

ENERGY AUDIT - 2024



SUM COLLEGE OF BTEACHER EDUCATION KANNUR, KERALA

Conducted By



ATHUL ENERGY CONSULTANTS PVT LTD

4th Floor, Capital Legend Building,
Korappath Lane, Round North, Thrissur, Kerala-680020

Ph: +91 735611199/0-6 Web: www.athulenergy.com E-Mail: info@athulenergy.com

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ACKNOWLEDGEMENTS

We express our sincere gratitude to **M/s SUM College of Teacher Education** for giving us an opportunity to carry out an Energy Audit. We are extremely thankful to the management and staff for their support throughout the audit process. The onsite visit for the energy audit was conducted on 20th May2024.

College Team

- | | | |
|---|------------------|------------------|
| 1 | C. Ahammed Kutty | Manager |
| 2 | Dr. C V Jayasree | Principal |
| 3 | Krishnakumar | IQAC Coordinator |



Yours faithfully

Authorised signatory
Athul Energy Consultants Pvt Ltd

GENERAL DETAILS – COLLEGE

The general details of the college are given in the table below

Sl. No:	Particulars	Details
1	Name of the College	SUM College of Teacher Education
2	Address	Mamba, Muzhappala, Kannur
3	Contact Number & E mail of the college	Dr. Jayasree CV, 0497-2850600
		sumcte@gmail.com
4	Type of Building	Educational Institution
5	Annual Working Days	210
6	No: of students enrolled	115
7	No: of teaching & non-teaching staff	17
8	Total Built Up area	3765.6M ²
9	Average power consumption per month. (kWh/month)	524
10	Average electricity charges per month. (Rs. /month)	9030



FIGURE 1: COLLEGE BUILDING

EXECUTIVE SUMMARY

1. PRESENT ANNUAL ENERGY CONSUMPTION

The present annual energy consumption has been analysed with the available data from the facility for the period July 2023- March 2024.

TABLE 1: ANNUAL ENERGY CONSUMPTION

Particulars	Unit	Gross calorific value (kCal)	Values	Toe	% of distribution
Electricity	kWh	860	2622	0.225	88.4
Petrol	Kg	11100	30	0.03	11.6
Total				0.255	100.0

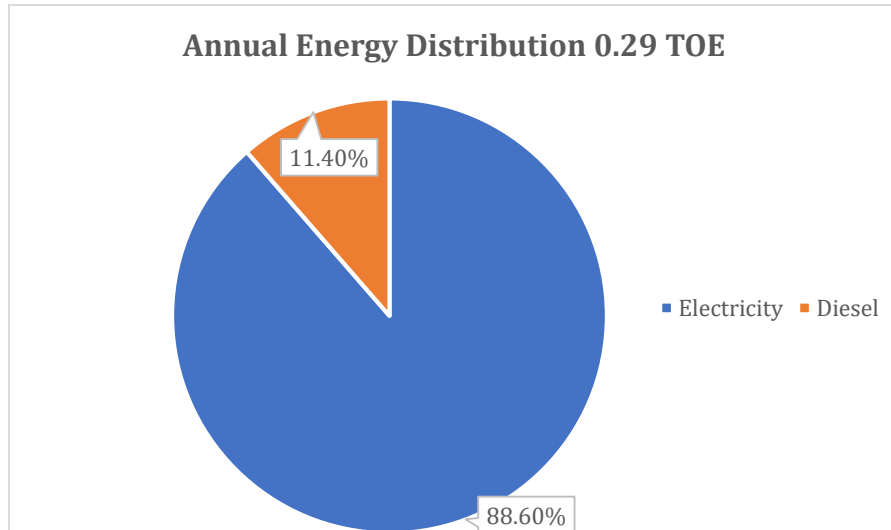


FIGURE 2: ANNUAL ENERGY DISTRIBUTION

2. ANNUAL ENERGY COST

Annual cost for energy consumption during April 2023- March 2024 is given in table below.

TABLE 2: ANNUAL ENERGY COST

Particulars	Unit	Rs/unit	Values	Rs in lakhs	% Of distribution
Electricity	kWh	8.97	3042	0.27	88.4
Petrol	litres	105	34	0.04	11.6
Total				0.31	100.0

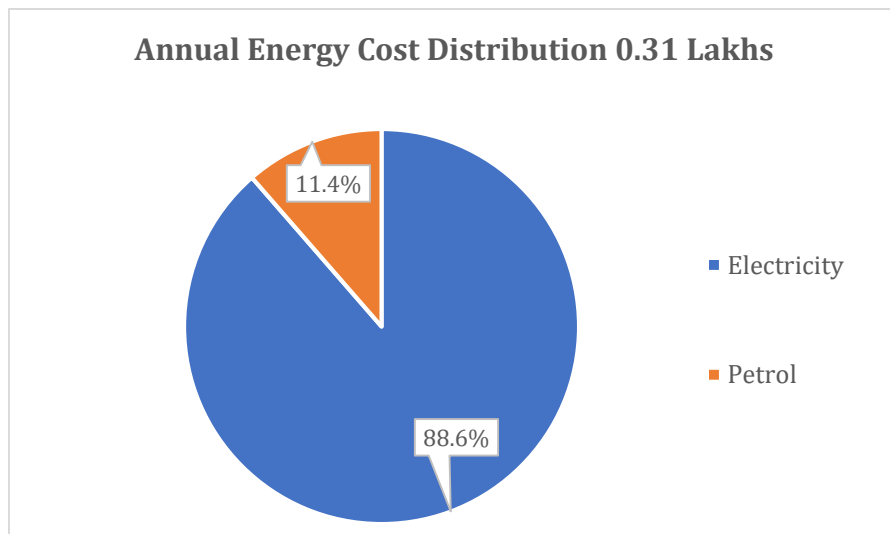


FIGURE 3 : ANNUAL ENERGY COST DISTRIBUTION



3. ENERGY CONSERVATION MEASURES

The following table shows the energy conservation measures and renewable energy integration possibility in the college its energy savings, financial savings & the payback period against the investment.

