ENERGY AUDIT 2021-22

MAR THOMA COLLEGE FOR WOMEN
Perumbavoor, Ernakulam

EXECUTED BY

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ACKNOWLEDGEMENTS

We express our sincere gratitude to the management of **Mar Thoma College for Women** for giving us an opportunity to carry out the project of Energy Audit in the college. We are extremely thankful to the management team, students and all staff for their support to carry out the studies and for their inputs and measurements related to the project of Energy audit. The energy audit conducted in the period February to March2022.

Mar Thoma College for Women– TEAMN – Faculties and Students of Physics

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Also congratulating our Energy audit team members for successfully completing the assignment by Final year BSc Physics students in time and making their best efforts to add value.

ENERGY AUDIT TEAM

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2. **Harikrishnanan – Project Engineer.**

Yours faithfully

Managing Director
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OBJECTIVE

An energy audit is a key to assessing the energy performance of 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 energyconsumption."**

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 issued within the plant and to find opportunities for improvement and energy saving. Sometimes, energy audits conducted to evaluate the effectiveness of an energy efficiency project or program. In Marthoma College for Women as per the request from the company, 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. Electrical, Mechanical and Thermal energy analysis.
3. Power Quality Analysis.
4. Identification of Energy saving opportunities.
5. Cost Benefit Analysis.

DESCRIPTION OF SITE

Mar Thoma College for Women, situated in the Municipal area of Perumbavoor, is the dream child of the late Thomas Mar Athanasius Suffragon Metropolitan of the Mar Thoma Syrian Church. A visionary, Thirumeni had foreseen that this college would cater to the educational needs and the empowerment of the girls of the rural and suburban areas, in and around Perumbavoor.

The College established in 1982, has, since the inception been an institution striving towards excellence in all spheres of higher education. The college has played an instrumental role in the progress of the locality, contributing proactively to its growth and development. It has been particularly successful in molding generations of women into progressive thinkers and leaders contributing to the nation in multifarious ways. The college, initially affiliated to the University of Kerala, started functioning as a junior college, offering the third and fourth groups of Pre-degree courses with 92 students. When Mahatma Gandhi University established in 1984, the college affiliated to it. Science courses offered since 1984. In 1991, the college upgraded to a degree college. At present, it offers 8-degree courses. The College is included under Sections 2(f) and 12B of the University Grants Commission. The National Assessment and Accreditation Council (NAAC) accredited the college at the B+ level (2.63) in 2017.

Figure 1 MAIN ENTRANCE

GENERAL DETAILS

The general details of the College are given below in table based on the data availed from the college and from their website.

TABLE 1: GENERAL DETAILS

SL. No	PARTICULARS	DETAILS
1	Name & Address	**Mar Thoma College for Women** Perumbavoor, Ernakulam District, Kerala Tel no: 0484-2522723 and 9446438500
2	**Location**: Latitude, Longitude	10.120219 ^{0}N, 76.489077^{0}E
3	**No : of Students**	969
4	No: of Staffs	50
5	Working Time	9,00 to 17.00
6	Build up area Sq. M	9200
7	Campus Area	10 Acre
8	No: of programs and departments	Degree – 11 , PG – 02 and Departments -09 and Integrated PG -01
9	Sanctioned load	43 kW
10	DG Set	30 KVA

EXECUTIVE SUMMARY

1. PRESENT ANNUAL ENERGY CONSUMPTION

The present annual energy consumption has been analysed in table with the available data from the College for the period Apr 2021 – Feb 2022.

TABLE 2: ANNUAL ENERGY CONSUMPTION

Particulars	Unit	Quantity	Gross calorific value (kCal)	Toe	Percentage of distribution (%)
Electricity	kWh	14977	860	1.29	82
Diesel	Litres	300	9729	0.29	18
Total				**1.58**	

