

ENERGY, ENVIRONMENT, AND GREEN AUDIT REPORT

For

**MUFFAKHAM JAH COLLEGE OF ENGINEERING AND
TECHNOLOGY**
MOUNT PLEASANT, 8-2-249 TO 267, ROAD NO:3
BANJARA HILLS, HYDERABAD, TELANGANA.



Prepared by: -



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ACKNOWLEDGEMENT

We thank management of **MUFFAKHAM JAH COLLEGE OF ENGINEERING AND TECHNOLOGY** for awarding the Green Audit, Energy and Environment study at their facility at PATTABIRAM to NIN Energy India Private Limited. This report is the result of Energy, Green, Environment audit conducted at **MUFFAKHAM JAH COLLEGE OF ENGINEERING AND TECHNOLOGY** on 07/03/2021.

We wish to thank officials of **MUFFAKHAM JAH COLLEGE OF ENGINEERING AND TECHNOLOGY** for their support during the audit for successful conduct of the audit.

For NIN ENERGY INDIA PRIVATE LIMITED



(B. SENTHILKUMAR)

DIRECTOR

ACCREDITED ENERGY AUDITOR BY BUREAU OF ENERGY EFFICIENCY

(AEA 023)

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List of Abbreviations

DG	Diesel generator
EE	Energy Efficiency
EEM	Energy Efficiency Measure
EER	Energy Efficiency Ratio
FTL	Fluorescent T8
CFL	Compact Fluorescent Lamps
kWh	Kilo Watt hour
LED	Light Emitting Diode
LT	Low Tension (below 120 kW)
TANGEDCO	Tamil Nadu Generation and Distribution Corporation
tCO ₂	Tonne of Co ₂

1. EXECUTIVE SUMMARY

S. No	Energy Efficient Measures	Estimated Annual Energy Savings, kWh/Annum	Estimated Investment, INR	Monetary Savings, INR	Simple Payback Period, Months
1	Replace existing Tube light to LED	35,541	5,19,600	2,13,244	29
2	Replace existing inefficient conventional fans with Energy efficient fans	51,060	25,53,000	3,06,360	100

Annual Electrical Energy consumption, kWh/Annum	502420
Annual Electrical Energy savings, kWh/Annum	86,601
Electrical Energy savings, %	17

2. INTRODUCTION

2.1 About College

Muffakham Jah College of Engineering and Technology (MJCET) was established in the year 1980 by Sultan-ul-Uloom Education Society (SUES) which is formed by a group of visionaries & intellectuals from various walks of life. Today that tiny acorn has developed into a mighty oak. Today, it is a premier institute offering BE Courses in 8 Branches (Civil, ECE, CSE, IT, EEE, Mechanical, AI & DS, AI & ML) and 5 ME Courses (CAD/CAM, Structural Engineering., Digital Systems, Computers & Power Electronics) of two years duration. The current intake of all BE Courses is 780, in addition to 102 students in ME Programs. Research Centres has started in ECE Dept & Mech. Engineering. for Doctoral Studies. The college is affiliated to Osmania University, Hyderabad & approved by AICTE, New Delhi. We are applying for Re-accreditation of NBA. The College is affiliated to the Osmania University and is approved by the AICTE.

Vision Statement of college

To be a part of the universal human quest for development and progress by contributing high calibre, ethical and socially responsible engineers who meet the global challenge of building a modern society in harmony with nature.

Mission Statement of college

- To attain excellence in imparting technical education from the undergraduate to through doctoral levels by adopting coherent and judiciously coordinated curricular and co-curricular programs.
- To foster a partnership with industry and Governmental agencies through collaborative research and consultancy.
- To nurture and strengthen auxiliary soft skills for overall development and improved employability in a multicultural workspace.
- To develop scientific temper and spirit of enquiry in order to harness the innovative talents.
- To develop a constructive attitude in the students towards the task of nation-building and empower them to become future leaders.
- To nourish the entrepreneurial instincts of the students and hone their business acumen.
- To involve the student and faculty in solving local community problems through economical and sustainable solutions.

