6. Guidelines for Improving Water Use Efficiency in Irrigation, Domestic & Industrial Sectors as Per IS –1172 - 1993

7. IEC 62891Solar PV For Grid Interactive system, IEC 61853- Part 1/ IS 16170: Part 1for Solar PV Panels

8. Central Public Health and Environmental Engineering Organization (CPHEEO) Manual on MunicipalSolid Waste Management.

9. Draft Indian Standard Municipal Solid Waste Management – Segregation, Collection & Utilization atHousehold/community for Recovery and Recycle as per IS: 9659

10. Indian Guide Lines for Carbon Foot print and reduction strategies https://indiaghgp.org/project-accounting-protocol-and-guidelines.

VISUALS OF PLANTATION OF TREES ACROSS THE CAMPUS

A Detailed Pictures are attached with these report visuals of Avanthi Green campus, Gunthapally.

Visuals from in front of Administrative Block

An area with green tall plants


GPS Map Camera
Sagarpump, Telangana, India
7PM5+XQM, Avanthi College Rd, Sagarpump, Telangana 501512, India
Lat 17.284535°
Long 78.708972°
08/11/20 10:38 AM GMT +05:30
Google


Optimus
GPS Map Camera
Sagarpump, Telangana, India
7PM5+XQM, Avanthi College Rd, Sagarpump, Telangana 501512, India
Lat 17.284535°
Long 78.708972°
08/11/20 10:40 AM GMT +05:30
Google


Chelan Plast
GPS Map Camera
Sagarpump, Telangana, India
7PM5+XQM, Avanthi College Rd, Sagarpump, Telangana 501512, India
Lat 17.284535°
Long 78.708972°
08/11/20 10:44 AM GMT +05:30
Google

E WASTE MANAGEMENT

Policy: E-waste Management: Electronic equipment such as Computers, TV, Phones, Printers, Fax and Photocopy machines are recycled properly. Electronic goods are put to optimum use and the minor repairs are set right by the Laboratory Assistants; and the major repairs are taken up by the professionaltechnicians and then reused. UPS Batteries are recharged and repaired by the suppliers. **Avanthi Institute of Engineering and Technology** zero waste management through recycle and up cycle. All electronic equipment used in the campus are regularly maintained and repaired to ensure minimum e - waste. Hazardous chemicals and radioactive waste management: Hazardous Chemicals are kept separately well labeled in the store room away from the reach of students. The hazardous chemical waste is properly treated before it is allowed to go into the drains. There is no use of any radioactive substance in the campus. Biomedical waste management: The institute is not involved in handling of microbes or clinical samples directly hence biomedical waste is not generated.

It is recommended to enter in to an agreement for disposal of the E Waste which are mentioned belowwith an agency

1. Electronic Waste (E-Waste) -The Term E-Waste will refer to the below mentioned electrical andelectronic waste for the purpose of this Agreement which includes;

a) Computers & Peripherals (CPU, Keyboard, Mouse& Monitor),

b) Laptops,

c) Servers,

d) PCBs,

e) Mobiles or Communication devices,

f) Mother Boards (Computers &Laptops),

g) Security Devices,

h) Telecom Equipment,

i) Printers & Scanners,

j) Military Electronic,

k) Control Systems,

l) Data Cables and wires,

m) Batteries,

n) CD/DVD,

o) Tube lights and CFL.

CARBON FOOT PRINT

The Avanthi Institute of Engineering and Technology has Students – 1382 (Teaching + Non Teaching- 252). The CO_2emission is 6211 Kg/day Members by Two Wheeler – 100 – CO_2 emission is 156.75 Kg /dayMembers by College Bus – 1474 - CO_2emission is 6011 Kg/day Members by Individual Car -4 – CO_2 emission is 53.66 Kg/day.

Note: Assume each member travel a distance of 25 kms to college and 25 kms return to home.