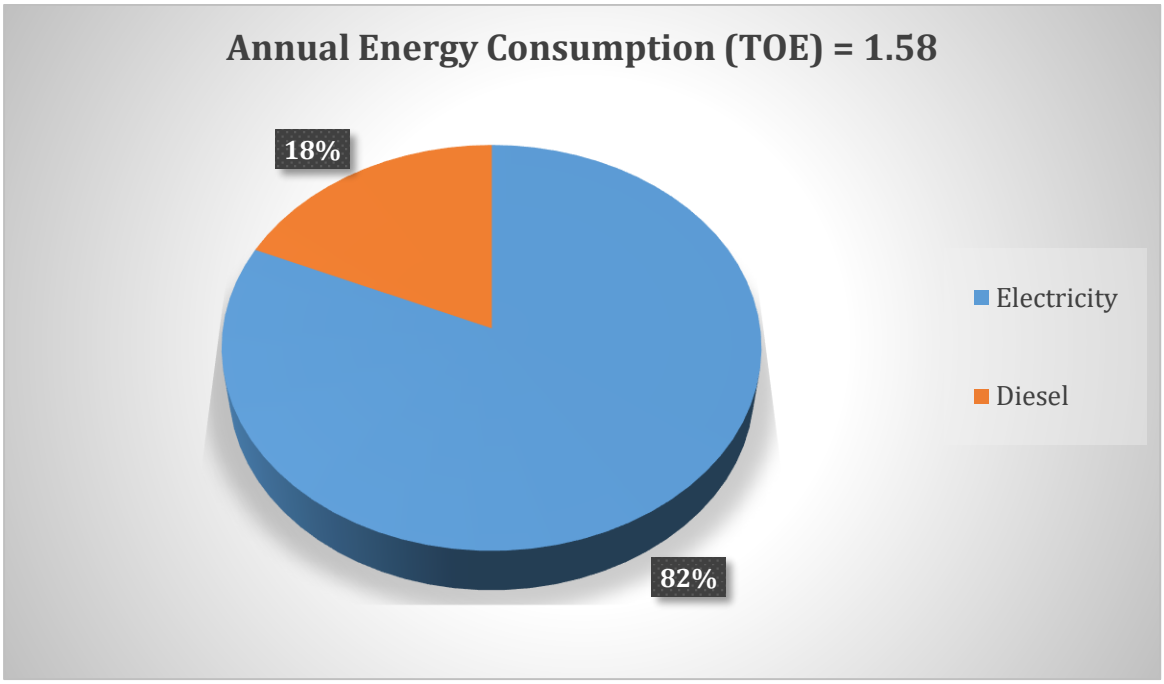


FIGURE 2: ANNUAL ENERGY CONSUMPTION

The truck/vehicle diesel consumption is not included in this analysis or in energy audit report

2. ANNUAL ENERGY COST

Annual cost for energy consumption during Apr 2021- Feb 2022 done in table.

TABLE 3: ANNUAL ENERGY COST

Particulars	Unit	Quantity	Average Cost/Unit	Average Cost (Rs)	Cost (%)
Electricity	kWh	14977	7.15	145536	84
Diesel	Litres	300	90	27000	16
Total				**172536**	