S. No	Description	Details
1	Name of the college	MUFFAKHAM JAH COLLEGE OF ENGINEERING AND TECHNOLOGY
2	Address	Mount Pleasant, 8-2-249 to 267, Road no:3 banjara Hills, Hyderabad, Telangana.
3	No of building blocks	5
4	Total No of departments	7
5	Department details	<ul style="list-style-type: none"> • Civil Engineering • Information Technology • Mechanical Engineering • Computer Science Engineering, • Electrical and Electronics Engineering • Electronics and Communication Engineering • Artificial Intelligence and Machine Learning
6	No of students	4000
7	No of Teaching staffs	178
8	No of Non-Teaching staffs	145
9	Total No of Staffs	333
10	No of Classrooms/ Labs/ Smart classrooms	52
11	No of Labs	36
12	No of Smart classrooms	8
13	Courses available in the college	12
14	No of solar streetlights available in the campus and its details	8

3. AUDIT TEAM

The Green audit assessment was done by the NIN Energy India private Limited team. Team details are as follows

Name	Designation
Mr. B. Senthil Kumar	Accredited Energy Auditor
Mr. T. Karthikeyan	Certified Energy Auditor
Mr. S. Praveen Kumar	Sr. Engineer

4. MONTHLY ELECTRICITY BILLING

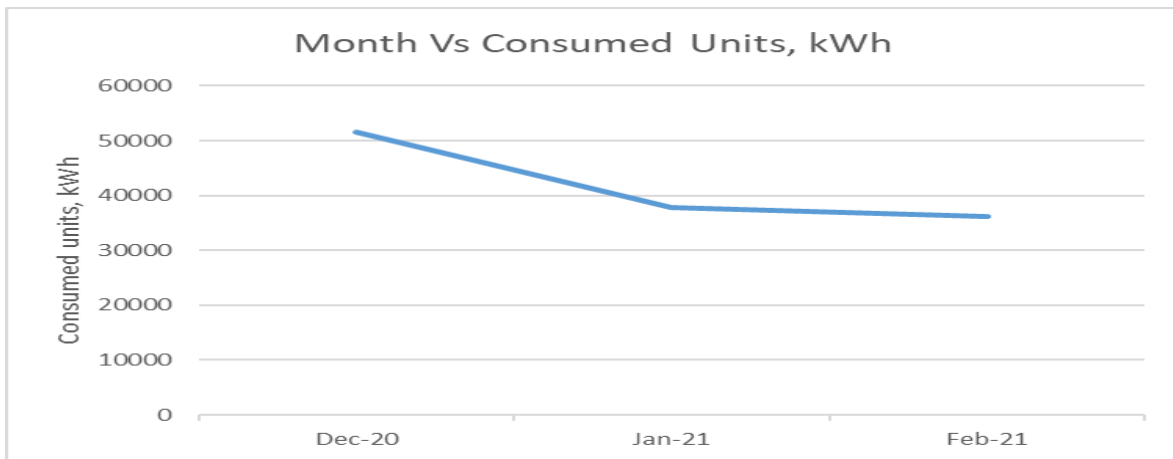
The Campus receives electricity supply from Southern Power Distribution Company of Telangana Limited and the details of the supply are as follows,

Source	Southern Power Distribution Company of Telangana Limited
Feeder Number	108122140502
Average Unit consumption, kWh	502420
Average demand, kVA	285.3

Month	Sanctioned demand, kVA	Recorded Maximum Demand, kVA	Maximum demand charge, INR	Units Consumed, kWh	Total Units Consumed, INR	Total bill paid, INR
Dec-20	350	295.98	1,15,432	51621	402644	5,29,140
Jan-21	350	280.00	1,09,200	37882	295479	4,14,193
Feb-21	350	280.00	1,09,200	36102	281595	4,00,866

