Green Audit

of

M/s **Institute of Aeronautical Engineering ,**

Dundigal Road, Dundigal, Hyderabad, Telangana 500043

2019-20

By

SRI GAYATRI ENERGY SERVICES

we support you conserve

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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 **Institute of Aeronautical Engineering, Dindigul**, Hakimpet , RR Distt. Telangana for entrusting the Green Audit work of their College .

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

Sri **Marri Rajasekhar Reddy** Chairman**,** Sri **Ch. Sathi Reddy** Secretary and Correspondent

Sri **B Rajeshwar Rao** Executive Director & Treasurer

Dr. **L V Narasimha Prasad** Principal

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We trust the data provided by the M/s **Institute of Aeronautical Engineering , Dindigul RR Dist. Telangana** personnel is true to their best of knowledge and we didn't verify the correctness of it.

Audit Study team

Shri D.S.R.Murthy	Senior Energy Auditor
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Shri Ashok	Engineer

CERTIFICATE

We here by certify that we carried out Green Audit in the M/s **Institute of Aeronautical College of Engineering**, Dindigul, Hakimpet, RR Distt. Telanagana during 21-22 June 2019 and following Observations were presented below. The Management is pro Active towards Green Initiative by Harvesting Solar Energy , Planting Trees , Better water conservation, Waste Management ,Carbon Foot Print , A continual improvement in Green Initiative is appreciated. We appreciate the efforts of the M/s **Institute of Aeronautical College of Engineering** , Dindigul , RR Distt, Telangana in this regard.

For Sri Gayatri Energy Services

D.S.R. MURTHY
EA-3915
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 which is mandatory for mitigating the Global warming.
3. The Grid Connected Solar PV is installed as part of Renewable energy initiative to the tune of 160 KW in an area of 35,101.086 sft in the campus . There is another 48039.33 sft available for additioinal solar plant . It is proposed to install Solar PV plant in near future . There by reducing the energy dependence on the Grid .
4. The Water conservation measures are already in place viz., Construction of water Harvesting Pits and individual buildings rain water soak pits are under construction so that the same can be interconnected to the Water Harvesting pits .At present Leaking taps in the campus are in process of elimination .
5. Water Wastage – Leaky taps are repaired, More efficient taps are proposed to be installed, Bio Toilets proposed to be installed . A Proposal to install ETP is in process .
6. Waste Management is segregated in to three categories like i) Bio Degradable Waste (Food Waste) , it is discouraged to waste food and penalties are imposed on the persons who waste the food . ii) Non Bio Degradable Waste (Plastic , Papers and Other) , The Waste paper collection bins are placed across the campus , Plastic bottles are discouraged . iii) E Waste Management .- It is proposed to sign an MOU with M/s Ramky for collecting E Waste and dispose it off in Eco Friendly manner .
7. All the Waste Management strategies are in place and implementation is already going on , some are already in implementation and looking for improvement from existing for better alternatives.
8. Carbon Foot Print is also focused on and gradually planning to reduce the same by introducing environmentally sustainable alternatives. To Increase the number of College buses where the routes are not covered earlier so that the students residing in those areas can come by college buses.
9. It can be concluded that the Green Audit initiatives are in place and College Management recognized the importance and taking active steps towards sustainable environment.

GreenAudit 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 is 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

Institute of Aeronautical Engineering (**IARE**), Hyderabad was established in the year 2000 and is run by Maruthi Educational Society founded by a devoted group of eminent professional and industrialists having a long and outstanding experience in educational system with a mission 'Education for Liberation'. It is the first institute to start B.Tech program in Aeronautical Engineering in the state of Telangana and has gradually transformed itself into an integrated multi-disciplinary technological institute. It is the most preferred institute with 100% admissions in the state of Telangana.