	Pounds CO_2	Kilograms CO_2	Pounds CO_2	kilograms CO_2
Carbon Dioxide (CO_2) Factors:	Per Unit of Volume or Mass	Volume or Mass	Million Btu	Million Btu
FOR HOMES AND BUSINESSES				
Propane	12.70/gallon	5.76/gallon	139.05	63.07
Butane	14.80/gallon	6.71/gallon	143.2	64.95
Butane/Propane Mix	13.70/gallon	6.21/gallon	141.12	64.01
Home Heating and Diesel Fuel (Distillate)	22.40/gallon	10.16/gallon	161.3	73.16
Kerosene	21.50/gallon	9.75/gallon	159.4	72.3
Coal (All types)	4,631.50/short ton	2,100.82/short ton	210.2	95.35
Natural Gas	117.10/thousand cubic feet	53.12/thousand cubic feet	117	53.07
Gasoline	19.60/gallon	8.89/gallon	157.2	71.3
Residual Heating Fuel (Businesses only)	26.00/gallon	11.79/gallon	173.7	78.79
OTHER TRANSPORTATION FUELS				
Jet Fuel	21.10/gallon	9.57/gallon	156.3	70.9
Aviation Gas	18.40/gallon	8.35/gallon	152.6	69.2
INDUSTRIAL FUELS AND OTHERS NOT LISTED ABOVE				
Flared natural gas	120.70/thousand cubic feet	54.75/thousand cubic feet	120.6	54.7
Petroleum coke	32.40/gallon	14.70/gallon	225.1	102.1

Other petroleum & miscellaneous	22.09/gallon	10.02/gallon	160.1	72.62
NONFUEL USES				
Asphalt and Road Oil	26.34/gallon	11.95/gallon	166.7	75.61
Lubricants	23.62/gallon	10.72/gallon	163.6	74.21
Petrochemical Feed stocks	24.74/gallon	11.22/gallon	156.6	71.03
Special Naphtha's (solvents)	20.05/gallon	9.10/gallon	160.5	72.8

Waxes	21.11/gallon	9.57/gallon	160.1	72.62
COAL BY TYPE				
Anthracite	5,685.00/short ton	2,578.68/short ton	228.6	103.7
Bituminous	4,931.30/short ton	2,236.80/short ton	205.7	93.3
Sub-bituminous	3,715.90/short ton	1,685.51/short ton	214.3	97.2
Lignite	2,791.60/short ton	1,266.25/short ton	215.4	97.7
Coke	6,239.68/short ton	2,830.27/short ton	251.6	114.12
	OTHER FUELS			
Geothermal (average all generation)	NA	NA	16.99	7.71
Municipal Solid Waste	5,771.00/short ton	2,617.68/short ton	91.9	41.69
Tire-derived fuel	6,160.00/short ton	2,794.13/short ton	189.54	85.97
Waste oil	924.0/barrel	419.12/barrel	210	95.25
Source: U.S. Energy Information Administration estimates. Note: To convert to carbon equivalents multiply by 12/44. Coefficients may vary slightly withestimation method and across time.				
Carbon Dioxide Emissions Coefficients by Fuel				
Detailed factors (discontinued)				

A Green Initiative: Bicycles are kept at the campus for commutation within the campus for the staff /student

WATER HARVESTING

Water harvesting in Avanthi institute of Engineering and Technology, Gunthapally

WATER PLANTATION

Water Plantation in Avanthi institute of Engineering and Technology, Gunthapally.

GREEN AUDIT REPORT ON

AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

(UGC, Affiliated to JNTUH, Gunthapally, Hyderabad-501 512)

On 5 July 2019

Submitted by

SRI GAYATRI ENERGY SERVICES
we support you conserve

Flat:401, SS Enclave,2-1-255, St. No:14, Nallakunta, Hyderabad,

M:9848050598Email: srigayatrienergyservices@gmail.com

Contents:

INTRODUCING ABOUT GREEN AUDIT

SELF-CONFESSION

The Green audit conducted is an external audit that aims towards creating awareness healthy and sustainable environment. Though nascent, the initiative is taken up to foster the concept of environmental sustainability.

