08-Feb-2019

ENERGY, GREEN & ENVIRONMENT AUDIT REPORT

SHADAN COLLEGE OF ENGINEERING AND TECHNOLOGY

Edge Technologies

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College Code: 08

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ENERGY, GREEN & ENVIRONMENT AUDIT COMPLETION CERTIFICATE

This is to certify that Energy, Green & Environment Audit has successfully completed in Shadan college of Engineering Peerancheru, Hyderabadas per guidelines laid down in the Energy Conservation Act 201 in the month of February 2019

Signature of the CEO

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ENERGY, GREEN & ENVIRONMENT AUDIT COMPLETION CERTIFICATE

This is to certify that following utility has carried out Energy, Green & Environment Audit as per guidelines laid down in the Energy Conservation Act 201 in the month of February 2019

Name of the Institution	**Shadan College of Engineering and Technology, Hyderabad District, Telangana - 500 086.**
Details of facilities Audited	**All Departments, Laboratories, Library etc.**
Date of Energy, Green & Environment Audit	**6/2/2019 to 7/2/2019**
Name of Certified Energy Auditor	**Ashok Kumar Pitta**
Certification No.	**EA-10677**
Validity of the certificate	**13th May 2022**

Signature of the Auditor

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Acknowledgement

Energy, Green & Environment Audit team of **Edge Technologies** conducted energy audit of **Shadan College of Engineering And Technology** at Hyderabad during 6th February to 7th February 2019 to evaluate the present system performance and to encourage energy efficiency. Edge Technologies team wish to express thanks to the staff members for the proactive support and courtesy extended to the energy audit team during the study.

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CHAPTER - 1

EXECUTIVE SUMMARY

Energy Profile

The institution is having one transformer of 500 kVA capacity. The major consumption is for Lights and system which is 53%.

Institution has Sewage Treatment Plant(STP) for l iquid waste manage ment. Bins are used for solid waste management and segregation. Canteen waste is used for Biogas.

The total electrical energy consumption of the institution is as under:

Total electrical unit consumption	=	399405 kWh / annum
Contract Demand	=	200 kVA
Billed Demand	=	160 kVA
Electricity Rate	=	Rs. 9.30/ kWh

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Summary of EE measures:

Table 1 Consolidated EE Measures

SL. No.	Equipment	Proposed action	Result for proposed action
1	Lightning equipment–40 w	Replace 40 W conventional light with l8W LED tube light	Total No. of high fittings=150 No's Total No. of presently operated =150 No's Total No. of light fittings to be replace= 150 No's Present Energy Consumption - 1440 KWH Expected Energy Consumption 648 kWH Total Energy Saved per Month — 1440-648=792 KWH per month
2	Lightning equipment 72 W	Replace 72 W conventional light with 36 W LED light	Total No. of light fittings =78No's Total No. of presently operated = 78No's Total No. of light fittings to be replace=78No's Present Energy Consumption=1684.8 KWH Expected Energy Consumption—842.4 KWH Total Energy Saved per Month= 1684.8-842.4 = 842.4 KWH per month
Positive Observation: Institution is equipped 70% with LED lights and some sensor based lights are also equipped based on human movement			
3	Fan system(Ceiling fan)	Replace present ceiling Fan consuming 78W with energy efficient fans consuming 40W. In the campus where usage is high this conservation measures will produce good saving	Total number of fans in the campus —591 No's Total number of fans used in the campus (considering usage e factor) =591 No's Number of fans to be replace=510Nos The Total Current Consumption = 7956 KWh The Expected tin Consumption 4080 KWh Total KWh saved per month - 7956 -4080 — 3876 kwh
4	LED Monitors	Replace Old CRT Desktop 200 W to LED Desktop 50/60 W	Total number of Old CRT Desktop in the campus – 150 No's Total number of Old CRT Desktop used in the campus = 150 No's Number of Old CRT Desktop to be replace= 150Nos The Total Current Consumption = 4500 KWh The Expected Power Consumption = 1350 KWh Total KWh saved per month - 4500-1350= 3150 kwh

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MAIN REPORT

INTRODUCTION

Preamble:

Shadan College of Engineering and Technology(SCET) was established in the year 1995 by Shadan Educational Soci ety, a society which constituents where visionaries and intellectuals from various walks of l ife working under the custody of the legendary educationalist, Dr. Mohd Vizarath Rasool Khan. The SCET was t he first minority engineering college to be affiliated to Jawaharlal Nehru Technological University (JNTUH) in 1995. The college committed to quality Technical Education and Innovation since i ts inception was started with three B. Tech Courses (CSE, ECE and M. E) with a total intake of 140 students and over a pe riod of 25 years has emerged as an institution Par Excellence Providing technological platform for students enabling them to excel in their careers and diverse fields of l ife. The college presently offers 6 Under graduate (B. Tech) courses in CSE, ECE, EEE, MECH, Civil and IT Branches and 7 post Graduate (M. Tech) programme in CSE, CS, CN, CN & IS, VLSI, ES, CAD/ CAM and MBA with a total intake of 792. The Institution has produced more than 10000 engineers till date who are working successfully in INDIA and abroad.

