ENVIRONMENTAL AUDIT

Yogi Vemana University, YSR Kadapa

Report - 2017-18

Prepared by

LEE SHREYUS FOUNDATION

Hyderabad

ENVIRONMENTAL REPORT
Yogi Vemana University, YSR Kadapa
2017-18

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2.	Vice-Chancellor	-	Prof. Attipalli Ramachandra Reddy Honourable Vice-Chancellor, Yogi Vemana University
3.	Principal	-	Prof. K. Satya Narayana Reddy
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PREFACE

Environmental protection has always been practiced by humans in one form or another. However, as anthropogenic pressures on the environment have escalated over the past century, the need for systematic environmental protection has increased. Due to the failings of the past and greater awareness of the complexity of environmental problems, there is a growing acceptance that environmental protection is best achieved through the use of a multipronged approach. This requires the use of a combination of regulatory, economic, voluntary, and information instruments.

Environmental Audit is the process of documenting the existing resource usage and recommend the required technologies and eco-friendly activities in the campus. This also gives opportunity for the students to learn environment protection and judicial use of resources.

Yogi Vemana University has been conducting environmental audit process for continuous assessment of the impact of the activities and technologies adopted so far. We thank university for giving us opportunity to conduct Environmental Audit of the campus.

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OVERVIEW

Environmental Audit is an effective method to assess the present status of resource usage and technological requirements for future. Hence this is a management tool comprising systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of helping to safeguard the environment by facilitating management control of practices and assessing compliance with company policies, which would include regulatory requirements and standards applicable. These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment. An environmental auditor will study an organizations environmental effect in a systematic and documented manner and will produce an environmental report.

This includes different techniques such as physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. This study cover various aspects of environment as mentioned in the report. Auditing methods are chosen based on the type of information needed to prove the real-life problems assumed in the preliminary study and demonstrate the scale of these problems. The data is collected verbally, visually, and textually. After data collection, the result analysis is done on cost benefit, life-cycle, comparative and regression analysis.

In view of the above, Lee Shreyas Foundation has conducted Environmental Audit of the Yogi Vemana University campus and following are the study aspects of the resource analysis:

1. Energy Audit
2. Water Audit
3. Waste Audit

UNIVERSITY CAMPUS PROFILE

The university is situated about 15 kms away from the historic Kadapa City on the Kadapa -Pulivendula road amidst serene surroundings and has a sprawling campus of about 700 acres. With a humble beginning, the university made rapid strides towards overall development and has sufficient infrastructural facilities such as buildings with academic ambience, library, modern science and research laboratories equipped with sophisticated instruments, Super Computer facility, Agri-Science Park, spacious hostels, gym, daycare centre, Botanical Garden and a vast playground. Besides, a a building complex was added for the purpose of conducting training short term vocational and job oriented courses on a continuous basis. At present the university has on its rolls 115 faculty members and about 200 non-teaching staff. The young faculty has rich research experience in India and abroad besides teaching. Presently about 1800 students are pursuing postgraduate and research programmes. Majority of the science faculty have obtained research projects from central funding agencies such as DST/ CSIR/DBT/MNRE / ISRO/UGC/MoES /BRNS /APCOST and considerable number of projects are under progress. The university was accorded 2 (f) recognition in 2007 and 12 (B) status in 2011 by the University Grants Commission, New Delhi. Presently it is an affiliating university with about 100 Post graduate, degree, law, B.Ed, MCA ,MBA and Physical Education colleges under its jurisdiction.

In the recent past, the university-initiated steps to launch women's cell, equal opportunities cell, a Day Care Center and coaching programmes for SC/ST/OBC/ minority students preparing for competitive examinations. The C.P Brown Library, now elevated to the status of a languages Research Center of the university, located in Kadapa town, has rare books, ancient documents and monographs and efforts are made to preserve and protect ancient literature.