TABLE 3: ENERGY CONSERVATION MEASURES

<i>Sl.</i>	<i>Energy conservation measures</i>	<i>Annual Energy Savings</i>	<i>Annual Financial Savings</i>	<i>Investment</i>	<i>Simple payback period</i>
		<i>kWh</i>	<i>Rs</i>	<i>Rs</i>	<i>Months</i>
1	Replacement of old ceiling fans with BLDC fans	806	7,233	42,000	70
Total Savings		806	7,233	42,000	70
<i>Sl</i>	<i>Renewable energy integration</i>	<i>Annual Energy Savings</i>	<i>Annual Financial Savings</i>	<i>Investment</i>	<i>Simple payback period</i>
		<i>kWh</i>	<i>Rs</i>	<i>Rs</i>	<i>Year</i>
1	Installation of 03kW on- grid solar PV system		25,786	1,65,000	6.40(Years)

3. AUDIT SUMMARY - ACTIONS

TABLE 4: AUDIT SUMMARY - ACTIONS

Sl No:	Particulars	Location	Action to be taken	Remarks
1	Energy efficiency – Replacement of ceiling fans with BLDC fans	Office, staff rooms, Classrooms	Change the existing old ceiling fans with BLDC fans	Power Consumption will get reduced
2	Installation of 03kW on-grid solar System	Rooftop	Solar plant can be installed	Energy charges would reduce

4. ENERGY PERFORMANCE INDEX

Energy performance index (EPI) was based on the energy consumption in the period **Aril 2023-March 2024**, is summarised in the table below.

TABLE 5: ENERGY PERFORMANCE INDEX

Energy Performance and climate impact	Unit	Baseline	Projection
Annual Electricity Consumption	kWh/annum	3042	2,336
	TOE/annum	0.26	0.20
	CO ₂ emission (Tons)	2.40	1.85
Annual petrol consumption	kg/annum	30	30
	TOE/annum	0.033	0.033
	CO ₂ emission (Tons)	0.069	0.069
Built up area	m ²	1,599.99	1,599.99
Specific Electricity consumption	kWh/m ² /annum	1.90	1.5
Specific Electricity consumption	TOE/m ² /annum	0.0002	0.0001
Specific Fuel consumption	TOE/m ² /annum	0.0000	0.0000
Energy performance index	TOE/m ² /annum	0.0002	0.0001
Annual energy cost	Rs in Lakhs/annum	0.270	0.198
Carbon footprint – net (all energy input)	CO ₂ emission (Tons)	2.47	1.91
Specific carbon footprint	CO ₂ emission (Tons)/m ² /annum	0.002	0.001

Tonne of oil equivalent (TOE) 1 TOE = 10 million kCal

CO₂ conversion

Petrol 1kg of HSD = 2.31 kg of CO₂ at 11100 kCal/kg of HSD

Electricity 0.79 kg CO₂ per unit of electricity at 860 kCal/kWh

INTRODUCTION

ABOUT ATHUL ENERGY CONSULTANTS (AEC)

Athul Energy Consultants Pvt Ltd (AEC) is an Accredited Energy Auditing Firm (AEA) recognized by BEE and also empaneled with Energy Management Centre (EMC), Govt of Kerala. Established in 2010 as Athul Engineering Systems and Energy Consultants, (AEC since 2016), is one of the leading consultancy firms concentrating mainly in Energy and safety audits across pan India. The motto of AEC is to deliver services at quality and in time. The basic priority given is for energy conservation and sustainable development.

AEC has wide experience in the energy audit sector and have conducted the same in Chemical, Textile, Steel, petrochemical, rubber, mines, food and beverages, DISCOM and buildings, hotels, hospitals, air ports, institutions etc. The safety audits are another sector in which the AEC has experience and have conducted more than 3000 safety audits in the banks, industries and buildings such as hotels, hospitals. AEC specialized in finding root cause of chronic issues pertinent in industries.

AEC have conducted various power quality audit in many industries as in industries, IT sector, hotels, hospitals, testing laboratories, solar installations, banking institutions etc. Conducted more than 200 studies in its portfolio

NAME AND DETAILS OF ENERGY AUDIT TEAM MEMBERS

The contact details of energy audit team from AEC are given in the table below.