Methodology of Energy Audit

A team of energy auditors from **Edge Technologies** visited the site for measurements, observations and analyses.

Measurements were conducted using portable instruments, covering electrical and mechanical systems. Specificat ions of equipment and operating data were collected to assess efficiency and performance of various systems. Frequent discussions with institution personnel, during the energy & Green Building audit, helped in understanding operations.

This report provides the details of measurements and observations, analysis, recommended energy saving measures along with green building benefits.

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Energy Audit Team

Following were the members of energy audit team:

- Mr. Ashok Pitta
- Mr. Muhammed Rizwan
- Mr. Shaik Hussain Shareef

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Energy Audit Instruments

For measurement purpose following instruments was used as shown in the following table.

Table 2 List of Instruments

Sr. No	Name of Instruments	Make	Measurement
1	Single CT power analyzers	KRYKARD	Power Data Logging
2	Three CT power analyzer	KRYKARD	Power Data Logging
3	Anemometer	ACD	Air velocity
4	Lux meter	TES 1332 A	Lux level

Objectives

The objectives of the exercise are as follows:

- To study performance of Lighting and Electrical systems etc.
- To compare the performance of utilities with Bench Mark
- To compare the performance of institution with Bench Mark
- To analyze the gap between present performance and Bench Mark
- To suggest Energy Conservation Opportunities (ECOs) to bridge the gap between present performance and Bench Mark
- To prepare First-Order Cost Benefit Analysis of the proposed ECOs
- To study the eco-friendly atmosphere of the institution.

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Methodology Adopted

To achieve the above objectives, a methodology was devised. It included the direct measurements and theoretical calculations. Trials were conducted during the study to ascertain the performance accurately.

In order to conduct the comprehensive energy audit study, **Edge Technologies** evaluated performance of individual equipment' s l ike, Lighting, Fans Systems etc. **Edge Technologies** adopted the following methodology:

Lighting

Performance audit:

40 % of the total connected l ighting load from the Census was studied in detail for following parameters:

- Measurement of illumination level
- Measurement of power

Electrical Supply and Distribution network

- Measurement and analysis of capacitor bank performance
- Study and examination of electrical cost breakup
- Electricity billing analysis

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CHAPTER - 2

ENERGY CONSUMPTION SCENARIO

Energy Billing Analysis

Shadan College of Engineering and Technology receives electrical power from TSSPDCL Power at 11 KV. 1 nos. step down transformer of 500 kVA Oil Type has been installed in institution. Contract Demand of the institution is 200 kVA.

Table 3 Electricity Bill for past 12 Months

Sl.No.	Bill Month	CMD	BMD	RMD	Billed Units
1	31-May-21	200	160	160	46517
2	31-Apr-21	200	160	160	39000
3	31-Mar-21	200	160	160	36112
4	28-Feb-21	200	160	160	33238
5	31-Jan-21	200	160	160	31182
6	31-Dec-20	200	160	160	28775
7	30-Nov-20	200	160	160	27629
8	31-Oct-20	200	160	160	27741
9	30-Sep-20	200	160	160	34031
10	31-Aug-20	200	160	160	20975
11	31-Jul-20	200	160	160	35205
12	30-Jun-20	200	160	160	39000

The unit rate including taxes is around Rs. 9.93/kVAh. This unit rate is considered as a basis for payback calculation.

Observation

The contract demand is 200 kVA and minimum bill demand is 160 kVA (80% of contract demand). The recorded demand in kVA as per last 12 months record does not exceed the billing M D. It was observed from the billing analysis of 12 month that the maximum recorded demand was 159 . 6 kVA and minimum recorded demand was 125 kVA.

Load Profile

The institution being an Education centre is a continuous operation institution. All utility equipment' s l ike fans, l ights etc. operate for 12 hours. Process equipment's operate as per process requirements.

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Transformer 1:

The 24 hrs load profile shows that load varies from 15. 7 kW to 158. 5 kW. The power requirement starts from around 7 . 00 hours and remains constant at around 158. 5 kW during day t ime upto 15. 00 hours. After 15 . 00 hours, power demand reduces and reaches 60 kW upto 18. 00 hours. After 18 .00 hours, the power demand reduces to 30 kW upto 20 . 00 hours. Between 20.00 hours to 07.00 hours, the power demand is around 15 kW.

Transformer Efficiency:

Table 4 Transformer Efficiency

Equipment ID	Rated Parameters			Measured Parameters							Calculated	
	Capacity (kVA)	No Load Loss (kW)	Load Loss (kW)	V	I	Loading (kVA)	Power (kW)	No Load Loss (kW)	Load Loss (kW)	PF (%)	% Loading	Effi ciency (%)
Transformer 1	500	1.4	3.5	397	189	150.91	148.80	1.4	2.1	0.986	30%	98.81%

The transformer efficiency is calculated based on average parameters measured during 24 -hour profile measurement. The transformer efficiency is good. As transformer No Load and Full Load details are not provided, we have assumed these numbers based on our experience and have calculated transformer efficiency.