M/s Sri Gayatri Energy Services, Hyderabad places on record its sincere thanks to progressive management of M/s **Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy(dist),** Telangana for entrusting the Green Audit work of their college.

The study team is appreciative of the keen interest and encouragement shown by.

REPUDIATION

WARRANTIES AND LIABILITY

While every effort is made to ensure that the content of this report is accurate, the details provided "as is" makes no representations or warranties in relation to the accuracy or completeness of the information found on it.

While the content of this report is provided in good faith, we do warrant that the information will be kept up to date, be true and not misleading, or that this report will always (or ever) be available for use.

While implementing the recommendations site inspection should be done to constitute professional approach and adequacy of the site to be established without ambiguity and we exclude all representations and warranties relating to the content and use of this report.

In no event We will be liable for any incidental, indirect, consequential or special damages of any kind, or any damages whatsoever, including, without limitation, those resulting from loss of profit, loss of contracts, goodwill, data, information, income, anticipated savings or business relationships, whether or not advised of the possibility of such damage, arising out of or in connection with the use of this report.

Exceptions

Nothing in this disclaimer notice excludes or limits any warranty implied by law for death, fraud, personal injury through negligence, or anything else which it would not be lawful for to exclude.

We trust the data provided by the M/**s Avanthi Institute of Engineering and Technology, Gunthapally(village), Abdullapurmet (mandal), Ranga Reddy(dist),** Telangana personnel is true to their best of knowledge and we didn't verify the correctness of it.

AUDIT STUDY TEAM

Shri ASHOK KUMAR PITTA, Senior Energy Auditor (External Auditor)

Shri. Y.RAMESH BABU, HOD (Mech) (Internal Auditor)

Shri. T. KRANTI KUMAR, HOD(EEE) (InternalAuditor)

SRI GAYATRI ENERGY SERVICES

we support you conserve

CERTIFICATE

We here by certify that we carried out Green Audit in the **M/s Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy(dist), Telangana** during **5th July,2019** and following Observations were presented below.

The Management is proactive towards Green Initiative by Solar Energy, Planting Trees, Better water conservation, Waste Management, Harvesting ,Carbon Foot Print; A continual improvement inGreen Initiative is appreciated.

We appreciate the efforts of the **M/s Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy(dist), Telangana** in this regard.

Shri ASHOK KUMAR PITTA
(BEE Certified Energy Auditor)

DIRECTORIAL SUMMARY OF OBSERVATIONS

1. A Detailed Green Audit is carried out at the Campus with following observations.
2. The plantation of Trees is a continual process which is under implementation the total green area coverage is 06.25 acres which is mandatory for mitigating the Global warming. (Photos enclosed)
3. The Campus is having 120 KW Grid Connected Solar PV Plant, it is recommended to enhance further 50 KW capacity.
4. It is recommended to rectify / repair the leaky taps and construct the water harvesting pits
5. Waste Management is segregated in to three categories like

   i) Bio Degradable Waste (Food Waste)/ (Paper Waste) It is proposed to install a Biogas plant inthe campus to generate Bio gas and can be used for cooking in the campus itself.

   ii) Paper waste is collected in dust bins and disposed to scrap merchant.

   iii) Non Bio- Degradable Waste (Plastic/ Other) are collected in the dust bins located at various locations in the campus. It is implemented to Ban/ discourage the usage of plastic water bottles inside the campus (Enclose Photos of Dust bins). The Waste is picked up by vendor

   iv) E Waste Management MOU is signed with GHMC for picking up the E waste generatedannually and dispose the E waste in eco- friendly way.
6. It can be concluded that the Green Audit initiatives are started and College Management recognized the importance and taking proactive steps towards sustainable environment.

