INTERNATIONAL JOURNAL
FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

www.ijraset.com

Call: ⓒ08813907089 | E-mail ID: ijraset@gmail.com

Green Auditing 2019-2020 Integral University Campus, Lucknow

Dr. Indrani Chakraborty[1], Dr Subhrajit Banerjee[2], Ar. Safa Seraj[3]

[1]Professor & Dean, Faculty of Architecture and Planning Convener of Green Audit Committee Integral University .
[2]Associate Professor, Faculty of Architecture and Planning, Dr APJ Abdul Kalaam Technical University, Lucknow, India
[3]Assistant Professor, Faculty of Architecture &Planning, Member of Green Audit Committee Integral University.

Abstract: The term "green" means covered with grass or other vegetation or eco-friendly and the term "audit" means an official inspection of an organization's accounts, typically by an independent body. This can be acronymic ally called as 'Global Readiness in Ensuring Ecological Neutrality (GREEN)'. The green auditing is an assessment of a business in terms of its impact on the environment and can also be known as the "environmental auditing". The green audit practically involves certain green factors in the campus such as : Energy conservation , Water conservation , Waste and E-Waste Management , indoor plantation , green scapes, tree diversity, green area , green offices ,green lab , green IT , car less campus , bi cycle friendliness ,etc. Various initiatives taken by the University (existing and proposed) for green campus are discuss. Through scoring the assessment of the university as per the observation are produce. After identifying the green factors and its application within the campus the audit report conclude with various suggestion and recommendation that will help the university to achieve the green motives for sustainable development.
Keywords: Global, Stages of Audit ,Environmental Management , Sustainable Development , Eco System

I. INTRODUCTION

Green audit is assigned to the criteria 7 of NAAC, National Assessment and Accreditation Council. The 'Green Audit' aims to analyze environmental practices within and outside the campus, which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. Later on, it is implemented as a measure to enhance a healthy environment to almost all the organizations. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit. The goal is to reduce CO2 emission, energy and water usage, while creating an environmentally literate campus where students can learn the idea of protection of environment and stay healthy. The "Green Campus" has been a very new concept adopted by this college. The college administration is still working on the several facets of "Green Campus" including Water Conservation, Tree Plantation, Waste Management, Paperless Work, carbon footprints and Alternative Energy.

II. BACKGROUND

Integral University is a state private university in Lucknow , the capital of Uttar Pradesh, India, which originated as the Institute of Integral Technology, Lucknow. The Institute of Integral Technology, Lucknow was established in 1998. Integral University, the first enacted Minority University in the country, started functioning from 1 April 2004. Integral University was accorded recognition by U.G.C. under section 2(f) of U.G.C. Act, 1956. The University was founded in 2004.
The university is divided into blocks: Academic blocks A, B,C,D,E,F and N, Administrative Block - M, Hospital Block - H, Boys Hostel Hall-1,2,3,&4,Central Library -Block C, Canteen , Department of Pharmacy Block -CW , Generator Room , Girls Hostel , Hospital Building , Playground , IIAST Block - BW , Laundry , Medical Gas Plant , Medicine Shop , Mess Girls Hostel ,Nescafe , Nurses Hostel , Post Mortem/Mortuary , Residential Quarters Block -R, Rainbasera , Staff Residence , Techno Academic Inter College -Block DW , University Polytechnic -AW and Workshop Beside this a Punjab National Bank branch has been operating in the university. Total Plot Area is 180382 sq.mt. In which 34550 sq.mt(excluding residential activities) is the ground coverage i.e. 25% and remaining 60,000 sq.mt i.e.75% is the green scape.

Table: 1 Illustration of the campus area and the total population.

	Attributes	Variables
UNIVERSITY AREA	Campus Area	121.047 Acre
	Built Up Area	40%
	Open Spaces	60%
POPULATION	Students	16054
	Teachers	304
	Non Teaching Staffs	400

The detail analysis of the classroom and other spaces are documented and analyzed. The university campus is divided into two campus:

Campus 1 consist of:

- Academic blocks:
  - Block - A
  - Block - B
  - Block - D
  - Block - E
  - Block - F
  - Block - N
- Administrative Block - M
- Hospital Block - H
- Boys Hostel Hall :
  - Boys Hostel Hall-1
  - Boys Hostel Hall-2
  - Boys Hostel Hall-3
  - Boys Hostel Hall-4
- Central Library -Block C
- Canteen
- Generator Room
- Girls Hostel

- Playground
- Hospital Building
- Laundry
- Medical Gas Plant
- Medicine Shop
- Mess Girls Hostel
- Nescafe
- Nurses Hostel
- Post Mortem/Mortuary
- Residential Quarters Block -R
- Rainbasera
- Staff Residence
- Workshop