In tune with the contemporary societal, scientific and technological needs the university with 27 departments is offering conventional and inter-disciplinary courses in basic and applied sciences, humanities, social sciences and management. The university launched two five year M.Sc integrated courses, namely Earth Sciences

and Biotechnology & Bio-Informatics in 2007. The University also started research programmes leading to PhD in the year 2010 and currently about 170 research scholars are pursuing research in 27 different Departments. To give a fillip to engineering education, the university in the year 2008 started YSR Engineering College in Proddutur, a major town in Y.S.R district and an industrial hub. Currently it is offering graduate courses in Engineering disciplines of Civil, Mechanical, Electrical & Electronics, Electronics & Communication, Computer Science and Metallurgy & Materials Technology, and about 850 students are on the rolls. The university will be holding its very FIRST CONVOCATION on 5th November 2012, About 1000 PG students will be receiving their degrees and 30 among them will be receiving GOLD MEDALS sponsored by Donors.

University Building Areas

Sl. No	Type of lighting	Wattage	No. of fittings	Total no. of days (usage)	Total wattage
1	Fluorescent tube lights(FTL)	36	3360	26	120960
2	Compact fluorescent light(CFL)	18	1004	26	18072
3	LED	20	738	26	14760
4	LED	50	16	26	800
5	LED	60	1	26	60
6	LED	200	1	26	200
7	False Ceiling 2X2	80	121	26	9680


ADMINISTRATIVE BLOCK


SIR CV RAMAN SCIENCE BLOCK


Dr. SARVEPALLI RADHAKRISHNAN BLOCK FOR ARTS AND COMMERCE

ENERGY MANAGEMENT

INTRODUCTION

Energy audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programmes which are vital production and utility activities. It will help to understand more about the ways energy utilized and help in identifying the areas where waste can occur and where scope for improvement exists.

Energy audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating and maintenance practices of a campus. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply decision on appropriate energy mix, decision on using improved energy conservation equipment, instrumentations and technology. It is proven that energy saving about 15 to 30% is possible by optimizing use of energy efficient equipment at the time of replacements.

University has come up with energy efficient technologies like installation of Solar Power Plant and usage of LED Bulbs. They also have range of eco-friendly activities involving students.

Objectives

The main objectives of conducting energy audit are as follows:

- To study the present pattern of energy consumption
- To identify potential areas for energy optimization
- To recommend energy conservation practices with cost benefit analysis

Energy Source

- Electricity from APSSDC
- Solar Power Plant

Energy Consumption

- Annual Electricity consumption, purchased from utilities (kWh) : 919289.5
- Annual Electricity Cost, purchased from Utilities (Rs.) : 9093841
- Annual Electricity Consumption, through Diesel Generating (DG)/Gas Generating (GG) Set (s) (kWh) : 137438.6
- Total Annual Electricity Consumption, Utilities + DG/GG Sets (kWh): 1056728.1
- Total Annual Electricity Cost, Utilities + DG/GG Sets (Rs.) : 10659159.64
- Connected Load (kW) or Contract Demand (kVA) : 500KVA
- Installed capacity: DG/ GG Sets (kVA or kW) : 400KVA
- What is power factor (less than 1, 1 or above 1) : <1
- Renewable Energy Sources- Solar Equipment's
- Capacity (KWH) of the solar equipment: 950kW