GREEN AUDIT SCOPE OF WORK

The Green Audit is carried out in view of assessing all necessary environmental components and theirimpact on the campus physically by visiting the premises with reference to following.

1. Identifying the Green Area in total area of the campus and process of planting tress so that Heat

   /Global warming are mitigated. Creating awareness among staff/Students for planting moretress in the campus. A continual drive is created.
2. Water Conservation/ Efficient Usage / Eliminate the water misuse or wastage, Rain WaterHarvesting etc.
3. Renewable Energy usage to reduce the fossil fuel dependency, Harvest the Solar Power.
4. Waste Management which includes Bio Waste/ Non-Bio Waste/ E Waste etc.
5. Carbon Foot Print – Transportation of Teaching Staff / Non-Teaching Staff/ Students.

APPROACHABLE

The Green Audit taken up by the college had been divided into two stages:

The Pre- Audit Stage: The Audit Stage encompasses of the team selection and the field works to be performed. The Green Audit Team focused on various Issues pertaining to college which have thehighest influence on the Green Attributes of the College. The Audit stage also focused on the Approachability that adopted. Checklist approach is adopted for transparent evaluation of the topics and increase readability for independent reader.

The Post- Audit Stage: The post-audit stage ensures formulation of Draft findings and sent to management response. After getting draft approval, the audit team went for final report formulation.

Project Schedule:

1. Audit : 1-2 days
2. Report generation: 1 Week

INTRODUCTION OF THE INSTITUTION

Sponsored by the Avanthi Educational Society, the s **Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy(dist),** came into being in 1992 to provide quality and contemporary education with social relevance in the engineering faculty with an ultimate vision to maintain global standards in higher learning and research. The Institute has the approval of AICTE and recognized by the Government of Telangana. It is an affiliated college of Jawaharlal Nehru Technological University (JNTU), Hyderabad.

The Institute has come upon 10 Acres and 06 Guntas of green pastures in Gunthapally, about 20km away from the historic city of Hyderabad and presents a picturesque and panoramic view. **Avanthi Institute of Engineering and Technology, Gunthapally (village), Abdullapurmet (mandal), Ranga Reddy(dist) offers** a four-year B.Tech. Programme in the disciplines of CSE, ECE, EEE and ME with a total intake of 648 students and at the postgraduate level, it offers courses like M.Tech. (CSE), M. Tech,(VLSI Design), M.Tech.(Power Systems) , M.B.A.

In addition to Pharmacy and Courses under the fold of the same Society. Accreditation: Based on its outstanding academic, curricular and co-curricular track record established by it within a period of just seven years, the National Board of Accreditation of the AICTE has for the first time accredited all the four branches of engineering offered by **Avanthi Institute of Engineering and Technology**. The branches include CSE, ECE, EEE, and IT. Wherever students go, the organizations prefer the students from the NBA accredited colleges and treated on par with the students of IITs and NITs.

STATEMENT OF POSITIVENESS

The Green Audit conducted for the first time in the college. The Management had taken initiative to carry out the Green Audit externally. As mentioned above it is in the process of improving the awareness towards the renewable energy and sustainable development. The conclusions are based on a comparison of the situations as they existed at the time of the audit. The evidences presented are in support of the conclusions.

ASPIRATIONS OF THE COLLEGE

In the effort to Increase an environmentally literate campus where students can learn the idea of protection of environment and stay healthy.

The college Management is proactively working on the several facets of "**Green Campus**" including Plantation of more trees, Water Conservation, Efficient water usage by eliminating leaking water taps, Installation of ETP, Water Harvesting Pits and interconnecting them to Recharge the Ground Water table.

Effective Waste Management which includes Food Waste, Plastic, Paper, Metal Work, Renewable Energy, carbon footprints etc.

1. To create a green campus with focus on above concepts.
2. To Harness Solar Power
3. To Conserve Water by eliminating the water leakages , wastage, Rain Water Harvesting.
4. To Reduce Waste management through reduction of Food waste generation, Plastic/Paper/Metal waste generation and effective disposal.
5. To Reduce the Carbon Foot print.
6. Enhancement of college profile.