West Campus consist of:
- IIAST Block - BW
- University Polytechnic -AW
- Techno Academic Inter College -Block DW
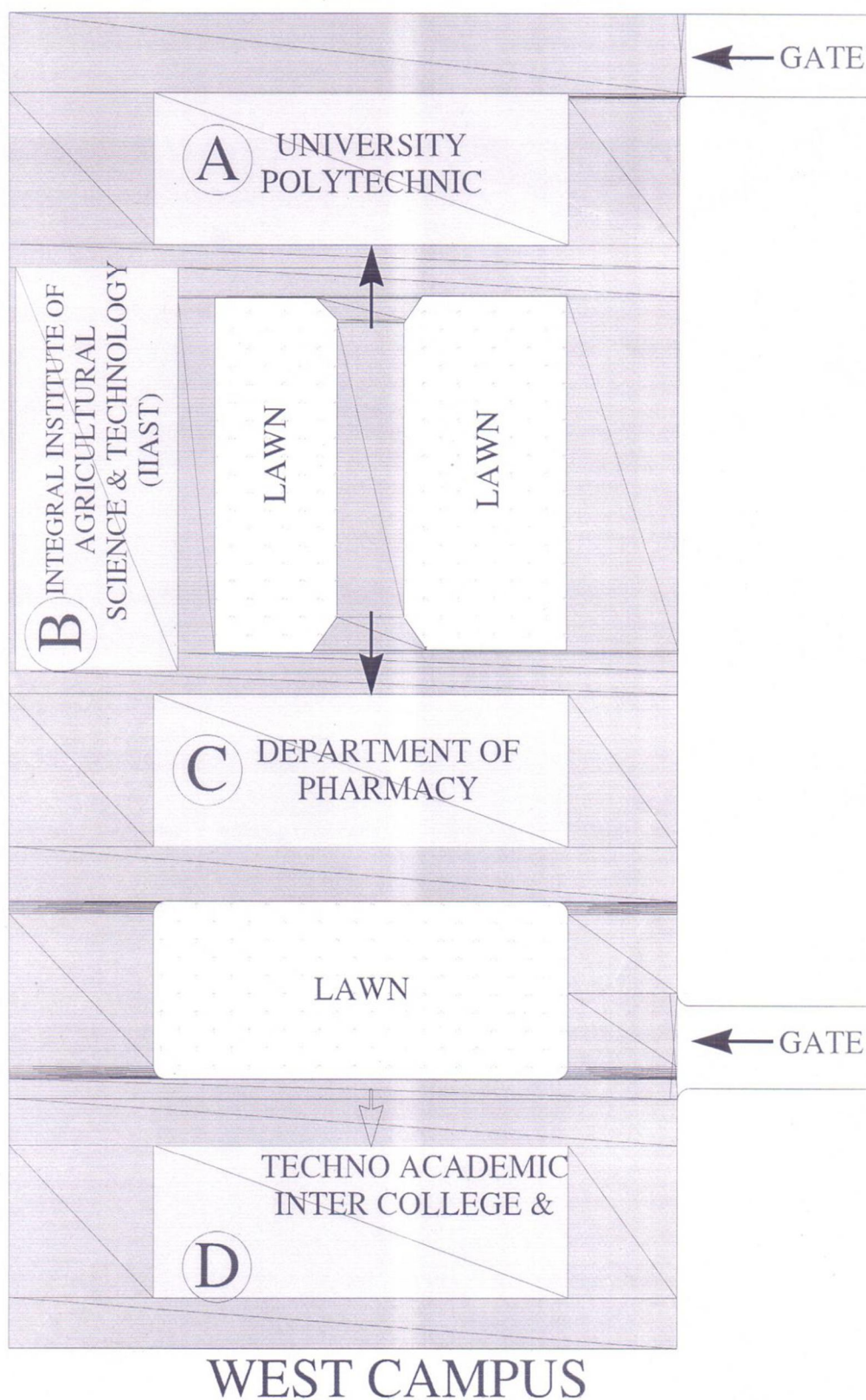- Department of Pharmacy Block -CW

Fig. 1: Layout Plan of the University

Fig. 2: Layout Plan of the West Campus of the University

III.   GREEN FACTORS WITHIN THE CAMPUS

1) *Energy Conservation:* The University consumes an average unit 441366.5 kW per year in average it is 29.8% only to maintain its volumetric activities throughout the year. Photo voltaic cells for solar energy (1 MW), energy efficient photocopiers, AC etc. The average solar unit consumed per year is 131419.8333 kW through the installed solar LED lights. The authority keep on replacing the old filament bulbs, CFL bulbs and tube lights by low energy consuming LED bulbs and LED tubes and bulky high power consuming fans by energy efficient fans in order to keep the electricity consumption of the University as low as possible. In tune with the international trend, Integral University has installed 1MWp Rooftop Grid Interactive Solar Power Plant as per Solar Energy Corporation of India (SECI) guidelines & specifications. Apart from 30%-40% revenue saving, the plant abates around 1400 tons of Carbon dioxide annually and reduces emissions from grid power and backup diesel generators.