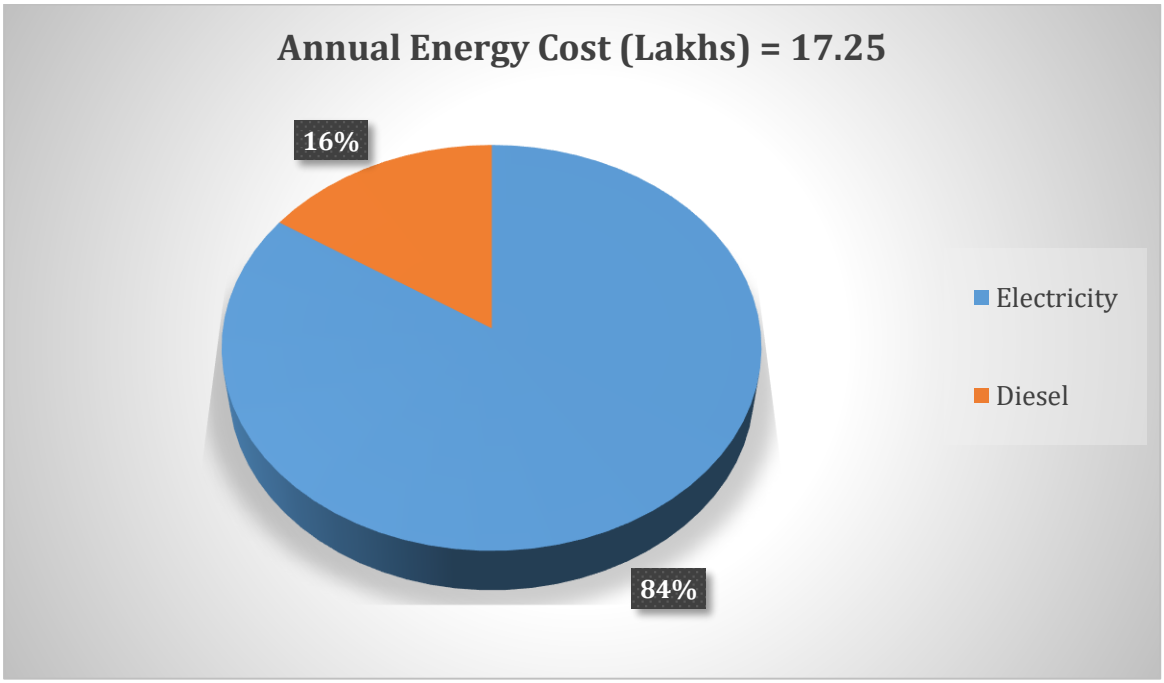


FIGURE 3: ANNUAL ENERGY COST

3. LOAD BALANCE IN CONNECTED LOAD

Load balance among the connected loads given in the figure shown below. The major loads in the building are air conditioners, light and fan load and office equipment. Lighting and fan loads shares majority of the loads corresponding to 59% of the total connected load in the building.

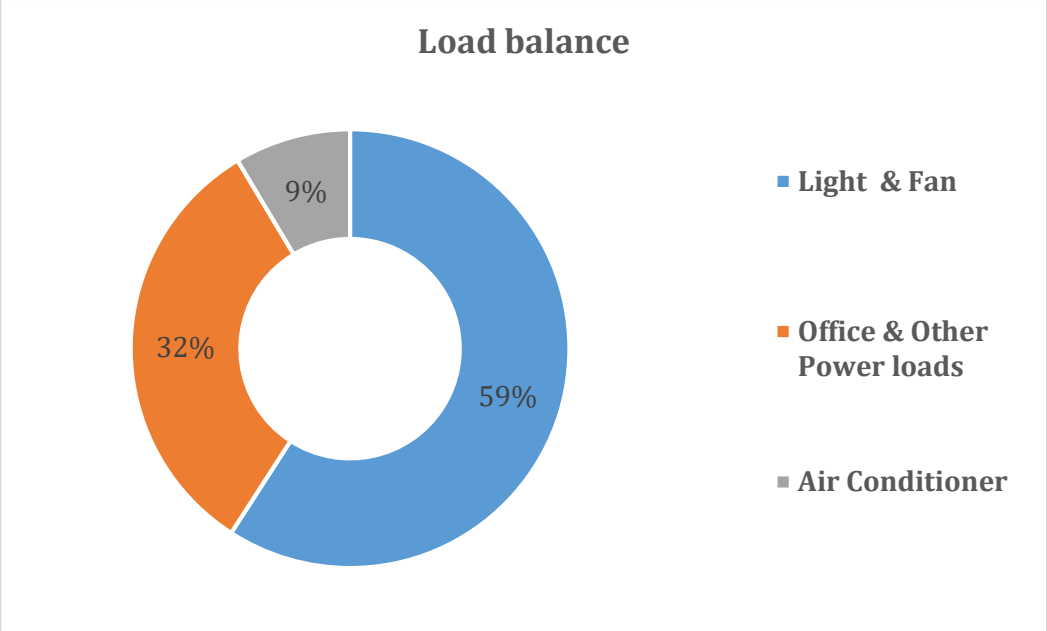


FIGURE 4: LOAD BALANCE (CONNECTED LOAD)

4. ENERGY AUDIT SUMMARY & RECOMMENDATIONS

- **Light loads:** Replace the fluorescent light fitting with LED lights for low power consumption. Detailed analysis given in the energy conservation measures section.
- **Ceiling fan loads:** Ceiling fans installed in majority of the areas in the office. By replacing, it with Brushless DC fans, which consumes in the range of 25 to 30W at full speed, instead of 60W in normal fans, will reduce the power consumption considerably. In addition, while purchasing new fans priority should give for BLDC.

5. AUDIT SUMMARY – ACTIONS

The actionable summary of the audit report given in the table below.