Lab Equipment's

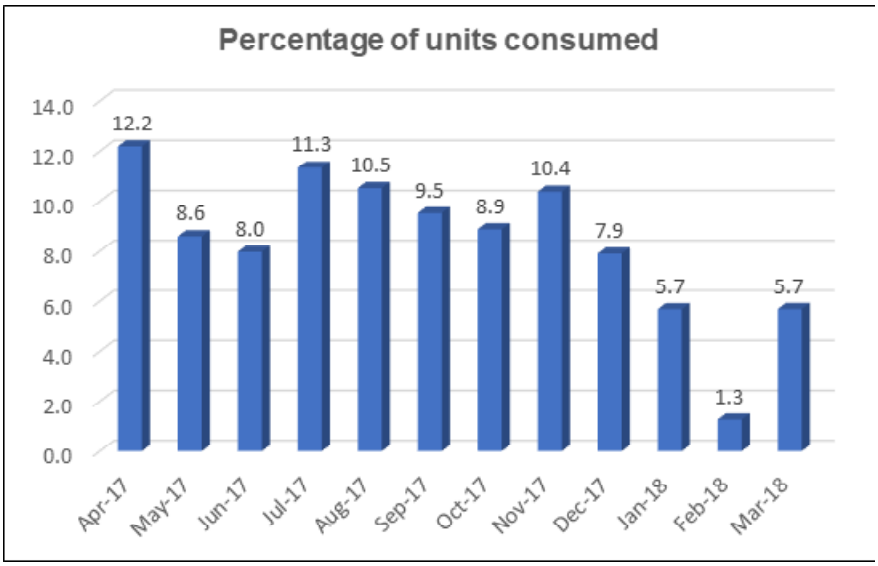
About 463 varieties of equipment are used in various labs of the university. Voltage ranging from 200 to 250 and having various watts. The equipment usage time period of these equipment is ranging from minimum 10 mins to 24 hrs. All the equipment run with solar power. Especially, Sir CV Raman Building has solar panels, where most of the labs located and high consumption of energy takes place.

Pumps and their capacities

Type of pump	Horse Power	Average number of units consumed to fill the overhead tank or sump fully	Average number of hours operated per day to fill the tank with full capacity
Mono Block	39HP	29.09	6 Hrs
Submersible	127HP	94.74	10 Hrs

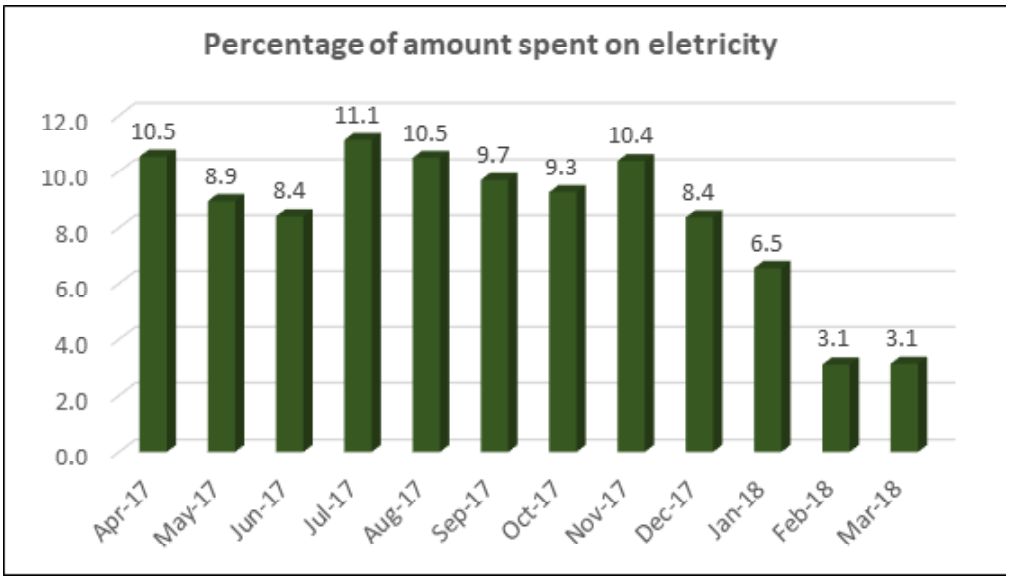
Electricity Consumption

Month and year	Units	Percentage
Apr-17	112074	12.2
May-17	79058	8.6
Jun-17	73304	8.0
Jul-17	104290	11.3
Aug-17	96824	10.5
Sep-17	87574	9.5
Oct-17	81690	8.9
Nov-17	95508	10.4
Dec-17	72696	7.9
Jan-18	52282	5.7
Feb-18	11662	1.3
Mar-18	52327.5	5.7
Total	919289.5	