Location	Capacity (kWp)	Modules (320 Wp)	Inverters
Academic Block	200	720 Nos.	66kVA (3 Nos.)
New Girls Hostel	150	460 Nos.	50 kVA (3 Nos.)
Civil Block	110	417Nos.	66kVA (1No.) , 25kVA(1 No.) 20kVA (1No.)
Medical Phase II	110	343Nos.	50kVA (2Nos.)
Medical Phase - I	100	400Nos.	25kVA (4 Nos.)
BNLT Block	90	340Nos.	66kVA (1 No.),25kVA (1 No.)
Residential Block	80	240Nos.	50 kVA (1 No.),30kVA (1No.)
Library	70	220Nos.	50 kVA (1 No.),20kVA (1No.)
Old Girls Hostel	60	180	66kVA (1No.)
NLT A Block	40	120	50kVA (1No.)

Table 2: 1MWP SOLAR PHOTOVOLTAIC PLANT (Grid Interactive & Rooftop)

The computers and other equipment put on power-saving mode and run "switch off" drills at university.

2) *Water Conservation:* Water is used for drinking, toilets, labs, gardening and cleaning purpose. Borewells are the main source of water in the university. Total sixteen in numbers with 16Hp (Horse Power) of each motors are used for pumping water from each well within the campus. Overhead water tanks are used for storing water with 60% of total consumption in which, 20% of water is used for gardening once in a week .To ensure minimum water consumption there are signages reminding people to turn off the water .

3) *Waste Management:* The university generates waste like – hazardous waste , solid waste , E-Waste , dry leaves , etc. Sewage Treatment Plant is under construction for the treatment of waste generated from toilet , urinal and sanitary . The campus consist of numbers of dust bin along with the color coding such as - green for bio-degradable waste and blue for plastic and metal waste .Transferring of Bio-Waste are made through proper care & handling procedure. The waste generated in the university are managed through composting , recycling & reusing and recycled paper are also used.

4) *E-Waste Management:* E-waste comprises of wastes generated from used electronic devices , electronic gadgets and their waste parts such as – monitor , keyboard , C.P.U., lighting equipment like bulbs , CFL,fluorescent tube lights ,fans , medical machines like – X-Ray machine , CT Scan machine and telecom equipment are stored in separate rooms.

5) *Biodiversity and Ecosystem Service:* The campus consist of the total 60,000 sq.mt i.e.75% of the area green scapes (excluding residential building).Indoor plantation within the departments are encouraging the student's mental health and reducing stress and increasing happiness. More than 100 species of native trees are planted, it not only provide the soothing environment but also takes less amount of water for healthy growth.
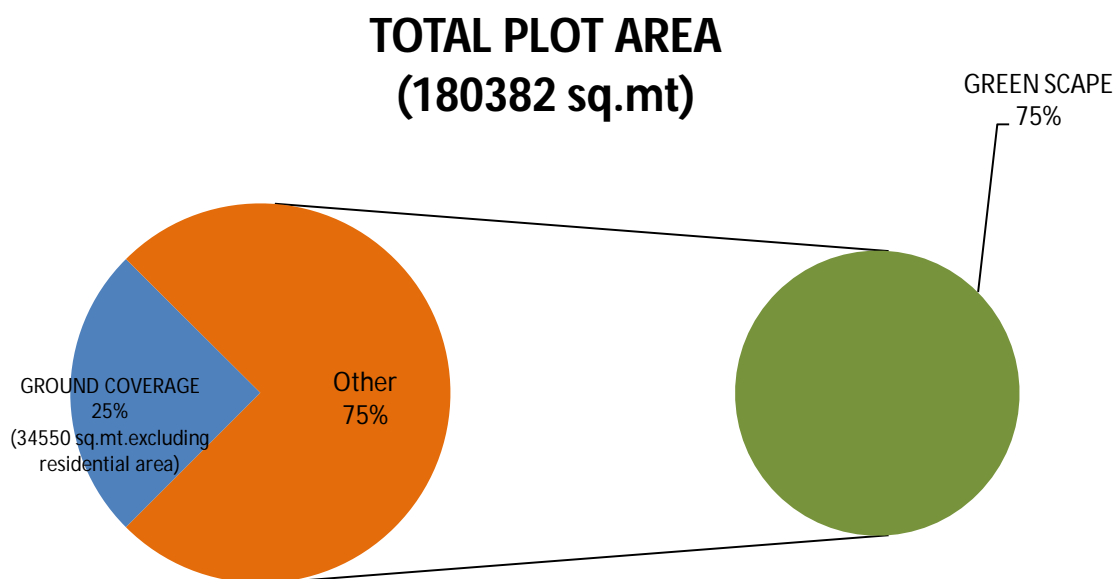
TOTAL PLOT AREA
(180382 sq.mt)

Fig.3: The chart illustrate the total plot area and the green scape within the campus.