TABLE 4: ENERGY AUDIT SUMMARY – ACTIONS

Sl No:	Particulars	Location	Action to be taken	Remarks
1	Energy efficiency – Replacement of ceiling fans with BLDC fans	Office, faculty rooms, laboratories	Change the existing old ceiling fans with BLDC fans	Power Consumption will reduce
2	Energy efficiency – Replacement of fluorescent lights with LED lights	Office, faculty rooms, laboratories	Change the existing lights with LED lights	Power Consumption will reduce
3	Energy consumption – Optimise the fan speed for best comfort		Optimize the speed to 2 or 3 setting	Power consumption will reduce

6. ENERGY PERFORMANCE INDEX (EPI)

EPI based on the energy consumption in Apr-21 to Feb-22. The projected energy consumption after the implementation of energy saving proposals given in the table below.

TABLE 5: ENERGY PERFORMANCE INDEX

Energy Performance and climate impact		Unit	Baseline	Projection
1	Annual Electricity Consumption	kWh	16339	9797
2	Annual Electricity consumption	TOE	1.41	1.06
	Annual Carbon Foot print	Ton CO_2	12.91	7.7
7	Energy Performance Index	kWh/Sq. m/annum	1.78	1.06
8	Energy Performance Index	TOE/Sq. m	0.000154	0.000092
9	Annual Energy Cost	Rs in Lakhs	1.00	53225
12	Annual Carbon Footprint(Electricity)	Ton CO_2	12.91	7.7

Note: Unit conversions:

TOE	=	10 million kCal (BEE energy audit manual)
MWh of electricity	=	0.82 Ton of CO_2 (www.cea.gov.in)
Kg of LPG	=	10500 kCal (BEE energy audit manual)
Liters of Diesel	=	9729 kCal (BEE energy audit manual)
kWh of electricity	=	860 kCal (BEE energy audit manual)

7. ANNUAL CARBON FOOTPRINT OF APPLIANCES

The present carbon dioxide generation by appliances in the College and the projected value after the implementation of the energy conservation measures given in the figure below

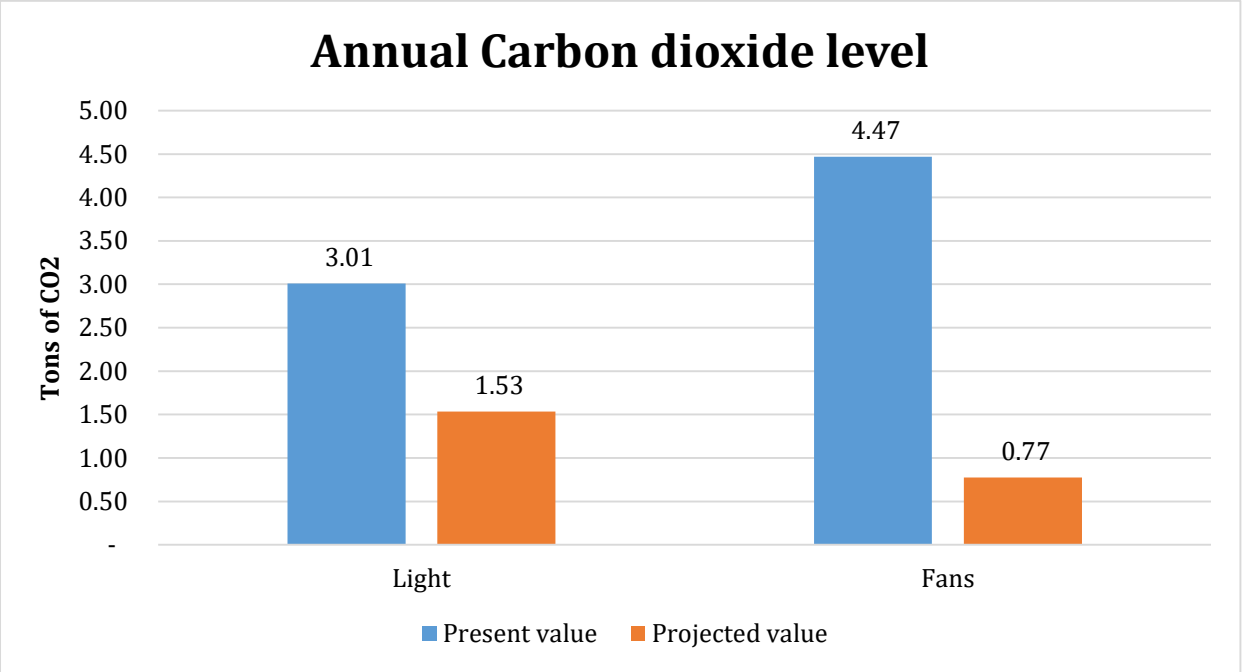


FIGURE 5: ANNUAL CO_2 EMISSION

8. ENERGY CONSERVATION MEASURES

The following table shows the energy conservation measures in the ascending rate of payback period.