TABLE 6: CONTACT DETAILS OF ENERGY AUDIT TEAM

Sl	Name	Certification	EM/EA/AEA/ Registration	Phone no	Email
1	Santhosh A	• Accredited Energy Auditor	AEA-0275	7356111990	santhosh@athulenergy.com
2	Harikrishnan K	• Certified Energy Manager	EM-11755/23	7356111996	hari@athulenergy.com

BACKGROUND

ENERGY AUDIT

An energy audit is a key to assessing the energy performance of an energy consuming facility and for developing an energy management program. The typical steps of an energy audit are:

- Preparation and planning
- Data collection and review
- Plant surveys and system measurements
- Observation and review of operating practices
- Data documentation and analysis
- Reporting of the results and recommendations

1.1. Definition of energy auditing

In the Indian Energy Conservation Act of 2001 (**BEE 2008**), an energy audit is defined as: **"The verification, monitoring and analysis of the use of energy and submission of technical report containing recommendations for improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption."**

1.2. Objectives of Energy Auditing

The objectives of an energy audit can vary from one plant to another. However, an energy audit is usually conducted to understand how energy is used within the plant and to find opportunities for improvement and energy saving. Sometimes, energy audits are conducted to evaluate the effectiveness of an energy efficiency project or program. In colleges per the request from the institution, we have assessed the energy consumption and saving opportunities at present scenario.

Methodology for the study

The methodology adopted for energy audit starts from historical energy data analysis, power quality analysis, monitoring of operational practices, system evaluation, cost benefit analysis of the energy conservation opportunities, and prepare plan for implementation. The proposals given in the report includes economical energy efficiency measures to reduce facilities unnecessary energy consumption and cost. The energy conservation options, recommendations and cost benefit ratio, indicating payback period are included in this report.

Scope of Work

The Scope of Work includes:

1. Historical energy data analysis.
2. Power Quality Analysis.
3. Identification of Energy saving opportunities.
4. Cost Benefit Analysis.

FACILITY DESCRIPTION

ABOUT SUM COLLEGE OF TEACHER EDUCATION

Shamsul – Ulama Memorial (SUM) College of Teacher Education was founded in the year 2006 under the patronage of Jamia Shamsul Ulama Al Islamia Mattanur. It was recognised by the NCTE Southern Regional Committee Bangalore and affiliated to Kannur University. It is situated in the tranquil surrounding of Anjarakandy Panchayat, adjacent to the Mamba mosque , the college enjoys a serene location.It is nearly 17 km away from Kannur Railway Station and bus stand and 10 km away from the Kannur International Airport .The institution boasts a picturesque campus with well maintained infrastructure and provisions catering specifically to physically challenged students .

SUM College of teacher education is a co -educational institution owned and run by Jamia Shamsul Ulama -Al Islamiya.Mamba.College started with a student intake of 100 across 5 optional subjects English, Mathematics ,Natural science, Physical science and Social science. Initially enrolling 100 students, college adapted to changes introduced by NCTE , transitioning to a 50 student intake when the two year B.Ed program was implemented

Vision

To be a leading institution to shape exemplary educators who inspire and empower learners, fostering a brighter future for our society

Mission

To cultivate strong sense of social responsibility community engagement and global awareness among our graduates. To uphold the highest standards of professionalism ethics and integrity in all aspects of our institution