6) *Green Office:* A large atrium in the center of the library provides skylight with good indoor environmental quality and encourages students to read and write under the daylights for efficient use of energy . Signages to "turn off" the lights and fan whenever not in a use are placed near the switch boards. The campus have security & monitoring system , hospitals , playground , auditorium , cafeteria ,shopping center , bank facility, ATM machine , post office , stationary ,etc. Awareness against the dehumanizing effect of ragging through poster and anti – ragging squads are also formed with total 19 members within the body to manifest a ragging free campus.

7) *Green Lab:* Educate the campus community to minimize the drain disposal of chemicals and the use of toxic substances in workshops, research labs and the classrooms. Reduce hazardous wastes and properly dispose materials for recycling waste oil, used batteries and solvents. Convert chemistry labs to microscale.

8) *Green IT:* The computers and other equipment are always put on power-saving mode. Labs with natural skylight are present that helps in conserving energy and also providing good ambience. Regular monitoring of the computer and its other damaged parts are performed to transfer it to E-Waste storage rooms.

9) *Transport:* The campus have parking facility in pockets . Chunks of Parking can be seen outside of the departments and a separate parking is also seen inside the campus . The campus have separate parking for bicycles, motor cycles , cars , ambulance and buses. Initiating pedestrian walkways more within the campus to insure car less campus.

10) *Mobility:* Making it accessible to all , the campus is based on inclusive design by providing ramps on the entrance and exit gate, separate toilets for male and female (as per standards) and pathways . The university is planning to upgrade a campus that supplies students with free bike repair resources, covered bike parking, discounted equipment, classes on bike safety and group ride.

IV. METHODOLOGY

In order to perform green audit, the methodology included different techniques such as physical inspection of the campuses, observation and review of the documentation, interviewing key person and data analysis, measurements and recommendations. The study covered the following steps to summarize the present status of environment management in the campus:

A. Onsite Visit
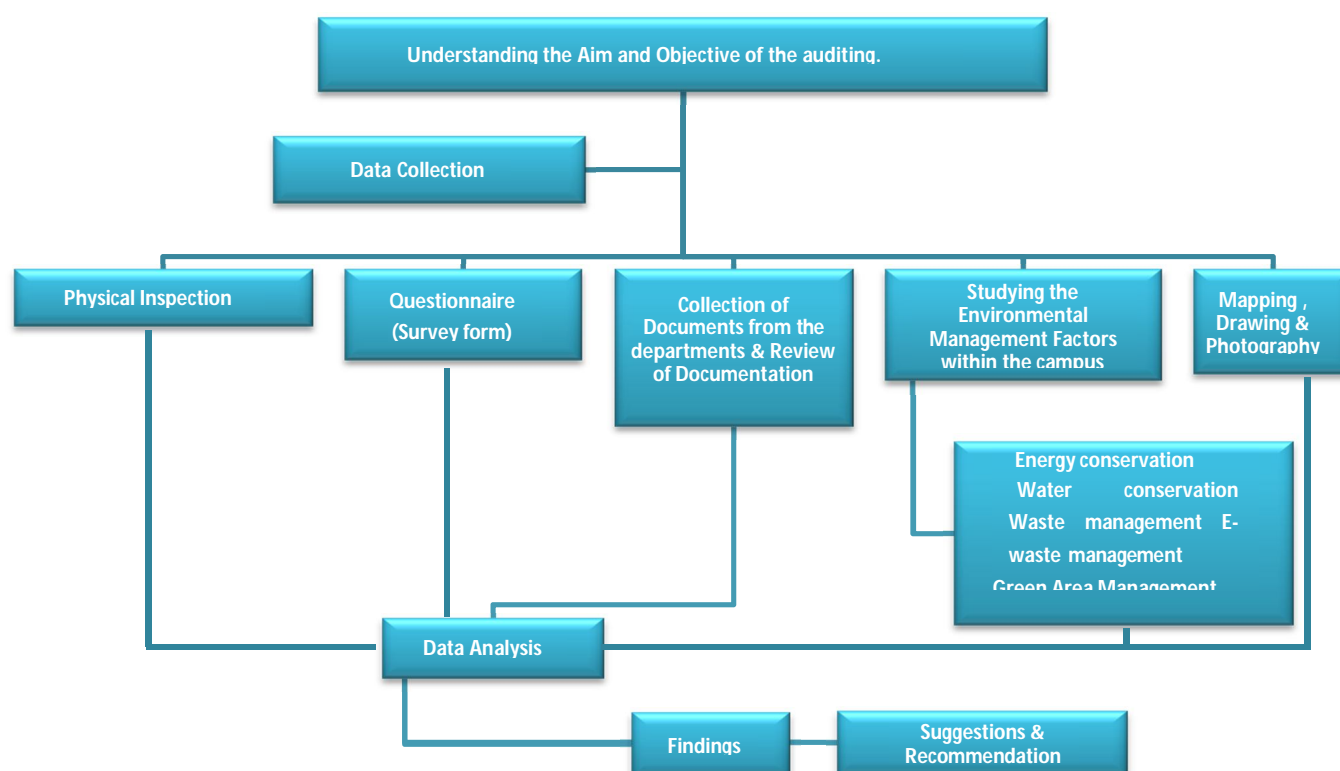B. Focus Group Discussion
C. Office/Building Survey
D. Recommendation.