TABLE 6: ENERGY SAVING PROPOSALS

No	Energy conservation measures	Annual Energy Savings	Annual Financial Savings	Investment	Simple payback period
		kWh	**Rs**	**Rs**	**Months**
1	Replacement of Fluorescent lights with LED – (T8-80 nos & T12-47 nos with 20W)	1865	13333	38100	34
2	Replacement of Ceiling fans (60W) with BLDC fans 5 star rated – 158 nos	4677	33441.4	406000	146
Total		6542	46775	444100	114

ELECTRICITY CONSUMPTION ANALYSIS

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

BASELINE DATA & CONSUMPTION: 11 MONTHS

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

TABLE 7 : BASELINE DATA

Base Line Data (Apr 2021 – Feb 2022)		
1	Electricity provider	KSEBL
2	Supply Voltage	230 V
3	Tariff	Tariff – LT-6A
4	Consumer number	1155836004590
5	Section, Circle	Perumbavoor, Ernakulam
6	Sanctioned load(kW)	43
7	Total Connected load(kW)	61.38
8	Average monthly electricity consumption (kWh)	1362
9	Average Fixed charges (Rs/month)	3300
10	Average Tariff rate for energy consumption (Rs / kWh)	7.15
11	Average monthly electricity cost (Rs)	12128

KSEB BILL DETAILS FOR LAST 11 MONTS

Name of the Consumer – Mar Thoma College for Women							
Tariff – LT-6A		Consumer No: 1155836004590					
Non -Domestic							
Connected Load							
Month	Monthly consumption (kWh)	Fixed charges (Rs)	Energy charge (Rs)	Meter rent (Rs)	Duty (Rs)	Other	Total amount to be paid (Rs)
Apr-21	1122	3300	7293.9	17.85	729.39	5	11346
May-21	621	3300	4036.5	17.85	403.65	-1531	6227
Jun-21	760	3300	4940.3	17.85	494.03	0	8752
Jul-21	1097	3300	7131.3	17.85	713.13	-8850	2312
Aug-21	977	3300	6351.25	17.70	635.13	-1	10303
Sep-21	1403	3300	9119.5	17.70	911.95	-1	13348
Oct-21	1075	3300	6987.5	17.70	698.75	53	11057
Nov-21	2360	3300	15340	17.70	1534	0	20192
Dec-21	1702	3300	11063	17.70	1106.3	7	15494
Jan-22	1616	3300	10504	17.85	1050.4	141	15013
Feb-22	2244	3300	14586	17.85	1458.6	1	19363
Total	14977	36300	97353	195.6	9735		133408
Avg	1362	3300	8850	18	885		12128

TARIFF RATES ANALYSIS

The average monthly energy and demand charges in rupees for the past year represented in Figure below.