Financial implications of the consumption

Month and year	Amount	Percentage
Apr-17	958361	10.5
May-17	813030	8.9
Jun-17	764070	8.4
Jul-17	1012248	11.1
Aug-17	954301	10.5
Sep-17	881504	9.7
Oct-17	841700	9.3
Nov-17	944249	10.4
Dec-17	760590	8.4
Jan-18	595105	6.5
Feb-18	283098	3.1
Mar-18	285585	3.1
Total	9093841	



Note: The amount incurred for the electricity consumption is calculated against the solar power transferred to the APSSDC through grid and the differential amount is adjusted with the electricity bills generated.

SOLAR POWER PLANT

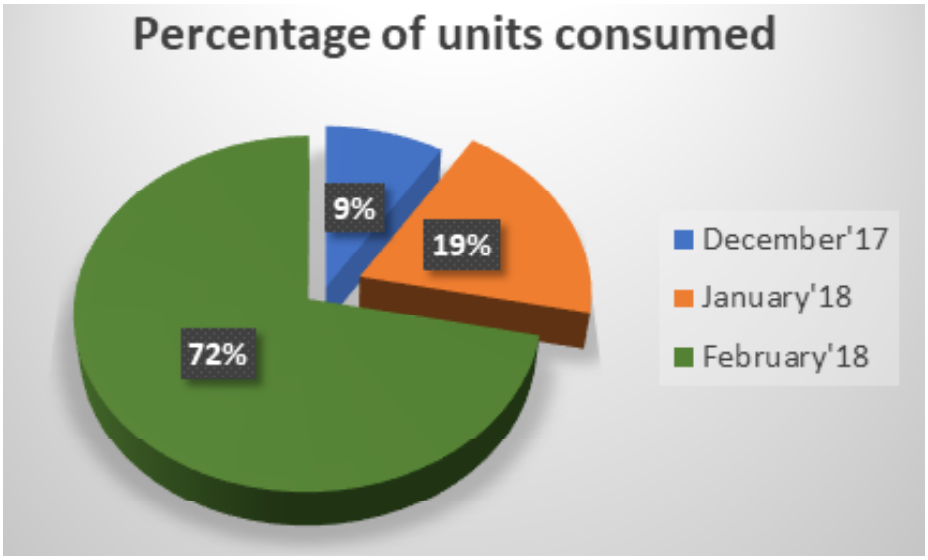
PPA agreement was signed between M/s SWelect Energy Systems Limited, Sri Yogi Vemana University and NREDCAP. As per agreement the agency has invested in the project and power is being delivered at a tariff of Rs. 6.40 per unit. In this project NREDCAP has extended 20% subsidy. This plant was setup in 4 acres land beside the university buildings in the year December 2017. The Swelect has agreed to install the plant and do operational and maintenance for next 25 years. The payments will be processed by Yogi Vemana University.

University is paying for the net energy in a billing month as per applicable retail supply tariff decided by regulatory commission of the concerned DISCOM, if the supplied energy by the DISCOM is more than the injected energy by the solar PV sources of the university. Any excess/ surplus energy injected in to DISCOM network in a billing month is being paid at APERC pooled cost that is year on year basis. Energy settlement is done in half yearly basis.

Total 950 KW (4 units per KW)	
1. Rooftop	
• Admin	50 KW
• Library	100 KW
• Sir CV Raman Building	100 KW
2. Ground Mounted	700 KW
• Total number of inverters	19 (each inverter storage is 50 KW
Peek Timing for generation of power	9.30 am to 3.30 pm

Solar Consumption

Month	Units
December	12455.30
January	26869.50
February	99610.00
Total	138934.80



WATER MANAGEMENT

INTRODUCTION

Water audit is conducted periodically to determine water supplied in the distribution system as well as water lost and/or used within a distribution system. It aims to establish the water consumption pattern in individual sections, so as to realise the consumption levels with respect to exploring various pollution prevention and wastewater minimisation opportunities. Water audit also helps to establish the existing water distribution system as well as wastewater collection and recycling, if any.