The total number of students is 4656 and that of faculty is 269 , ensuring healthy faculty student ratio. The research activity on campus is woven in pursuance of its vision & mission statements around the philosophy of **I**nspire**, I**nnovate, and **I**mplement to benefit the contemporary society. It unwinds itself into different fields such as environment, aerospace, PLC, CAD/CAM, CNC machining, tool design, welding, embedded systems, and low power VLSI digital system design. Emphasis is also being laid on manufacturing, automation, business analytics, big data, cloud computing, wireless technology, image processing, and next generation networks.

Institute has state of art infrastructural facilities to support teaching-learning, research and administrative services. The institute is spread over **26.72 acres** with built up area of 3,37,500 sft. housing 65+ smart class rooms, 2 ICT studio rooms,4 flipped classrooms, 4 conference halls, auditorium, 8 research laboratories, 103 academic laboratories, science and technology startup park, technology innovation and incubation center, open air amphitheater, makerspace, community facilitation center, skill development center and library. Campus-wide networking with 600 Mbps internet connectivity, Wi-Fi and CCTV facility is available. To reduce the consumption of electricity efficient lightings are used with solar electric energy of 160 KW on the grid. A captive power of 480 KVA is provided to ensure smooth working of the institute in times of power outage. The institute operates 32 buses for the benefit of students and staff.

STATEMENT OF ASSURANCE

The Green Audit conducted for the Second time in the college. The Management had taken initiative to carryout the Green Audit externally. As mentioned above it is in the process of creating 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 creating 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 , 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

1. **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 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 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 mature acre 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 they release about 200-450 gallons of water per day.

Our Case : Almost 1.033 acres of Tree plantation out of 26 Acres of the campus is having tree plantation and heading for area of Greenery

Renewable Energy : 100 KW Solar PV Grid Connected in an area of 35101.086 sft .

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 can not run out of solar energy 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 160 KW Grid Connected Solar PV to Harness the Solar Power and further enhancement of solar PV is in the pipe line.

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 has decreased from 1816 m3/year in 2001 to 1545m3/year in 2011.

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 through ponds 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 : Constructed Water harvesting Pits 5 No's across the campus and in the process of constructing water drains and interconnecting the same to water harvesting pits to recharge the ground water

Waste Management :

1. Bio Waste – Mostly Food Waste generated from the cooked food at the campus in the canteen / Restaurants , the best way to reuse / dispose the food waste is to install a Bio Gas plant which can effectively dispose the food waste and develops a non fossil fuel for cooking the food .
   Bio Gas Plant : Generating Bio Gas from Food Waste is an Anaerobic digestion is controlled biological degradation process which allows efficient capturing & utilization of biogas (approx. 60% methane and 40% carbon dioxide) for energy generation. Anaerobic digestion of food waste is achievable but different types, composition of food waste results in varying degrees of methane yields, and thus the effects of mixing various types of food waste and their proportions should be determined on case by case basis.

2. Non Bio Waste – Plastic Bottles / Waste Paper / Cardboards/ Batteries etc

   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 of recovery. 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.

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.

Our Case : Presently Food Waste is collected and proposed to install a Biogas plant for production of methane gas .

Non Bio Degradable waste : The Plastic/paper / Metal waste is collected at present and handed over to GHMC .

E Waste: The Institute is having a MOU with m/s Ramky Environ Engineers , to collect the E waste and dispose in the environmentally friend way .