Fig. 4: The methodology adopted to achieve the aim and objective of the Green Audit .

V. GREEN CAMPUS INITIATIVE

Existing Initiatives	Proposed Initiatives
I. Energy efficient measures including energy efficient street lighting system with proper control, low energy fixtures, energy efficient pumping system, energy efficient motors and other equipment's, sensors for lighting, use of energy star rating equipments, improvement of power factor, use of variable frequency drive and other energy efficient technologies should be adopted and reflected in the proposed master plan.	I. The energy audit and water audit of the entire campus should be carried out through registered certified professionals and the base line for the energy and water consumption should be defined.
II. The buildings in the campus have rooftop SPV systems preferably grid connected systems.	II. Utilization of renewable energy system such as solar water heater, solar air conditioning, solar dryers, solar cookers, solar lantern, solar pumps, solar traffic signals, battery operated vehicle, hybrid systems etc. should be explored
III. The master plan should be site specific and should have minimum 5 numbers of implementable a detailed project reports as per guidelines of MNRE and BEE under various schemes. An audit report should be prepared and submitted alongwith the master plan.	III. Solar cooking systems must be utilized for hostels/hospitals etc. All houses, hostels, kitchen must have solar water heaters (including multi-storied buildings).
IV. An awareness/training workshop should be organized in the campus regarding renewable energy applications, and taking suitable measures for energy conservation and energy efficiency	IV. A master plan for the entire campus should be prepared keeping in view the overall reduction in fossil fuel based energy by 25% within next 5 years by utilizing renewable energy applications, and taking suitable measures for energy conservation and energy efficiency
V. The possibility of redesigning of exterior surfaces of the buildings with energy efficient material may be explored.	V. Suitable architectural retrofit options for building envelop (floor, roof, walls etc.) and energy efficient glasses for windows should be explored and included in the report.

Table 3: The initiatives taken by the University for green campus.

A. Other Energy Saving Initiatives

Promote the use of reusable by giving away or selling them to members of the campus community and organizing discounts at local and campus stores. Work with the university stores to reduce waste:

1) Establish a bag/carton return program (in which there is a small refund for returning them)
2) Promote the use of cloth bags instead of disposable bags
3) Encourage the sale of goods with less packaging
4) Create a market for used books and other items.
5) Strict rules need to be implemented to prevent littering on the campus.
6) Declare the entire campus as 'No Plastic Zone'.
7) Water dispensers need to be set in several locations on campus with durable and reusable cups (bottled water as well as sale point of soft drinks and water in pet bottles on campus need to be banned).
8) A small part of the land on campus needs to be earmarked to set up four separate waste processing units: one for organic waste (biogas plant/ compost), one for secondary and tertiary segregation of dry wastes, yet another for shredding and incinerating, and a fourth one to store recyclable wastes, construction rubble and waste residue intended for municipal landfill and e-waste that need to leave the campus in a designated way.
9) E-waste is to be deposited with designated contractor duly authorized by the Pollution Control Board.
10) Refurbished computers, monitors, scanner and printers may be donated.
11) Avoid paper pamphlets and flex banners. Instead, use reusable cloth banners and notice boards.
12) Wet waste can be treated at source itself for the benefit of other organisms. The wet waste from the kitchen and the canteen is to be collected at a place so that birds, cows, dogs, goats and small animals can feed on it. If unused food is in large quantity and not spoiled, it can be channeled to the needy through 'Food Bank' system on the campus.
13) When institutes and offices become paperless, a lot of trash can be reduced. Hence use emails, SMS, WhatsApp and Facebook and other social media platforms and online resources to a certain extent.