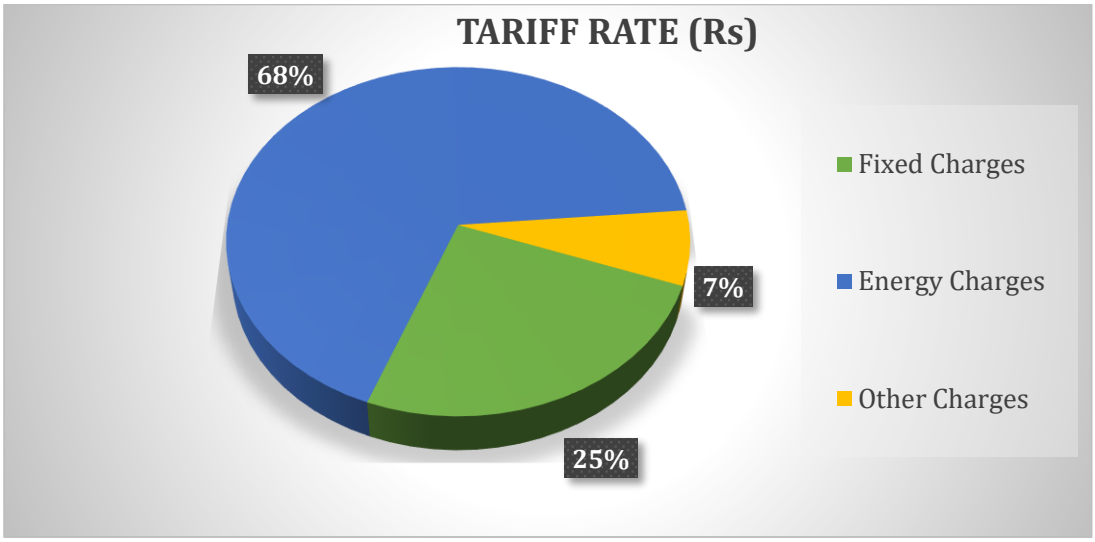


FIGURE 6: TARIFF RATE

Inference

i. Average fixed charges for the past one year were Rs 3300/ per month and energy charges was Rs 8850/ per month.

ii. The energy charges came about 68% of the total bill.

SPECIFIC ELECTRICITY CONSUMPTION (KWH/SQ.M)

Specific electricity consumption calculated based on the electricity consumption and the building area. The details of specific electricity consumption for the period from Apr-21 to Feb-22 given below. Average Specific Electricity Consumption for the period from Apr-21 to Feb-22 found to be 1.78kWh/sq.m /Year.

TABLE 8: SPECIFIC ELECTRICITY CONSUMPTION (kWh/Sq.m)

Month	Unit Consumption	Built up area	Specific Electricity Consumption
	kWh	M^2	kWh/m^2
Apr-21	1122	9200	0.12
May-21	621	9200	0.07
Jun-21	760	9200	0.08
Jul-21	1097	9200	0.12
Aug-21	977	9200	0.11
Sep-21	1403	9200	0.15
Oct-21	1075	9200	0.12
Nov-21	2360	9200	0.26
Dec-21	1702	9200	0.19
Jan-22	1616	9200	0.18
Feb-22	2244	9200	0.24
Average	**1362**		**0.15**
Sp. energy consumption per year			1.78

The energy performance index is plotted in the below chart which gives a pictorial representation of the specific electricity consumption and units consumed in various months during the period from Apr-21 to Feb-22.

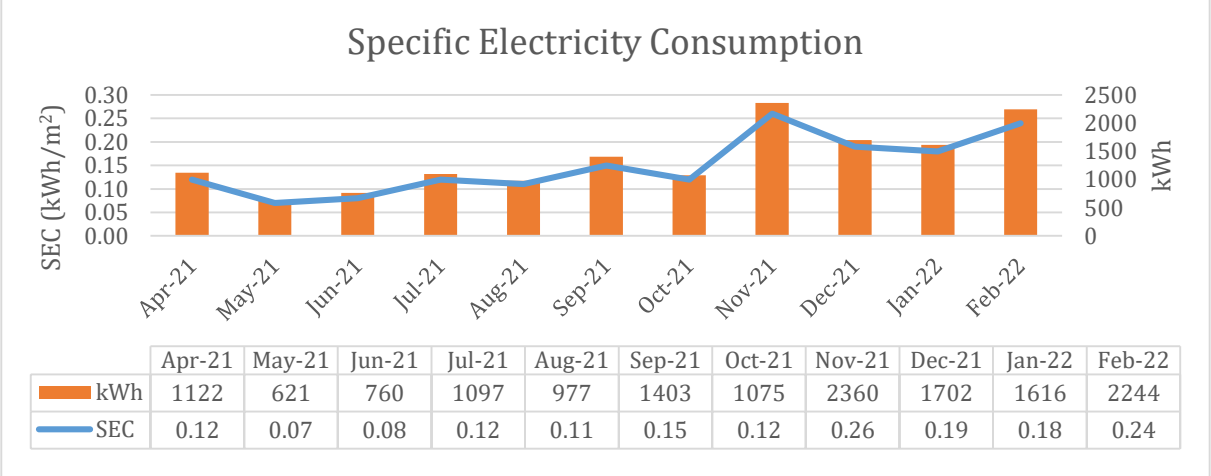


FIGURE 7: SPECIFIC ELECTRICITY CONSUMPTION

ELECTRICITY SUPPLY & DISTRIBUTION PERFORMANCE

The major source of electricity to the college is electrical connection from the KSEB. A diesel generator provided in the college, but it only used during the power failures.