Audit Framework and detailed findings of the Audit

Objective	Observation/ Present status	Remarks / Recommendation
Green Cover - Plantation of Trees	Plantation of trees is started in the campus and the green cover is extended every year in the campus. At Present 1.033 Acres campus is having the Green cover .	A Continual plantation of trees is going on . It is recommended to increase the Green Cover further to another 5 Acres in coming one year.
Renewable Energy – Harness Solar Power , Wind Power etc	A Grid Connected Solar plant is installed with capacity of 160 KW	The Solar PV plant is functional and exporting clean energy to the grid . It is recommended to explore the vacant areas to increase the solar roof top plants to harness more solar energy
Water Conservation – i) Rain Water harvesting	i) Rain water Harvesting pits in place	They are functional
ii) Eliminating Leaking Taps	ii) A Dedicated Team working on the repairing the leaking taps across the campus	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.
iii) Interconnection of Water Soaking pits to Rain harvesting Pits	iii) Interconnection process is initiated	Process initiated
	iv) RO Plant is installed for providing safe drinking water , which generates RO reject water ,this water is used for Gardening.	It is recommended to Install a Aqua Conditioner to reduce the RO Reject.
iv) Avoid Misuse/wastage of water	v) Encourage to reduce the water usage	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.
	vi) Water Sprinkler system installation is initiated to save water	Under process

Waste Management i) Bio Waste ii) Non Bio Waste iii) E Waste	i) The Bio Waste – Food Waste generated in the canteen is proposed to be feed stock for Bio Gas plant , ii) 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. iii) E Waste – All Electronic Junk is generated in the campus in the form of Used Computer key boards/ Mouses/ CPU's/ Damaged Printers etc	i) Process is initiated for Bio gas plant. ii) It is proposed to install plastic bottle crusher, which can be sold as a feed stock for the Plastic industry. iii) It is proposed to install Sandy (Sanitary napkin crusher at ladies Toilet) to avoid choking of toilets and wastage to water . iv) An agreement is in place with M/s Ramky Enviro Engineers ,Hyd to pick up the E waste every month

Carbon Foot Print i) Transportation	i) All staff commute in the College Transport from City ii) Students commute in the college Buses	i) Adequate buses are available for the students .

References

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3. Urban Green Guide Lines –2014 , Min. of Urban Development , Govt. Of India
4. Roof top Rain Water harvesting Guidelines – IS 15797 – 2008
5. Guidelines For Improving Water Use Efficiency in Irrigation, Domestic & Industrial Sectors as Per IS – 1172 - 1993
6. IEC 62891Solar PV For Grid Interactive system, IEC 61853- Part 1/ IS 16170 : Part 1for Solar PV Panels
7. Central Public Health and Environmental Engineering Organization (CPHEEO) Manual on Municipal Solid Waste Management.
8. Draft Indian Standard Municipal Solid Waste Management – Segregation, Collection & Utilization at Household/community for Recovery and Recycle as per IS : 9659

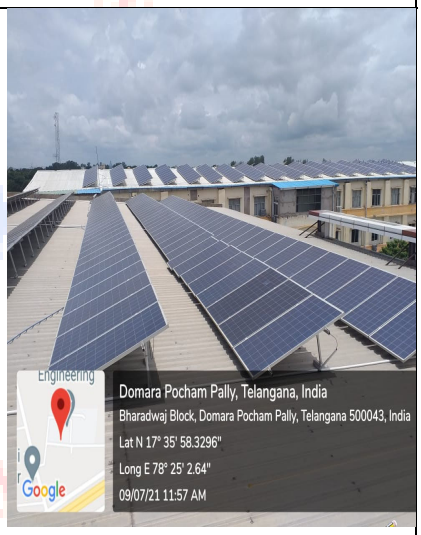
Visuals of Plantation of Trees across the campus

Grid Connected Solar PV installed at the Campus

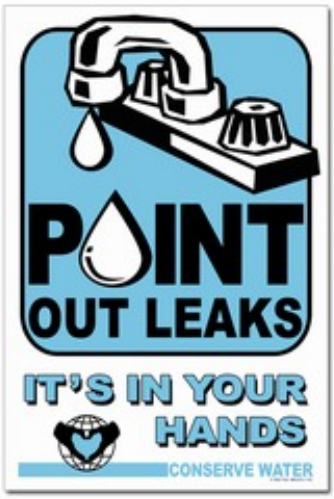
Solar PV Panels on roof top

Solar PV Inverters

Solar PV Inverters



Rain Harvesting Pits

 Leaky Taps	

Waste Collections Bins