VI. OBSERVATION

Sl No	Criteria	Indicator	Sub Indicator	Score
1.	Energy, Carbon and Climate Change	Energy Conservation	Employment of Energy Manager	4
			Energy efficiency standards for new construction and refurbishments	3
			Energy efficiency purchasing standards	5
			Staff energy conservation training Improved space utilisation to avoid new construction or heating/cooling of underutilised space	3
			Thermal comfort policy (e.g. widening heating/cooling temperature settings)	2
			Financial strategies to assign energy cost incurred - and savings achieved - to the responsible cost centres	4
			Energy / climate change awareness programs	4
			Establishment of "energy champions" network across campus building	2
		Energy efficiency	Detailed energy audit to identify prority areas	2
			Periodic recommissioning and building tuning to optimise energy efficiency	3
			Building retrofitting	1
			Lighting	4
			Heating, ventilation and air-conditioning (HVAC)	4
			Laboratory ventilation and fume hoods	3
			Installation of building management and control systems (BMCS)	1

			and sub-metering for major building energy uses, energy use displays.	
		Renewable and alternative energy	Purchase of certified "green power".	5
			Installation of photovoltaic, wind, biomass, etc. systems	4
			Installation of cogeneration and trigeneration.	1
			Fuel switching	1
			University managed plantation program to offset greenhouse emissions.	5
2.	Water	Water conservation	Employment of Water Manager (can be combined Energy / Water Manager position).	5
			Water efficiency standards for new construction and refurbishments.	4
			Water efficiency purchasing standards	3
			Staff water conservation training (can combine with energy conservation training).	3
			Financial strategies to assign water costs incurred – and savings achieved – to the responsible cost centres.	4
			Water conservation awareness programs – posters, stickers, events and competitions, websites, awards and incentives.	3
			Extension of "energy champions" network to incorporate water conservation.	3
		Water efficiency	Detailed water audit and campus water balance to identify priority areas.	3
			Active maintenance program of early detection and repair of faulty plant, equipment and fixtures	5
			Retrofitting of water saving devices	3
			Underground pipework leak detection and repair.	4
			Use of pervious paving.	2
			Specification of low water use species for campus grounds.	3
			Laboratory water use	3
			Installation of building management and control systems (BMCS) and sub-metering for major building water uses, water use displays	1
		Water reuse and recycling	Capture and reuse of rainwater from roofs and other hard surfaces for non-potable uses (irrigation, laboratories, toilet flushing, cooling towers, construction works, swimming pools, etc.)	3
			Substitution of borewater for non-potable uses, when combined with managed aquifer recharge to ensure more water is returned to the aquifer than extracted.	2
			Installation of greywater recycling system for treatment of kitchen, laundry and shower water	1
			Composting toilets and urine recovery for fertiliser.	1
			Installation of blackwater recycling system to treat sewage for non-potable uses.	1
			Recovery and reuse of fire system test water, vehicle washdown water, etc.	1
3.	Waste	Policy and behaviour change	Employment of Waste Manager	5
			Sustainable procurement standards which address longevity, durability, repairability, recyclability and recycled content	5

			Financial strategies to assign waste costs incurred – and savings achieved – to the responsible cost centres	5
			Waste management awareness programs	4
			Programs targeting teaching and research to minimise generation of hazardous wastes.	4
		Waste management	Waste characterisation study to identify waste stream components and prioritise response.	3
			Individual staged and prioritised programs for waste minimisation which address each component of the university waste stream according to environmental impact.	3
			Performance-based waste management contracts to specify resource recovery targets. 1 In-house collection of recyclables (e.g. paper / cardboard) where practicable, to support local job creation.	4
			Provision of adequate storage spaces for waste and recyclables.	5
		Closing the loop	Campus based exchange and reuse programs	3
			On-site composting of food and garden organics for reuse on campus grounds.	1
			Campus based programs to process collected recyclables	4
4.	Biodiversity and Ecosystem Service	Policy, design and development	Survey and evaluation of campus biodiversity and ecosystem services	4
			Extension of campus green space (consolidation / intensification of campus buildings over time, installation of green roofs / walls)	5
			Increase density of campus vegetation, e.g. through additional tree planting	5
			Enhance diversity of campus vegetation. 3 Green infrastructure / ecological engineering projects (green roofs / walls, designed wetlands for wastewater treatment, phytoremediation of contaminated land, indoor landscapes for biofiltration / indoor environmental quality).	5
			Development of productive landscape systems (permaculture, aquaponics) to provide food / fibre / timber.	4
			Restorative and enabling landscapes for contemplation, recreation and wellbeing	4
			Campus grounds and green infrastructure used in teaching and research	4
		Management and maintenance	Specify local native species	5
			Preserve significant vegetation during building works	4
			Avoid monocultures	3
			Avoid environmental weeds	5
5.	Planning, Design and Development	Campus Planning	Campus-specific sustainability objectives included in all campus planning instruments	4
			Space planning at campus, precinct and building scale to optimise flexibility, adaptability, diversity and multifunctionality of spaces.	4
			Investigation of non-building solutions to accommodate university growth.	3
			Physical accessibility of the campus to the external community, different age groups and people with a disability	4