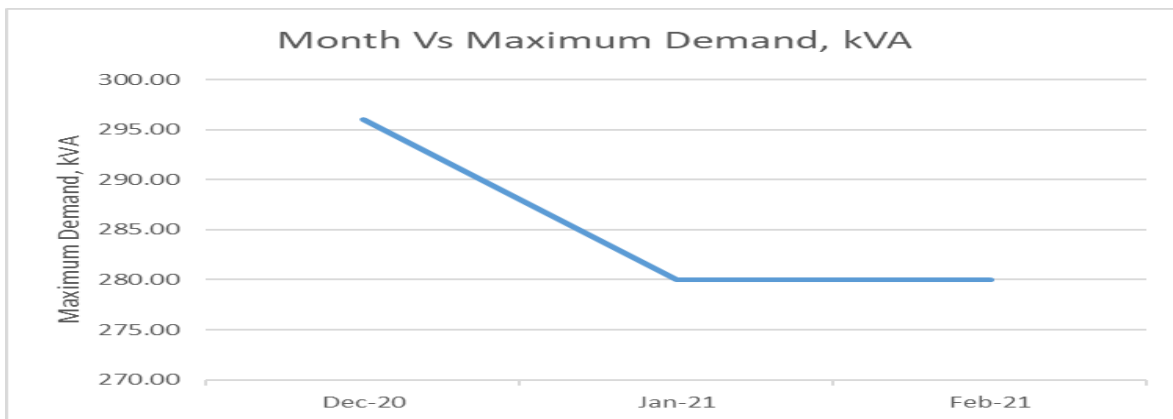
- Average units consumed per year – 502420 kWh.

The graphical representation between consumed Units vs. month is shown below:



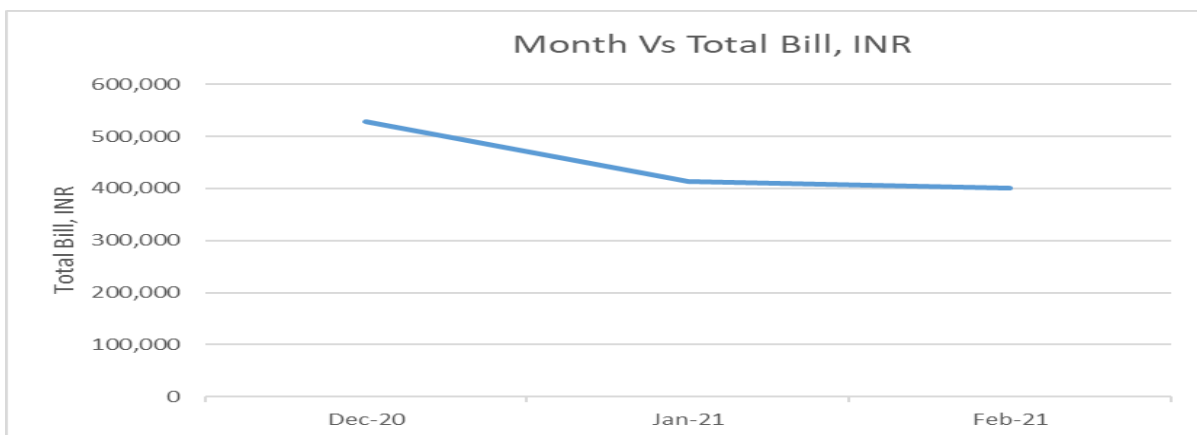
It is observed that maximum units are consumed in the month of December-2020 and minimum in the month of February 2021.

The graphical representation between maximum demand, kVA vs. month is shown below:



It is observed that maximum demand is attained in the month of December-2020 and minimum in the month of February 2021.

The graphical representation between Total Bill vs. month is shown below:



It is observed that maximum bill is paid in the month of December-2020 and minimum in the month of February 2021.

5. INVENTORY DETAILS

5.1 LIGHTING

At Present, campus using the following lights for lighting purpose. The details of the lights with wattage and operating hours are listed below,

S. No	Block Name	Floor details	Location	Type of Light	No of Lights	Load, kW	Operating Hours
1	BLOCK-1	G+4	Campus	Tube Light	142	1.92	8
2	BLOCK-2	G+3	Campus	Tube Light	172	0.68	8
3	BLOCK-3	workshops	Campus	Tube Light	58	10.64	8
4	BLOCK-4	G+3	Campus	Tube Light & LED	94	0.6	8
5	BLOCK-5	cellular+6	Campus	Tube Light	145	3.92	8
6	Gulam Ahmed hall	-	Campus	Tube Light	200	4	8
7	Sports Building	-	Campus	Tube Light & Bulbs	27	0.54	8
8	Society Building	G+2	Campus	Tube Light	78	1.56	8