ATMOSPHERE

Plantation of Trees: The college management made it a practice to plant trees across the campus to improve greenery. This is a continual ongoing process and every year a target is taken to plant trees and increase the green cover inside the campus. The Following are the objectives kept in mind for increasing the Green Area coverage inside the campus and internal in the buildings too.

Reducing Climate Change

If people are good at something, then it is building up excess carbon dioxide in the atmosphere. Harmful CO2 contributes to climate change, the biggest current problem the world has to deal with. Trees, however, help fight it. They absorb CO2 removing it from the air and storing it while releasing oxygen.

Annually, an acre of trees absorbs the amount of carbon dioxide equal to driving your car 26 000 miles. Trees are our main survival tools; only one tree can produce enough oxygen for four people.

Purifying Air

Trees do purify the air. They absorb pollutant gases such as nitrogen oxides, ozone, ammonia, sulfur dioxide. Trees also absorb odors and act as a filter as little particulates get trapped in leaves. A matureacre of trees can yearly provide oxygen for 18 people.

Cooling Down the Streets

The average global temperature grew by 1.4 F. This happens as tree coverage declines. Removing trees and replacing them with heat absorbing asphalt roads and buildings makes cities much warmer. Trees are cooling cities by up to 10 F by providing shade and releasing water.

Natural Air Conditioning

Architects and environmentalists came up with the great solution – green roofs. Green roofs are an amazing way to incorporate vegetation to our Premises and provide environmental benefits. Indoor trees do not only have a calming effect, they also act as natural air conditioning.

Saving Water

Except for cooling, trees also help to save water. Because of the shade they provide, water will evaporate slowly from low vegetation. Trees need about 15 water gallons a week to survive, and theyrelease about 180-420 gallons of water per day.

Our Case: Almost 6.25 acres of Tree plantation out of 10 Acres of the campus is having tree plantationand heading for area of Greenery

RENEWABLE ENERGY

The campus is having enough area to install Grid Connected Solar PV in the campus. The campus installed with 120 KW solar PV to harness Solar Power.

Among all the benefits of solar energy the most important thing is that solar energy is a truly renewable energy source. It can be harnessed in all areas of the world and is available every day. We cannot run out of solar energy source.

Solar System has generated energy, the energy bills will drop. How much you save on bill will be dependent on the size of the solar system and electricity usage. Moreover, not only will you be saving on the electricity bill, there is also a possibility to receive payments for the surplus energy that you export back to the grid. If you generate more electricity than you use (considering that your solar panel system is connected to the grid).On average ,around 55% of the total load met by Solar Plant.

Some of the key benefits of solar energy on the environment include:

- Using less water. Water is one of our most precious natural resources. ...
- Reducing air pollution. ...
- Help to slow climate change
- Reducing your household's carbon footprint. ...
- Reducing our reliance on fossil fuels.

Our Case: Presently installed 120 KW Grid Connected Solar PV to Harness the Solar Power

Solar Power Plant view in Avanthi Campus.

Solar Panel Connected to the Sensor.

WATER CONSERVATION, HARVESTING AND MANAGEMENT

Per capita water availability of many river basins in India is declining over the years due to sustained population pressure, agriculture and industrial expansion, besides changing climate scenarios. This is particularly evident from the fact that the per capita availability.

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If the total fresh water available on the earth remains pollution free, it is sufficient to meet the drinking water needs of the existing population of the world, unfortunately a large portion of fresh water does not remain fit for use of the living world due to increasing economic activities,urbanization etc.

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Our Case: It is proposed to Construct Water harvesting Pits 2 No's, water conserving Toiletsthis may result in 6 KL /day.