Sources of water

The water source is borewell. The campus has overhead tanks for each building along with bore well. For drinking water RO plants is set up in the campus.

Water used for campus needs are from borewells. This indicates two aspects; one is drawing water from ground water and other is recharging water into the ground. The following are details:

Total unpaved area (Sq.mts)	13063.19
Total paved surface (sq. mts)	15823
Total area of rooftop (Sq.mts)	77943.15
Water Storage (Tanks)	114500
Sump Capacity	563000
RO Plant Water Utilization	18500
Regular Visiting Population	8379
Floating Population	890
Total People visiting	8962
Total per capita consumption of hostels (Litres)	101
Total per capita consumption for other buildings	45
Total water used for entire Landscapes (includes drip, direct and irrigation from sumps (Litres)	1,20,000 to 1,50,000
Total waster wasted (through leakages & broken pipes, toilets, and other area etc. (Litres)	4178.9

Type	Per capita Consumption	Consumption per day	water wastage per day
Hostels	101	128977	102181.6
Other Buildings	45	359640	287712
		488617	389893.6

Rainwater Harvesting

To conserve water, minimize wastage & to ensure its more equitable distribution both across and within the states through integrated water resource development and management. Promotion of citizen and state actions for water conservation, augmentation and preservation is one of the goals of the campus.

The campus soil in alkaline and have shortage of water. In view of this, university has constructed about 100 soak pits & trenches and 100 farm ponds that are made to catch the rainwater through the campaign. Rainwater harvesting structures are also planned and construction started this year.

WASTE MANAGEMENT

The solid waste management is in order with the installation of dust bins and their daily cleaning. The University has its own collection facility that collects the solid wastes daily from Residential complex, Hostels and Departments. This helps in maintaining the cleanliness by providing an efficient, safe and regulated management of solid wastes in the Campus.

However, no segregation of the waste takes place during collection and Land filling is the general waste management strategy adopted by the University. However, there is no management plan for managing inorganic waste, especially plastics. Studies were carried to assess the composition of the waste generated in the University. The data showed that the total generation of solid waste in the Campus is 385 kg per day. University adopts standard operating procedures for safe disposal of hazardous chemicals collected in the chemistry laboratory and other allied departments. The chemicals like acids utilized for experiments are very negligible hazardous chemicals. So the chemicals of through the normal waste in shrinks.

Campus has source segregation mechanism and twin dust bin culture. The dust bins are arranged department wise. Bins available in the campus are:

Type	Nos
Twin bins	**56**
Small bins	**81**
Medium size bins	**38**
Main (big) bins	**27**

The wet waste generated from the canteen is being sent to compost unit and also part of it is given to the piggery people from the nearby village. They collect the food waste and use as feed for the pigs. Therefore, the major part of the wet waste is disposed properly and also reused. The litter of the campus is composted through vermi compost unit. The campus has lot of greenery in various patches and also in and around department buildings. The litter is collected in trollies and send to compost

units for composting. The resulted manure is used to the plants and nursery in the campus itself. Especially leaf litter is being composted separately. The dry waste like paper, glass, plastic etc from the classrooms, department rooms and labs are stored in separate spaces. But there is no method for their disposal. University have a mechanism to dispose paper waste of library. The magazines are stored for 2 to 3 years and disposed for recycling through tender process. On the other hand, the books which deteriorate are being sorted and book binding is done for reuse.