UTILITY FLOW DIAGRAM

This section shows the basic single line diagram of the major utilities

ELECTRICITY

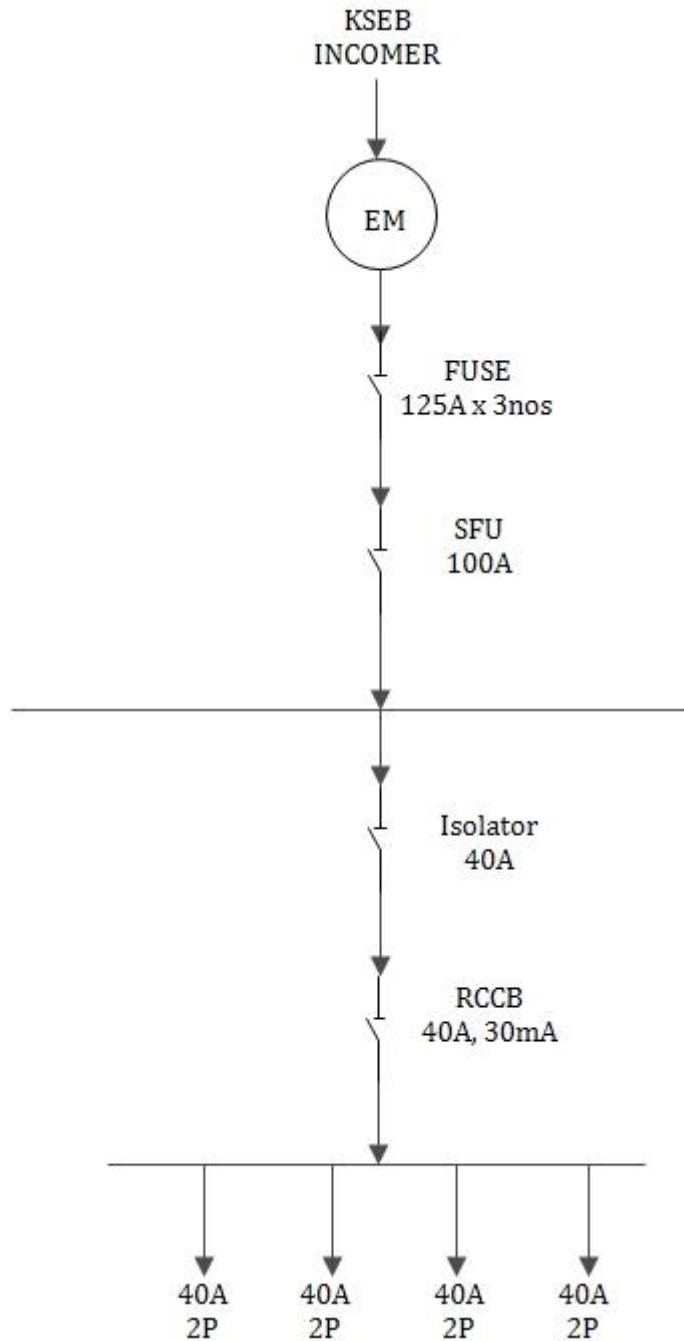


FIGURE 4: SINGLE LINE DIAGRAM

WATER FLOW DIAGRAM

College have one bore well and the water is pumped into two synthetic tanks of capacity 1Kl each by a bore well pump of motor rating 1HP.

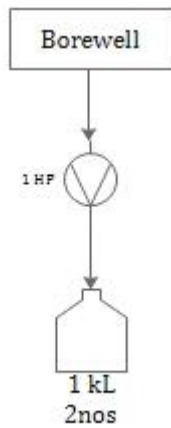


FIGURE 5: WATER FLOW DIAGRAM



Figure 6 STORAGE TANKS

HISTORICAL ENERGY CONSUMPTION ANALYSIS

The major energy that is presently being used in the college are:

1. Electricity
2. Petrol(Generator)

This section analyses the consumption of each energy in the facility for the period **July2023–March 2024**

ELECTRICITY CONSUMPTION ANALYSIS

This section gives the detail analysis of electricity consumption in the building.

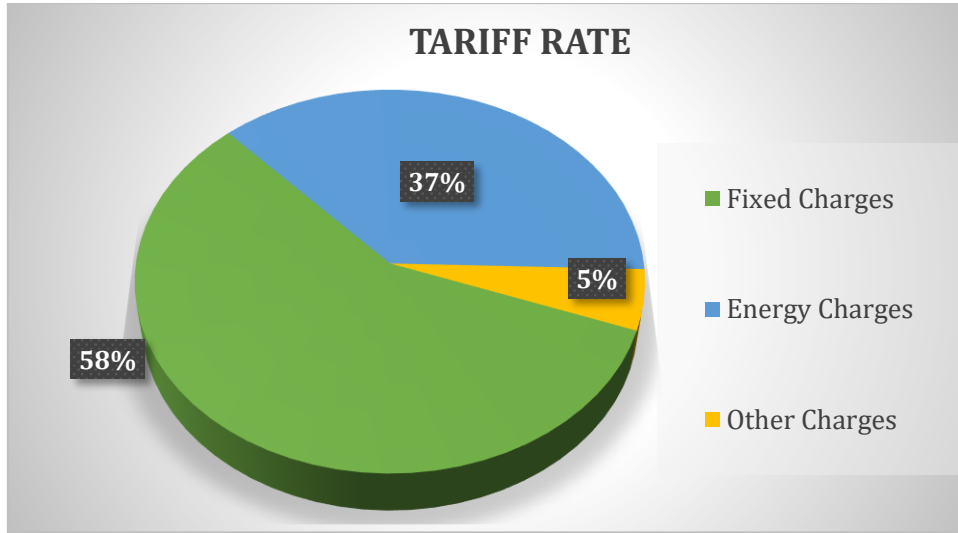
BASELINE DATA & CONSUMPTION: 12 MONTHS

The electricity baseline data, based on the bills, and the recorded, is summarized in the table below.

Particulars	
Consumer No	1166601021849
Electrical section	Chakkarakkallu
Approved connected Load (Kw)	14.096
Measured connected load	12.064
Tariff	LT-6F/Three
Average monthly consumption (kWh)	524
Average monthly electricity charges (Rs)	9030

TARIFF RATE ANALYSIS

The average monthly energy and Fixed charges for the period July 2023 - Mar 2024 is represented in Fig.



SPECIFIC ELECTRICITY CONSUMPTION

The electricity consumption from April 2023 to March 2024 has been used for benchmarking. The comparison is made based on electricity consumption, the number of students, and the building area. The table below shows the specific electricity consumption of the college.

TABLE 7: SPECIFIC ELECTRICITY CONSUMPTION

Month	Electricity Consumption	Number of Students+ staff	Building Area	SEC	SEC
	kWh	Number	m ²	kWh/Student+ staff	kWh/ m ²
Jul-23	458	132	3765.6	3.47	0.12
Sep-23	358	132	1599.99	2.71	0.10
Nov-23	484	132	1599.99	3.67	0.13
Jan-24	540	132	1599.99	4.09	0.14
Mar-24	782	132	1599.99	5.92	0.21
Average	524	132	1600	3.97	0.14
Annual Specific Electricity consumption (Julynto March)				19/86	0.7
Annual Electricity Consumption (kWh) (July to March)				2622	