Waste Management

1. Bio Waste – Food Waste / Waste Paper Food Waste: The Canteen situated in the campus which cooks food f has daily minimal food wastage. This Food waste can be used to generate Bio Gas which can be reused as a fuel for cooking the Food. It is proposed to install Bio Gas plant in the campus to generate Bio Gas from the food waste, which can be used in the Food Cooking. The Bio gas plant is installed and is functional.

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   Present Status: Dust bins were provided for the waste disposal the same is collected dailyonce and handed over the Municipal corporation.

2. Non- Bio Waste – Plastic Bottles /Sanitary Pads
   Non- biodegradable waste, which cannot be decomposed by biological processes, is called non- biodegradable waste. These are of two types - Recyclable: waste having economic values but destined for disposal can be recovered and reused along with their energy value. e g. Plastic, paper, old cloth etc. Non-recyclable: waste which do not have economic value ofrecovery. e.g., Carbon paper, thermo coal, tetra packs etc. Disposal of non-biodegradable waste is a major concern, not just plastic, a variety of waste being accumulated. There are a few ways to help non-biodegradable waste management. The impact of non- biodegradable waste on the environment and also focus on its safe disposal for sustainable environment. **Present Status: The plastic bottles are collected in the dust bins and disposed to scrap merchant. The sanitary pads in the Girls Wash rooms are disposed with Incinerators.**

3.E- Waste Management

Waste Electrical and Electronic Equipment (WEEE) or E-waste is one of the fastest growing waste streams in the world. In developed countries, it equals 1% of total solid waste on an average. In developing countries, it ranges from 0.01% to 1% of the total municipal solid waste generation. In countries like China and India, though annual generation per capita is less than 1 kg, it is growing at an exponential pace.

Present Status: The College is collecting the E waste and disposing once in a year basis to the E Waste disposing agencies, the agency will come and pick up the E waste and dispose it in environmental friendly way.

RECOMMENDATIONS:

1.Leakage Taps should be replaced.

2.Create more awareness on Green activities among the student and staff.

3.Plants number should be increased.

4.Solar plamts should be installed.

5. Place the name boards of Trees.

Audit Framework and detailed findings of the Audit

Objective	Observation/ Present status	Remarks / Recommendation
Green Cover - Plantation ofTrees	A Grid Connected Solar PV plant is proposed to increasethe capacity .	It is recommended to Increase some more capacity of the solar PV roof top plants to harness solar energy.
Water Conservation – i) Rain Water harvesting ii) Eliminating LeakingTaps iii) Avoid Misuse/wastage ofwater Waste Management	i) It is proposed to construct additional Rain water Harvesting pits. ii) A Dedicated Team working on the repairing the leaking taps across the campus. iii) RO Plant is installed for providing safe drinking water, which generates RO reject water, this water is used for Gardening. iv) Encourage to reduce thewater usage by displaying messages v) It is recommended to install Water Sprinkler system installation is initiated to save water.	They will be functional veryshortly. Most of the taps are repaired, it is recommended to install taps with reduced water flow like shower / Mist. Reward the personnel informing Leaky taps, Paste Labels where ever water is expected to be wasted. Processinitiated It is recommended to Install a Aqua Conditioner to reduce theRO Reject. Recommended to install Bio Toilets/Water Less Toilets like ECO Loo which reduces water usage and generates fertilizer from human waste and Natural liquid from the Urine which can be reused for gardening. Underprocess.

i) Bio Waste	i) The Bio Waste – Food Waste generated in the canteen is	i) Bio gas plant is proposed to be installed very

	proposed to be feed stock forBio Gas plant.	shortly .
ii) Non-Bio Waste	ii) Paper Waste is disposed toscrap merchant iii) Non-Bio Waste – Plastic Bottles / Paper Waste Metals waste is being collected in the dust bins placed across the campus. A GWMC team is visiting the campus on weekly basis and collecting the same.	ii) It is proposed to install plastic bottle crusher, which can be sold as a feed stock for the Plastic industry. iii) Installed Sandy (Sanitary napkin crusher at ladies Toilet) to avoid choking of toilets and wastage ofwater.
iii) E Waste	iv) E Waste – All Electronic Junk is generated in the campus in the form of Used Computer key boards/ Mouses/ CPU's/ Damaged Printers etc. is disposed to E Waste agency which collects and disposes in an environmental friendly way.	iv) It is recommended to have an MOU with E Waste disposal agency on yearly basis.