		Campus Building Design	Design to the appropriate green building rating system as the minimum starting point.	3
			Each new building / major refurbishment to incorporate at least one innovative sustainability feature beyond the requirements of the green building rating system.	4
		Campus Construction Management	Construction contractors certified to ISO 14001	4
			Contractor staff inducted to the university's sustainability management system.	3
			Management of campus construction/demolition to minimise on- and off-site impacts	4
6.	Procurement	Developing Specification	Evaluation of university contracts for procurement of goods and services on the basis of cost, complexity and actual/potential sustainability impacts to determine priorities.	3
			Staged development of sustainable procurement standards / specifications based on identified priorities	2
			Inclusion of sustainability criteria in tender specifications for procurement of goods and services.	2
		Tender Evaluation	Inclusion of sustainability criteria in tender evaluation procedures	3
		Contract Management	Inclusion of sustainability objectives and targets in contract management documentation, and regular monitoring of progress.	3
			Second party" audits of providers to drive continual improvement through the supply chain	3
7.	Green Office	Policy and behaviour change	Employment of Green Office Manager.	3
			Sustainable procurement standards for office equipment and consumables	3
			Education, training and awareness programs	4
			Establishment of "Green Office champions" network across campus buildings as the vehicle for the energy and water conservation network	4
		Office Practices	Campus- wide audit of office practices disaggregated to department level	2
			Establishment of department-specific targets to drive continual improvement	2
8.	Green Lab	Policy and behaviour change	Employment of a Green Lab manager.	3
			Development of a "green chemistry" program.	3
			Sustainable procurement standards for lab equipment and consumables.	2
			Green Lab online and face-to-face training.	2
		Laboratory Practices	Campus wide audit of university laboratories – energy, water, input and output of chemicals, hazardous waste management.	3
			Establishment of lab-specific prioritised targets for improvement.	3
			Development of online tracking system for chemical management (inputs, processes and outputs).	2
			Establish lab equipment / consumables exchange program to minimise waste.	3
		Maintenance	Development of green laboratory design standards, e.g. referencing	2

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VIII Aug 2020- Available at www.ijraset.com

		and capital works	Labs21.	
			Laboratory ventilation and fume hoods	3
			Laboratory water use	3
			Secure storage spaces for hazardous wastes to minimise risk of spillage / leakage.	3
9	Green IT	IT Policy and behaviour change	Adoption and implementation of IT purchasing standards (e.g. IEEE, EPEAT, etc.).	4
			"Switch off when not in use" awareness programs	3
			Standard operating environments (hardware and software)	3
		IT Management and Capital Works	Reduce frequency of computer replacement programs – substitute software upgrades for hardware upgrades where possible.	3
			Centralised / dedicated server space(s) to avoid dispersing server heat loads across multiple buildings	4
			Computer reuse program, e.g. donation to community groups / schools.	2
			E-waste program.	4
			Ensure energy saving features are enabled.	2
10.	Transport	General	Employment of Transport Manager.	5
			Development of university transport policy	3
		Commuter Transport	Student housing and services on or close to campus.	5
			Awareness and promotion of alternatives to private transport – posters, stickers, events and competitions, websites, awards and incentives.	2
			Regular liaison with public transport providers to optimise services to the campus.	2
			Incentives for staff committing to forego use of private commuter transport.	2
			Secure, undercover bike racks, and shower facilities, lockers and bike repair workshop for cyclists.	4
			Car pooling programs. Reduction of car parking spaces and provision of dedicated spaces for car pool vehicles and electric vehicles (and also charging points)	2
			Establishment of shuttle bus service where the university has multiple campuses.	3
			Acknowledgement that for reasons of social equity, disability, etc. some staff and students will still need to use private vehicles to access the campus.	2
			Pedestrian-friendly campus to minimise internal motor vehicle trips	3
		Travel on University Bussiness	Acquisition and promotion of video conferencing technology to staff and students.	2
			University managed revegetation program to offset emissions for air travel, and/or commitment to "third party" carbon credit / carbon offset program.	2
			Purchase of fuel efficient vehicles for university fleet.	2
			Regular maintenance to optimise motor vehicle fleet fuel efficiency	4

a Score (1= Very Not Good; 2 = Not Good; 3 = Moderate; 4 = Good; 5 = Very Good)
b Total Score (10 – 17 = Very Not Good; 18 – 25 = Not Good; 26 – 33 = Moderate; 34 – 41 = Good; 42 – 50 = Very lGood)

VI. SUGGESTIONS AND RECOMMENDATION

A. More than 12 acres of land area is available to raise horticulture gardens, fruitbearing trees and shade-giving trees.

B. Compostable solid waste shall be collected and deposited in solid waste collection tanks. These wastes shall be profitably converted into compost and applied to gardens and trees to reduce the application of chemical-based fertilizers and pesticides.