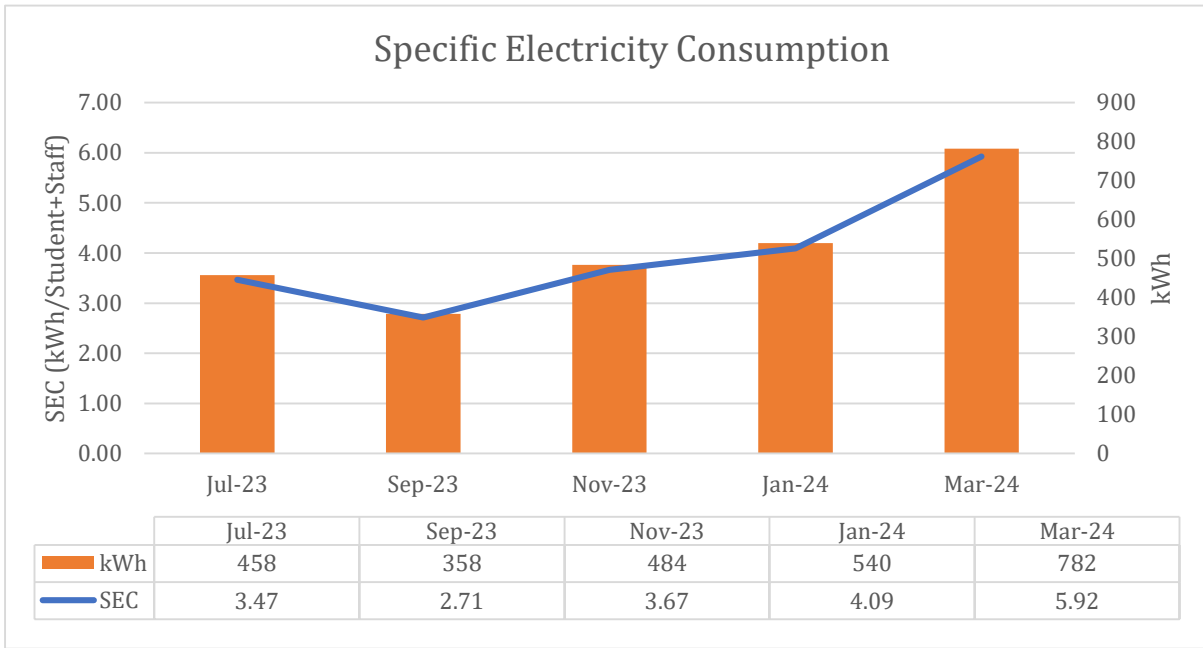


FIGURE 7: SEC (KWH/STUDENT+STAFF)

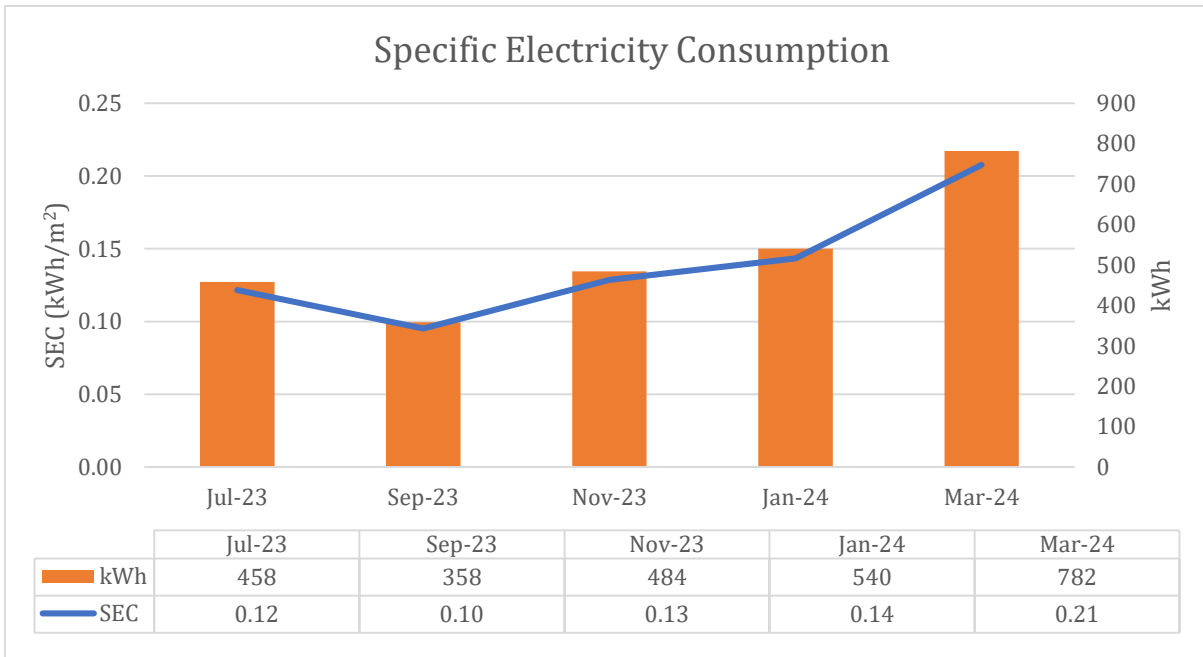


FIGURE 8: SEC (KWH/M²)

PETROL CONSUMPTION ANALYSIS

Petrol is utilized as fuel for the generator. The petrol consumption was found to be lower last year. The approximate petrol consumption over the past year is given below.