5.2 FANS

At Present, campus using the following fans for ventilation purpose. The details of the fans with wattage and operating hours are listed below,

S. No	Block Name	Floor	Location	Type of Fan	No of Fans	Wattage	Load, kW	Operating Hours
1	BLOCK-1	G+4	Campus	Ceiling Fan	132	80	10.56	8
2	BLOCK-2	G+3	Campus	Ceiling Fan	45	80	3.6	8
3	BLOCK-3	workshops	Campus	Ceiling Fan	112	80	8.96	8
4	BLOCK-4	G+3	Campus	Ceiling Fan	166	80	13.28	8
5	BLOCK-5	cellular+6	Campus	Ceiling Fan	288	80	23.04	8
6	Gulam Ahmed hall	-	Campus	Ceiling Fan	51	80	4.08	8
7	Sports Building	-	Campus	Ceiling Fan	23	80	1.84	8
8	Society Building	G+2	Campus	Ceiling Fan	34	80	2.72	8

5.3 AIR CONDITIONER DETAILS

At Present, campus using the following air conditioners for ventilation purpose. The details of the air conditioners are listed below,

S. NO	BLOCK NAME	FLOOR	LOCATION	TR	NO OF AIR CONDITIONER	Load, kW	OPERATING HOURS
1	BLOCK-1	G+4	Campus	1	24	84	8
2	BLOCK-2	G+3	Campus	1	34	119	8
3	BLOCK-4	G+3	Campus	1	3	10.5	8
4	BLOCK-5	cellar +6	Campus	1	23	80.5	8
5	Gulam Ahmed hall		Campus	1	16	56	8
6	Society Building	G+2	Campus	1	10	35	8

6. WATER CONSERVATION MEASURES

6.1 REPLACEMENT OF NORMAL WATER TAPS WITH WATER EFFICIENT TAPS

At present, normal water taps are used in the wash basin and showers. It is recommended to change water efficient water taps in the campus which will save 50 % of the water consumption in taps and showers.

S. No	Description	Units	Values
1	Normal water taps flow	LPM	10
2	Water efficient taps flow	LPM	5
3	Water savings	%	50

Cost of the water taps and showers

S. No	Description	Price
1	Water efficient tap nozzle	700
2	Water efficient showers	1500



6.2 PROPOSAL FOR INSTALLING DRIP WATER IRRIGATION SYSTEM FOR TREES AND PLANTS

In campus, there are around 550 to 800 plants and Trees were being grown. Water required for the plants and Trees about 800 Litres (Approximately). It is highly proposed to install drip water irrigation system in the campus which will save more amount of water.

7. ROUTINE GREEN PRACTICES

Every year college celebrates World Environment Day, World Water Day and Ozone Day in the campus. The focus of these programs was to provide awareness to the students about the importance of the environment, its conservation and sustainable use of environmental resources. The programs are conducted through seminars, poster presentation, quiz competition debates etc.

8. WASTE MANAGEMENT

Waste management is important for an ecofriendly campus. In college different types of wastes are generated, its collection and management are very challenging. The following data provide the details of the waste generated and the disposal method adopted by the college.

Waste management Practices adopted by the college:

For the last few years, college is following proper waste protocol throughout the campus. The daily wastes generated by the students and staffs were collected using dustbins and disposed to local garbage collector vehicle from corporation. The chemicals from the laboratories are disposed in a sealed tank along with water, so that the chemicals undergo neutralization with the water. Additionally, Used Sanitary napkins were collected and disposed separately by using napkin collector.

9. CARBON FOOTPRINT ANALYSIS

Objective

To assess the amount of carbon dioxide produced in the campus by the human activities either direct or indirect contribution.

Floristic status of the institution:

The Current situation of planted trees are as follows

Particulars	Number/area
Matured trees	80
Semi-grown trees	100
Bushes (including floriculture plants)	1000
No of medicinal plants	50
Any other plants details if any	15

Matured trees (above 5 years), semi-grown trees (below 5 years), shrubs.