Waste classification & Quantity

The waste generated in the campus is majorly of three types i.e., Wet Waste, Dry Waste and Hazardous Waste. The waste generating sources in the campus are:

SNo	Source	Types of Waste	Quantity of waste produced per day
1	Canteen	Vegetable waste & cooked food waste	**59 Kgs**
2	Hostels	Plastic, paper, cloth, sanitary	**171 Kgs**
3	Classrooms	Paper and plastic	**16 Kgs**
4	Labs	Glass, chemicals, iron, paper & plastic	**25 Kgs**
5	Construction Site	Broken bricks, cement pieces	**47 Kgs**
6	Garden	Litter	**32 Kgs**
7	Washrooms	Sanitary waste	**19 Kgs**
8	Any other areas	Plastic waste	**16 Kgs**
			385 Kgs

The waste generated is reduced when compared to the previous years. Reduce and reuse principals are being well utilised by the students and staff. A vermi compost is constructed in the botanical garden located inside the campus. This plant waste and other wet waste goes into this compost unit.

STUDENTS ACTIVITIES & ACHEIVEMENTS

University has been doing lot of awareness programmes to the students and also putting efforts to make them part of their eco-friendly activities as well. So, first step was to setup display like signages, wall paintings and posters etc. on eco-friendly and conservation habits. Faculty and management have been inspiring students and supporting them in generating new ideas and creativity such awareness campaigns. Especially posters have created lots of behavioural change in students and management. The students are voluntarily coming forward and doing various activities in the campus. The university have nature club for students where in students become a part of the environmental activities.

University has won few awards like:

1. A.P Green award,
2. Vanam Manam award,
3. Conservation awards

University also conducts a lot of seminars, workshops and conference on various topics. Some of them are as follows:

1. Lecture Workshop on Environmental Resources and Development-17th Sept. 2018, at Yogi Vemana University
2. Awareness on Catch the Rain
3. Organized 65 Awareness on renewable energy Programs

OBSERVATIONS & RECOMMENDATIONS

OBSERVATIONS

- Solar Power Plant at the roof top of capacity 450 KW was installed in the campus. This serves as renewable energy source for the campus energy requirement. The management is slowly reducing the usage of general electricity supply.
- Soak pits are dug in the campus for ground water recharge. RO plants are used for the drinking water requirement and bore water is used for other uses.
- Solid waste source segregation started in this year and lot of awareness programmes were conducted to the students and staff for proper source segregation. The bins are placed as per the requirement. Dry waste management need to be established for effect implementation.
- Sprinkler method is used for watering the plants. This reduces the effort on manual watering and also water conservation is happening in the campus.
- Rainwater harvesting and farm ponds are major rain water recharge structures available in the campus.
- farm pond serves as a source of drinking water to animals and birds of the campus
- On an average 4178.9 Litre of water is wasted due to leakages, broken tapes & pipes and overhead tank etc per day as real loss.
- Since the connections are old and many connection are through underground pipe network, there might be chances for underground leakage that is not visible though surface observation
- The e-waste, sanitary waste and other dry waste management is not streamlined so far.

RECOMMENDATIONS

- There is a need to streamline the waste management for effective usage of the wet and dry waste. A separate dry resource centre is required for the campus. Especially, for the management of lab waste there need to a specific allotted space with proper handling mechanism.
- The waste generated has to be tied up with the local recyclers as well for better dry waste management to avoid the land pollution as this waste contains majorly the chemicals and glass material.
- There is a need to set up a vending Machine in the college hostels and waiting rooms to collect the used sanitary napkins and dispose scientifically. Presently, campus doesn't have sanitary waste Management mechanism.
- The old equipment's like computers, printers, fans and other electrical and electronic appliances are to be either repaired, maintained or retrofit to improve the efficiency and reduce overall energy consumption.
- Vehicle pooling can be encouraged involving both students and the faculty as a green initiative within and outside the campus through proper awareness. Initially this can be declared by the management or through student groups on particular days.
- Electric Sub Meters has to be installed for every building in the campus to analysis and understand the consumption patterns of each building.
- Sewage Treatment Plant has to be constructed as per the requirement and load of the campus sewage.