TABLE 8: DIESEL CONSUMPTION - SUMMARY

Annual consumption (L)	Calorific value (kcal/kg)	Tonne of Oil Equivalent (TOE)
34	11100	0.04

Calorific value of Petrol is 11100 Kcal/kg and 1 TOE means 10000000 Kcal.

ANALYSIS OF MAJOR EQUIPMENT

This section analysis the major equipments in the college

GENERATOR

The college employs a petrol generator with a capacity of 2.1 kVA as a backup power supply. The details about the generator can be found in the table provided below:

TABLE 9: DIESEL GENERATOR

KVA	Fuel	Make
2.1	Petrol	Honda

UNINTERRUPTED POWER SUPPLY

An uninterruptible power supply, UPS is an electrical apparatus that provides emergency power to a load when the input power source fails. The table describes the ups/inverter in the college.

Location	UPS Details		Battery Details	
	Rated KVA	Make	Make/Type/Nos	Volt/Ah
ICT Resource Centre	2	Hi- Power	On & On/Tubular/2	12/100
Terrace	3	-	Tubular/2	12/100

LIGHTS AND FANS

The lights and fans are provided in various rooms and areas of the building to improve human comfort conditions. The details of the lights in the college are given below

TABLE 10: LIGHTS

Particulars	Wattage (W)	Total nos	Net kW
LED Tube	30	11	0.33
LED	9	20	0.18
LED	6	22	0.132
LED	3	20	0.06
LED	18	74	1.332
Total kW			2.034

The installed Fan load details of the facility is as given in table shown below. The types of fans installed in the building include ceiling fans, wall fans, exhaust fans and pedestal fans

TABLE 11: FANS

Particulars	Wattage (W)	Total nos	Net kW
Ceiling Fan	60	53	3.18
Exhaust Fan	40	2	0.08
Total kW			3.26

Inference

- I. All the lights are energy efficient LED lights.
- II. Continuous working conventional fans can be replaced with energy efficient BLDC fans

AIR CONDITIONER

SUM college installed only one AC . Details of air conditioner is given below

Table 12 AC DETAILS

Make	Type	Capacity (TR)	ISEER	Star Rating	Year	Net power (kW)
IFB	Split	1	5.15	5	2023	0.95

UPS

Table 13 UPS

UPS		Battery	
Make	Capacity	Make/Type/No's	Volt/Ah
Microtek	2.75kVA	V-Guard/Tubular/2	12/135

OFFICE AND OTHER EQUIPMENTS

The other major loads in the facility are as summarized in the table below.

TABLE 14: OFFICE AND OTHER EQUIPMENTS

Particulars	Power (W)	Quantity	Total Power (kW)
Cooler	100	1	0.1
PC	110	5	0.55
Xerox	500	1	0.5
Projector	120	2	0.24
interactive screen	150	3	0.45
Air cooler	165	2	0.330
TV	150	1	0.15
Pump	750	1	0.75
Cooler	100	1	0.1
Total Power kW			3.07

CONNECTED LOAD SUMMARY

This section provides an idea of the total connected load distribution within the system. The table below illustrates the division of connected loads.

TABLE 15: CONNECTED LOAD SUMMARY

Particulars	Power (kW)	Percentage share
Light Load	2.034	16.9
Fan Load	3.26	27.0
AC Load	0.95	7.9
Office and other equipments	3.07	25.4
UPS	2.75	22.8
Total Power (kW)	12.064	100

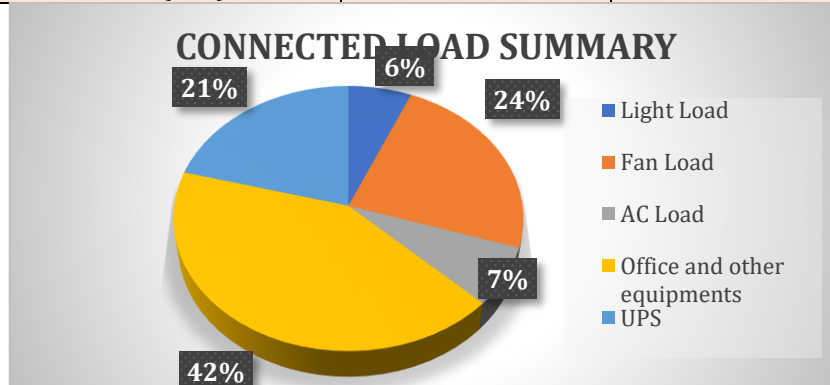


FIGURE 9: CONNECTED LOAD SUMMARY

ANNEXURE - 1

ENERGY CONSERVATION MEASURE - 1

REPLACEMENT OF OLD CEILING FANS WITH BLDC FANS

Background

A BLDC fan takes in AC voltage and internally converts it into DC using SMPS. The main difference between BLDC and ordinary DC fans is the commutation method. All the fans used in the building are ordinary fans.

Proposal

Replace the ceiling fans with BLDC in areas such as staff rooms, principal room, class room etc.

Detailed calculation is shown in the table given below.