Campus farming

The college has planning to start a novel venture of cultivation of fruit trees in the campus. In addition, Organic vegetable farm, medicinal plant garden will be established soon.

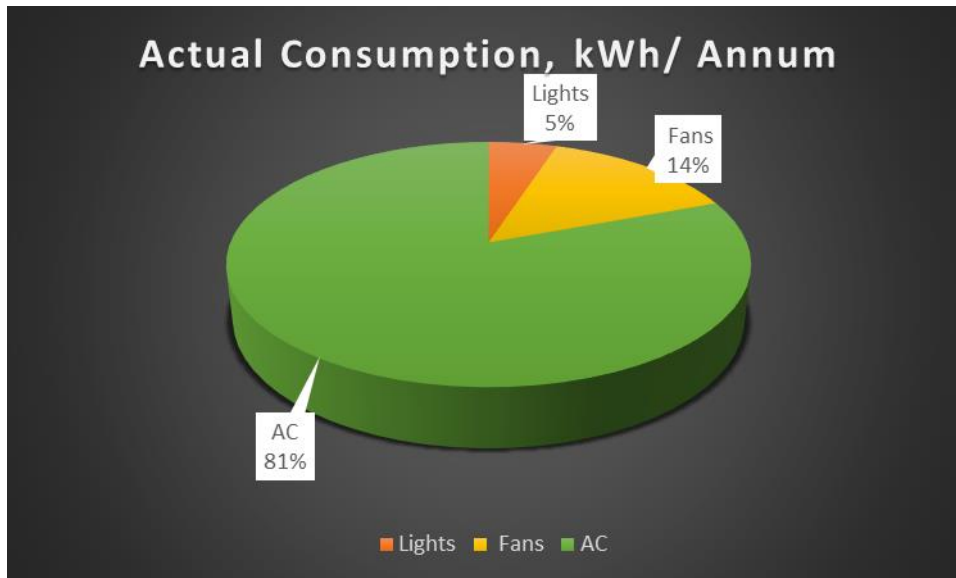
Energy Consumption Scenario

The campus electricity consumption details by utility wise

1. The College total electricity consumption by utility grid is 504420 kWh during the period 2020 – 2021.
2. The campus non five star rated air conditioners electricity consumption is only consider here, and the value is 877800 kWh/Annum.
3. The ceiling fans are used for ventilation purposes and their total consumption is 155222.4 kWh/Annum.
4. The Electricity consumed by the various lighting system is 54400.8 kWh/Annum.

Annual Energy consumption by various loads

S. No	Major Load Details	Actual Consumption, kWh/ Annum
1	Tube light	54400
2	Ceiling fan	155222
3	Air conditioner	877800



Carbon absorption by flora in the Institution

Carbon absorption capacity of one matured tree = 6.8 of CO₂. In bushes it absorbs an average of 200 g of CO₂. The carbon absorption capacity of a 10-sq.ft. area of lawn is 1 g CO₂.

1. Therefore, the carbon absorption capacity of 80 matured trees in the campus of the Institution ($80 \times 6.8 \text{ kg CO}_2/\text{Annum}$) = 544 kg of CO₂/Annum.
2. The carbon absorption capacity of 100 semi-grown trees is 50% of that of full- grown trees. Hence, the carbon absorption ($100 \times 3.4 \text{ kg CO}_2/\text{Annum}$) = 340 kg of CO₂/Annum.
3. There are 1000 bushes of various species being raised in the gardens of the Institution, total carbon absorption was calculated to be $1000 \times 200 \text{ g CO}_2/\text{Annum}$) = 200 kg of CO₂/Annum

The grand total of carbon absorption by the flora in the campus is 1084 kg per year.

CO2 REDUCTION MEASURES:

Replacing Non-LED light with LED Implementation

The Institution using FTL (Florescent Tube Lights) for the lighting purpose by replacing it with LED tubes/ lamps the institution will save up to 35,541 kWh savings per annum which means 29.14 Ton of CO2 reduction is possible.