C. Regular checking and maintenance of pipelines are done to control water wastage.

D. Energy-efficient measures such as replacement of all incandescent bulbs with LED lamps, old electrical regulators of fans with energy-efficient electronic regulators, air-conditioning units with all-star rated systems need to be undertaken.

E. Students from the different Department shall be trained as e-waste managers to manage e-waste. These e-managers shall be in constant touch with schools, orphanages and parish houses through social media and inform them of the outdated computer systems that shall be used by them. They also shall dispose of the less efficient, damaged and non-functioning e-wastes to the vendors.

F. Biogas plants shall be installed in the campus using solid waste and night soil generated from the Girls Hostel in the campus. The biogas shall be used by the Hostel Kitchen and College canteen.

G. Water quality testing laboratory will be installed in one part of the laboratory to test the potability of the drinking water to ensure the students are free from water-borne diseases. All the water taps shall be fitted with high-efficiency aerator taps to reduce wastage of water. All toilets shall be fitted with dual flush water closets, which will reduce water consumption by 40%.

H. Environment education shall be imparted to all college students through 1-hr life-skill classes once a week. This will create wide-level environment consciousness among the student community. They will be sensitized to encourage pillion riding with their peers or use public transport instead of two wheelers. Moreover, they will also motivate their parents to replace all the incandescent or fluorescent bulbs with energy-efficient LED bulbs.

I. Though water is used nominal in the University, but to ensure a further minimal rate, placards and warnings are set up in the University premise.

J. The University has put several posters and reminder notes in classrooms and other relevant places to turn off electric appliances when not in use. Encourage staff, students and conference guests to save energy through visible reminders, incentives and information to increase awareness. This particularly concerns turning off electrical appliances when not in use

K. The University tries to put the main switch off when there is no need of electricity. Monitor and understand the importance of different sources of University energy consumption.

L. E-waste generated in the campus is very less in quantity. Administration conducts the awareness programs regarding E-waste Management with the help of various departments. The E-waste and defective item from computer laboratory is being stored properly. The institution has decided to contact approved E-waste management and disposal facility in order to dispose E-waste in scientific manner. Recycle or safely dispose of white goods, computers and electrical appliances.

M. Use reusable resources and containers and avoid unnecessary packaging where possible. Always purchase recycled resources where these are both suitable and available

N. Campus is located in the vicinity of many trees (species) to maintain the bio-diversity. Various tree plantation programs are being organized at University campus and surrounding villages through NSS (National Service Scheme) unit.

O. This program helps in encouraging eco-friendly environment which provides pure oxygen within the institute and awareness among villagers. The plantation program includes various type of indigenous species of ornamental and medicinal wild plant species.

P. Review periodically the list of trees planted in the garden, allot numbers to the trees and keep records. Assign scientific names to the trees.

Q. Promote environmental awareness as a part of course work in various curricular areas, independent research projects, and community service.

R. Create awareness of environmental sustainability and take actions to ensure environmental sustainability.

S. Establish a University Environmental Committee that will hold responsibility for the enactment, enforcement and review of the Environmental Policy. The Environmental Committee shall be the source of advice and guidance to staff and students on how to implement this Policy.

T. Ensure that an audit is conducted annually and action is taken on the basis of audit report, recommendation and findings.

U. Celebrate every year 5th June as 'Environment Day' and plant trees on this day to make the campus more Green.

V. Indoor plantation to inculcate interest in students, Bonsai can planted in corridor to bond a relation with nature.

W. Green library should be established.

REFERENCES

[1] United Nations Environment Programme, 2014(UNEP), Transforming Universities into Green and Sustainable Campuses : A Toolkit for Implementers, Greening Universities Toolkit V2.0.

[2] Lorna Pappas ,(2008) . 10 Green Practices that Work . RIS News: Business/Technology Insights for   Retail, Supermarket Executives

[3] Maryam&Faghihimani , (2010). Best Green University Practice .Version: Steering Group , University of Oslo.

[4] JLL , (2019). A user's guide to the sustainable campus : Best practices for creating environmental sustainability: https://www.us.jll.com/en/views/sustainable-campus-best-practices

[5] Diana Starovoytova , 2018 , Journal of Environment and Earth Science : Solid Waste Management at University Campus (Part 5/10):Characterization and Quantification of Waste, and Relevance of the Waste Hierarchy in its Management www.iiste.org , ISSN 2224-3216 (Paper) ISSN 2225-0948 (Online) Vol.8, No.8, School of Engineering, Moi University, Kenya

[6] National Institute of Rural Development and Panchayati Raj , Solid Waste Management

[7] Standard Operating Procedures for Swachh Campus: 10Steps to a Swachh Campus , http://www.nird.org.in/ , Rajendranagar, Hyderabad – 500 030

INTERNATIONAL JOURNAL
FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)