TABLE 16: ECM 1

Particulars	Unit	Value
Present Power Consumption	Watts	60
Proposed Power Consumption	Watts	28
Reduction in power	Watts	32
Operating hours per day	Hrs/day	8
No: of working Days	days/annum	210
No: of fans operating	Nos	15
Annual energy savings	kWh/annum	806
Cost per kWh	Rs	8.97
Annual Financial Saving	Rs/annum	7,233
Cost of BLDC fan	Rs	2,800
Investment	Rs	42,000
Simple payback period	Months	70

Replace as and when existing fans reach end of life

RENEWABLE ENERGY INTEGRATION

INSTALLATION OF 3kW On- grid Solar PV System

Background

The college has ample free space at the rooftop with sunlight throughout the day. The solar energy potential in India is immense due to its convenient location near the Equator. India receives nearly 3000 hours of sunshine every year, which is equivalent to 5000 trillion kWh of energy.

Proposal

A 3kW on-grid solar system can be installed atop the building.

Calculations

TABLE 17: RENEWABLE ENERGY INTEGRATION

Particulars	Units	Value
Available solar intensity in the area - Average	kWh/m ² /day	3.15
Rooftop area required for solar installation	m ²	30
Approximate generation capability with respect to the area	kWh/day	74
Overall efficiency of the solar power plant- estimate	%	13
Approximate available units for utilisation	kWh/day	10
Approximate annual unit generation @ 300 days per annum	kWh/annum	2,875
Unit cost of electricity - average	Rs/kWh	8.97
Net annual savings	Rs/annum	25,786
Total expenses with GRID tie inverter @ Rs 55000 per kW of SPP (approx. size of the plant =3 kW)	Rs	1,65,000
Simple Payback period	Years	6.40



Figure 10 RECOMMENDED SOLAR PLANT INSTALLATION AREA

E-VEHICLE CHARGING FACILITY

We know that cars or any internal combustion vehicles produce a lot of carbon emissions that are ejected into our natural atmosphere, leaving us vulnerable to things like pollution and greenhouse gases. Also, as the price of hydrocarbon fuels are getting higher in each day, the alternative method for transportation is relevant in these days. In order to positively help the environment, we live in, an electric car/vehicle is a great step forward.

As a government entity SUM College move ahead in sustainable path by installed E vehicle charging facility in its facility for their use . As a teacher training college this educates the students in the college who become teachers in due courceb of time will remember this green initiative.



Figure 11 E-VEHICLE CHARGING FACILITY



ANNEXURE - 2

ELECTRICITY BILL SAMPLE COPY

KERALA STATE ELECTRICITY BOARD LIMITED						
DEMAND CUM DISCONNECTION NOTICE						
(As per Regulation 122 & 123 of Kerala Electricity Supply Code 2014)						
Section	[6660]-Electrical Section Chakkarakallu		Phone#	0497-2851614	Customer Care	1912
Consumer#	1166601021849		Reg. Mob#	886xxxx827	Regular CC Bill	KSEBL GSTIN: 32AAECK2277NBZ1
Name & Mailing Address			For redressing complaints/grievance approach the concerned CGRF			
ABDUL RAHIMAN CHAIRMAN KALLAYI JAMIA SHAMSUL ULAMA AL, ISLA MIYA, P O MUZHAPPALA, AP I 34B 34C 34D			South: Chairperson,CGRF(South),KSEBL,Vydyuthi Bhavanam, Kottarakara-691506, Ph:0474-2451300 Central: Chairperson,CGRF(Central),KSEBL,220KV SubStation,Kalamassery-683503,Ph:0484-2556500 North: Chairperson,CGRF(North),KSEBL,Vydyuthi Bhavanam,Gandhi Rd.,Kochikode-673011,Ph:0495-2367820 State Electricity Ombudsman, D.H.Rd & Foreshore Rd Jn.,Near GandhiSquare,Ernakulam-682016,Ph:0484-2346488			
Bill#	6660231109241		Bill Area	A02/7	DTR	MUZHAPPALA
Billing Period	11/2023[Bi-Monthly]		Tariff/Phase	LT-6F/Three	Pole#	MN14/1
Bill Date	10-11-2023		Due Date	20-11-2023	DC Date	07-12-2023
Contract Demand	Nil] VA [75% : DKV, 130% : DKV]		Connected Load	14096 Watts	Security Deposit	Rs.15000.00
Meter#	L&T020180018393809		Average consumption(Monthly)			
Meter Digits	6.2		Power Unit/Zone	CUMULATIVE		
Meter Type/Owner	TOD/KSEB		KWH	202		
Last Billed Rdg. Date	Prev. Rdg. Date	Prev. Meter Rdg. Status		Prst. Rdg. Date	Prst. Meter Rdg. Status	
08-09-2023	08-09-2023	Working		10-11-2023	Working	
Power Unit	Zone	Trading	Initial Reading(IR)	Final Reading(FR)	OMF	Units*
KWH	Cumulative	Import	7946.00	6430.00	1	484
Remarks :			Bill Details			
Fuel Surcharge[FS] @9 Pa./Unit (Vide Order dt. 25-01-2023) Last Paid Amount - Rs.16300.00 Last Payment Date - 20-05-2024 Payable amt.(excluding ACD) as on 2023-11-10 18:41:58:Rs.8284/-			[INR] Amount(Rs.)			
			a)	Fixed Charges	Fixed Charge(FC)	5150.00
					Sub Total	5150.00
			b)	Energy Charges	Energy Charge(EC)	3630.00
					Fuel Surcharge[FS]	43.56
					Auto Recovery FS(FSM)	48.40
					Sub Total	3721.96
			c)	Other Charges	Electricity Duty(ED)	363.00
					Meter Rent(MR)	30.00
					Sub Total	393.00
			d)	GST	MR-CGST	2.70
					MR-SGST	2.70
					Sub Total	5.40
			e)	Round Off		-0.36
			e)	Total Amt.(Bill#6660231109241)	(e+b+c+d+a)	9270.00
			f)	Surcharge		45.00
			g)	Reconnection Fee		0.00
			h)	Interim Bills		0.00
			i)	Arrears		0.00
			j)	Less paid/adv.		-9315.00
			k)	Less Advance		-28.00
				Net Payable(e+f+g+h+i-j-k)		0.00
Demand for 11/2023 is Rupees Nine Thousand Two Hundred and Seventy Only						
ESOE Payment Options: Cash,Cheque,DD,MO. Online: www.kseb.in (Debit/Credit Cards,Net Banking). Other Platforms: BBPS,Friends,Alakshya,CSC,NACH						