Utility	Actual Consumption, kWh/Annum	Projected savings, kWh/Annum
Tube Light	54400.8	35541

Replacing existing conventional ceiling fans with Energy efficient gorilla fans

The Institution using Conventional ceiling fans for the ventilation purpose by replacing it with energy efficient gorilla fans, the institution will save up to 51060 kWh savings per annum which means 23.9 Ton of CO2 reduction is possible.

Utility	Actual Consumption, kWh/Annum	Projected savings, kWh/Annum
Ceiling fan	155222.4	51060

The following table illustrates the total quantity of CO2 reduced through various measures,

Energy Saving measures	CO2 reduction, Tons/Annum
Replace existing Tube light to LED	29.14
Replace existing inefficient conventional fans (60W) with Energy efficient fans	23.9
Total	53.04

Net Carbon emission of the campus

Description	Unit	Values
Carbon emitted due to the energy consumption in the campus	tCO2 /year	411.98
Carbon absorption by mature trees, semi mature trees, bushes and lawns	tCO2 /year	-1.08
Net carbon emission of the campus	tCO2 /year	410.9
Carbon reduction opportunities by energy saving projects	tCO2 /year	53.04

Suggestion and Recommendations

There following terms can improve the green campus status of the College,

1. It is recommended to go for additional plantation of gardens, trees, and lawns in possible location to enhance oxygen emission.
2. The plastic waste from the campus can collect in separate bins and send to authorized bodies for recycling.
3. Energy-efficient measures such as replacement of all old Non-LED with LED lamps, old electrical regulators of fans with energy-efficient gorilla fans, air-conditioning units with 5-star rated invertor systems need to be undertaken.
4. All the water taps shall be fitted with high-efficiency aerator taps to reduce wastage of water.
5. All toilets shall be fitted with dual- flush water closets, which will reduce water consumption by 40%.

10. ENERGY CONSERVATION MEASURES

10.1 REPLACE EXISTING 36 W FTL WITH 18 W LED LAMPS

Present scenario

In campus, 36 W Tube lights are used for indoor lighting purpose.

Recommendation

It can be replaced by energy efficient 18 W LED Lamps for energy savings.

Lifecycle

The nominal lifetime of the LED is 40000 hours.

Effect on occupant health, comfort, and safety

There will be no effect on occupant's health, comfort, and safety.

Energy saving calculation

Replace existing Tube light to LED		
Description	Units	Values
Quantity of Tube light	Nos	866
Wattage of each Tube light	W	36
Running hours	hours/day	8
Total working days	days/Annum	285
Average unit cost	INR/kWh	6.00
Energy Consumption by Tube light	kWh/Annum	71,081
Wattage of LED TL	W	18
Energy Consumption by LED TL	kWh/Annum	35,541
Cost of one LED TL	INR	600
Energy savings	kWh/Annum	35,541
Cost Savings	INR/Annum	2,13,244
Investment	INR	5,19,600
Payback Period	Months	29

10.2 REPLACE EXISTING CONVENTIONAL FANS WITH ENERGY EFFICIENT GORILLA FANS

Present scenario

In campus, 80 W Conventional fans are used for the space cooling in the classrooms, offices etc.

Recommendation

It can be replaced by energy efficient 30 W energy efficient fans for energy savings.

Lifecycle

The nominal lifetime of the Fan is 10 years.

Effect on occupant health, comfort, and safety

Enhanced indoor air environment to the occupant. Better thermal comfort to the occupant.



Energy saving calculation

Replace existing inefficient conventional fans with Energy efficient fans		
Description	Units	Values
Quantity of ceiling fans	Nos	851
Wattage of each fan	W	80
Running hours	hours/day	8
Total working days	days/Annum	150
Average unit cost	INR/kWh	6.00
Energy Consumption by existing fans	kWh/Annum	81,696
Wattage of super fan	W	30
Energy Consumption by super fans	kWh/Annum	30,636
Cost of one super fan	INR	3,000
Energy savings	kWh/Annum	51,060
Cost Savings	INR/Annum	3,06,360
Investment	INR	25,53,000
Payback Period	Months	100