Carbon Foot Print

Total students : 1650
Faculty : 136
Staff : 56
Buses : 15

A detailed Carbon foot print calculation is presented in later chapters Carbon Foot Print

Carbon Foot Print i) Transportation	i) Most staff commute in the College Transport - Buses from City ii) Students commute in the college provided transport - Buses	i) Adequate buses are available for the Staff /Students.

References

1. Plantation of Trees - https://greenpop.org/10-environmental-benefits-planting-tree

2. Bio Toilets -https://www.iwapublishing.com/news/bio-toilets-sustainable-solutionindia%E2%80%99s-sanitation-challenge

3. Bio Toilets: https://www.indiascience.in/videos/bio-toilets-sustainable-solution-for-sanitatione

4. Urban Green Guide Lines –2014, Min. of Urban Development, Govt. Of India

5. Roof top Rain Water harvesting Guidelines – IS 15797 – 2008

6. Guidelines for Improving Water Use Efficiency in Irrigation, Domestic & Industrial Sectors as Per IS –1172 - 1993

7. IEC 62891Solar PV For Grid Interactive system, IEC 61853- Part 1/ IS 16170: Part 1for Solar PV Panels

8. Central Public Health and Environmental Engineering Organization (CPHEEO) Manual on MunicipalSolid Waste Management.

9. Draft Indian Standard Municipal Solid Waste Management – Segregation, Collection & Utilization atHousehold/community for Recovery and Recycle as per IS: 9659

10. Indian Guide Lines for Carbon Foot print and reduction strategies https://indiaghgp.org/project-accounting-protocol-and-guidelines.

PICTURES OF PLANTATION OF TREES

A Detailed Pictorials are attached with this report

Picturesque of Avanthi Green campus,Gunthapally.

Greenery of Avanthi Adjacent to the Main Block.

Graphics from Central road of Avanthi Campus

Dust bin for solid waste

Dust bin for Liquid Waste

Avanthi Administrative Block view

way to College Canteen

An Area for water Harvesting

E -WASTE MANAGEMENT

Policy : E-waste Management:

Electronic equipment such as Computers, TV, Phones, Printers, Fax and Photocopy machines are recycled properly. Electronic goods are put to optimum use and the minor repairs are set right by the Laboratory Assistants; and the major repairs are taken up by the professional technicians and then reused. UPS Batteries are recharged and repaired by the suppliers. Avanthi Institute of Engineering and Technology zero waste management through recycle and up cycle. All electronic equipment used in the campus are regularly maintained and repaired to ensure minimum e - waste. Hazardous chemicals and radioactive waste management: Hazardous Chemicals are kept separately well labeled in the store room away from the reach of students. The hazardous chemical waste is properly treated before it is allowed to go into the drains. There is no use of any radioactive substance in the campus. Biomedical waste management: The institute is not involved in handling of microbes or clinical samples directly hence biomedical waste is not generated.

It is recommended to enter in to an agreement for disposal of the E Waste which are mentioned belowwith an agency

1. Electronic Waste (E-Waste) -The Term E-Waste will refer to the below mentioned electrical andelectronic waste for the purpose of this Agreement which includes;

a) Computers & Peripherals (CPU, Keyboard, Mouse& Monitor)

b) Laptops

c) Servers

d) PCBs

e) Mobiles or Communication devices

f) Mother Boards (Computers &Laptops)

g) Security Devices

h) Telecom Equipment

i) Printers & Scanners

j) Military Electronic

k) Control Systems

l) Data Cables and wires

m) Batteries

n) CD/DVD

o) Tube lights and CFL

CARBON FOOT PRINT

The Avanthi Institute of Engineering and Technology has Students – 1472 (Teaching + NonTeaching-267). the Co2 Emission is 6211 Kg/day Members by Two Wheeler – 100 – Co2 emission is. 156.75 Kg /dayMembers by College Bus – 1474 - Co2 emission is 6011 Kg/day Members by Individual Car -4 – Co2 emission is 53.66 Kg/day

Note: Assume each member travel a distance of 25 kms to college and 25 kms return to home .