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Harmonics:

The total harmonic component of voltage is within l imit and current component is above l imit i . e. below 3% in voltage and below 12% in current.

V_{THD} variation:

Voltage harmonics are within limit as per IEEE-619 Standard

Table 5 Voltage distortion as per IEEE Standard 519

Bus Voltage at PCC	Individual voltage distortion (%)	Total voltage distortion THD %
69 kV and below	3	5

V_{thd} Variation:

Figure 1 V_{thd} Variation

Minimum Value	Maximum Value	Average Value
Transformer 1		
1.7	2.6	2.15

I_{THD} variation:

Figure 2 I_{thd} Variation

Minimum Value	Maximum Value	Average Value
Transformer 1		
6.8	8.9	7.5

Current harmonics are above limit as per IEEE-619 Standard

Table 6 Maximum harmonic distortion in percent of IL

I_{SC}/I_L	TDD
<20	5
20<50	8
50<100	**12**
100<1000	15
>1000	20

The total Harmonic Distortion in current exceeds the IEEE 519 limit of 12% maximum.

The dominant harmonics current observed during this period are 5th and 7th.

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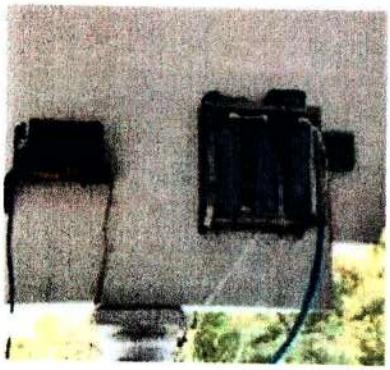
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CHAPTER - 3

SUSTAINABLE ENVIRONMENT

The college has its part to play in creating initiatives for Green campus. The campus has trees and the students are made to plant trees and protect them. Institution has gardens and they are maintained by gardeners with treated. Water is conserved by rain water harvesting, LED lights and bulbs are used to conserve energy. Plastics are avoided and reusable bags are advised and used. Water conservation and harvesting are done by the institution. RO plant is provided for students and water dispenser is used rather than water bottles. Solar power is used for road lights. Waste is segregated and disposed of suitably. Pedestrian pathways are provided.





Biogas Plant

Biogas is the mixture of gases produced by the breakdown of organic matter in the absence of oxygen, primarily consisting of methane and carbon dioxide.

Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source. In India it is also known as "Gobar Gas".

Biogas is primarily methane (CH) and carbon dioxide (CO2) and may have small amounts of hydrogen sulphide (HSX) moisture and siloxanes. The gases methane, hydrogen and carbon monoxide (CO) can be combusted or oxidized with oxygen. This energy released allows biogas to be used as a fuel; it can be used for any heating purpose, such as cooking. It can also be used in a gas engine to convert the energy in the gas into electricity and heat.

Biogas Plant is installed in the campus.

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Rainwater Harvesting

Sustaining and recharging the ground water along with judicious use of the limited fresh water resources is the need of the hour. Shadan College of Engineering and Technology (SCET) is seriously implementing the rain water harvesting techniques in the campus

Rainwater Harvesting Pits are available to collect the rain water from roof top of main block with the following dimensions

Main Block: 4m x 3m x 3m

This pit will contribute the improvement of ground water table substantially in the college premises. SCET is involved in the process of identifying the other locations in the campus for construction of Rain water harvesting pits



Plastic Free Campus

Initiative has been taken by college administration to make the campus plastic and paper free. Most of the information is now shared to the faculty and students by email and social media applications rather than paper notice.

Also college has organized awareness program for students on above topic. It has been decided that a day in a month will be celebrated as bicycle day which will avoid the use of motor vehicles. Automobiles are banned after parking place.

Green campus initiative are followed by the institution.

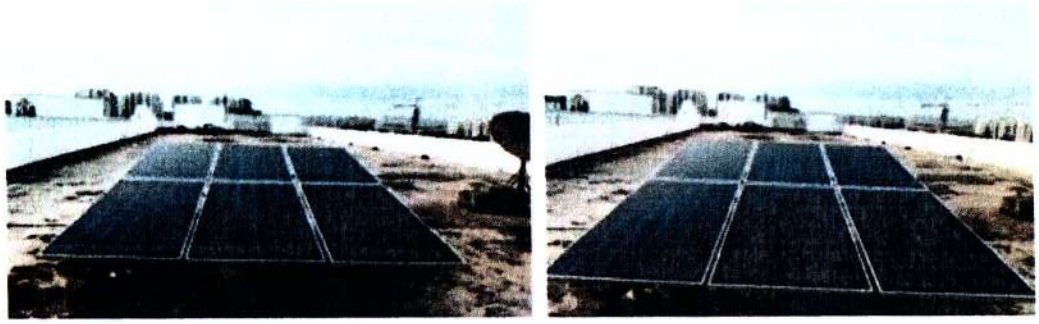
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Solar Plant

The capacity of solar plant in the institution is 2kW and there is a proposal to increase its capacity to 150kW in SCET.



Prepared by

Mohammed Abdul Rizwan

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