EMC Certificate



Energy Management Centre - Kerala (Department of Power, Govt of Kerala)

CERTIFICATE OF EMPANELMENT

This is to certify that **M/s. Athul Energy Consultants Pvt Ltd** (4/2, Capital Legend Building, Korapath Lane, Round North, Thrissur - 680020) is empanelled as Energy Audit firm in Energy Management Centre Kerala to conduct mandatory energy audit as per Government of Kerala G.O (Rt) No.2/2011/PD dated 01.01.2011.

Empanelment No:
EMCEE-0811F- 4

Scope/Area	Building	Industry -Electrical	Industry Thermal
	Yes	Yes	Yes

This empanelment is valid up to 31/01/2027


Issuing Date: 06/04/2024

Place: Thiruvananthapuram.

Director,
Energy Management Centre - Kerala




BEB Accreditation certificate

 **BUREAU OF ENERGY EFFICIENCY**

Examination Registration No.: **EA- 7597**

Accreditation Registration No.: **AEA-0275**



Certificate of Accreditation

This is to certify that Mr./Ms. **Santhosh. A** having its trade/registered office at **Kerala** has been given accreditation as accredited energy auditor. The certificate shall be effective from **2nd** day of **November, 2017**


The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **0275** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **12th** day of **February, 2018**


Secretary,
Bureau of Energy Efficiency
New Delhi

CONSOLIDATED KSEBL BILL – ANALYSIS PERIOD

Name of the Consumer		SUM college of Teacher Education								
Tariff - LT6F/Three		Consumer No:					1166601021849			
Connected Load (kW)		14.096								
BI MONTH	Monthly consumption	Fixed charges	Energy charge	Fuel surcharge	Auto recovery	Meter rent	Duty	GST	Total amount	Rs/kWh
	kWh	Rs	Rs	Rs	Rs	Rs	Rs	Rs	Rs	
Jul-23	458	5100	3435	41.22	41.22	30	344	5.4	8996	8.25
Sep-23	358	5100	2434	32.22	35.8	30	243	5.4	7881	7.48
Nov-23	484	5150	3630	43.56	48.4	30	363	5.4	9270	8.25
Jan-24	540	5400	4050	48.6	54	30	405	5.4	9993	8.25
Mar-24	782	5220	3337	40.05	44.5	30	334	5.2	9011	4.69

TABLE 18: CONSOLIDATED KSEBL BILL

ABBREVIATIONS

APFC	:	Automatic Power Factor controller
AVG	:	Average
BDV	:	Breakdown voltage
BEE	:	Bureau of energy efficiency
CEA	:	Central electrical authority
CFL	:	Compact fluorescent lamp
CFM	:	Feet cube per minute
DB	:	Distribution Board
DG Set	:	Diesel Generator Set
EC	:	Energy Conservation
FD	:	Forced draft
FY	:	Financial year
HPSV	:	High-pressure sodium vapour
HT	:	High Tension
ID	:	Induced draft
IEC	:	International electro technical commission
IEEE	:	The Institute of electrical and electronics engineers
IS	:	Indian Standard
KG	:	Kilogram
KSEB	:	Kerala state electricity board
KVA	:	Kilo Volt Ampere
KVAH	:	Kilo volt Ampere Hour
KVAR	:	Kilo volt-ampere
KW	:	Kilo Watts
KWH	:	Kilowatt-hour
LED	:	Light emitting diode
MAX	:	Maximum
MH	:	Metal halide
NEMA	:	National Electrical Manufacturers Association
OLTC	:	On load tap changer
ONAN	:	Oil natural air natural
PCC	:	Point of common coupling
PSI	:	Pound square inch
RMD	:	Registered Maximum demand
SEC	:	Specific electricity consumption
SFU	:	Switch Fuse Unit
SLD	:	Single Line Diagram
TDD	:	Total demand distortion
THD	:	Total harmonics distortion
TOE	:	Tonne of oil equivalent
UPS	:	Uninterruptible power supply
VFD	:	Variable frequency drive

REFERENCES

1. BEE energy audit books
2. CEA regulations of grid connectivity-2007
3. IEEE Std. 519-1992.
4. National lighting code - 2010