	Pounds CO2	Kilograms CO2	Pounds CO2	kilograms CO2
Carbon Dioxide (CO2)Factors:	Per Unit of Volume or Mass	Volume orMass	Million Btu	Million Btu
FOR HOMES AND BUSINESSES				
Propane	12.70/gallon	5.76/gallon	139.05	63.07
Butane	14.80/gallon	6.71/gallon	143.2	64.95
Butane/Propane Mix	13.70/gallon	6.21/gallon	141.12	64.01
Home Heating and Diesel Fuel (Distillate)	22.40/gallon	10.16/gallon	161.3	73.16
Kerosene	21.50/gallon	9.75/gallon	159.4	72.3
Coal (All types)	4,631.50/shor tton	2,100.82/shor tton	210.2	95.35
Natural Gas	117.10/thousan dcubic feet	53.12/thousan dcubic feet	117	53.07
Gasoline	19.60/gallon	8.89/gallon	157.2	71.3
Residual Heating Fuel (Businesses only)	26.00/gallon	11.79/gallon	173.7	78.79
OTHER TRANSPORTATION FUELS				
Jet Fuel	21.10/gallon	9.57/gallon	156.3	70.9
Aviation Gas	18.40/gallon	8.35/gallon	152.6	69.2
INDUSTRIAL FUELS AND OTHERS NOT LISTED ABOVE				
Flared natural gas	120.70/thousan dcubic feet	54.75/thousan dcubic feet	120.6	54.7
Petroleum coke	32.40/gallon	14.70/gallon	225.1	102.1
Other petroleum &miscellaneous	22.09/gallon	10.02/gallon	160.1	72.62
NONFUEL USES				
Asphalt and Road Oil	26.34/gallon	11.95/gallon	166.7	75.61
Lubricants	23.62/gallon	10.72/gallon	163.6	74.21
Petrochemic alFeedstocks	24.74/gallon	11.22/gallon	156.6	71.03
Special Naphthas (solvents)	20.05/gallon	9.10/gallon	160.5	72.8

Waxes	21.11/gallon	9.57/gallon	160.1	72.62
COAL BY TYPE				
Anthracite	5,685.00/short ton	2,578.68/short ton	228.6	103.7
Bituminous	4,931.30/short ton	2,236.80/short ton	205.7	93.3
Subbituminous	3,715.90/short ton	1,685.51/short ton	214.3	97.2
Lignite	2,791.60/short ton	1,266.25/short ton	215.4	97.7
Coke	6,239.68/short ton	2,830.27/short ton	251.6	114.12
	OTHER FUELS			
Geothermal (average all generation)	NA	NA	16.99	7.71
Municipal Solid Waste	5,771.00/short ton	2,617.68/short ton	91.9	41.69
Tire-derived fuel	6,160.00/short ton	2,794.13/short ton	189.54	85.97
Waste oil	924.0/barrel	419.12/barrel	210	95.25
Source: U.S. Energy Information Administration estimates. Note: To convert to carbon equivalents multiply by 12/44. Coefficients may vary slightly with estimation method and across time.				
Carbon Dioxide Emissions Coefficients by Fuel				
Detailed factors (discontinued)				

A Green Initiative: Bicycles are kept at the campus for commutation within the campus for the staff /student

It shows the water harvesting pit.

Water Plantation in Avanthi institute of Engineering and Technology,Gunthapally.