I. DESCRIPTION OF ELECTRICITY BILL

Base line data given below based on the Electricity bill provided by the supplier of electricity to the College. Details obtained from the KSEBL bill for the month of April 2021 to February 2022 is as follows in the Table.

TABLE 9: KSEB BILL ANALYSIS

Particulars	Details
Consumer No	1167967002329
Section	Perumbavoor
Connected Load (kW)	55.62 kW
Tariff	LT-6A/Three
Average monthly electricity consumption (kWh/month)	**1,224**
Average Energy charges (Rs/month)	**7,034**
Average electricity cost (Rs/month)	**11,154**

Inferences

i. Average energy charges were Rs.7,034 per month

ii. The electricity connection to the building is being upgraded to HT connection

I. TARIFF RATES ANALYSIS

The average monthly energy and demand charges for the period April 2021 to Feb 2022 is represented in Fig.

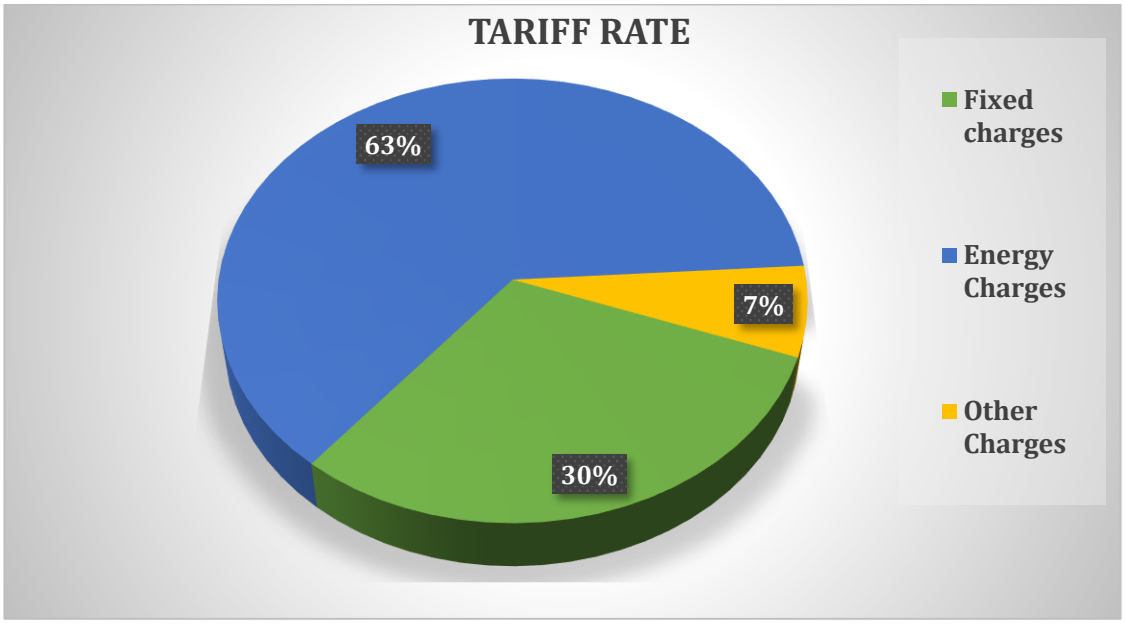


FIGURE 8: TARIFF RATE ANALYSIS

Inference

iii. Average fixed charges for the past one year were **Rs 3,386/-** per month and energy charges was **Rs 7,034/-** per month**.**

iv. The energy charges come about 63**%** of the total bill.

RENEWABLE ENERGY

The Sun is an inexhaustible, reliable and non-polluting source of power. Since the inception of life on earth, the only energy that was available came from the sun. The time is now approaching when humankind will again depend upon the sun as dominant energy source. The fossil fuels are depleting at a rapid rate. A growing worldwide concern for conservation of energy has reignited the interest in ecologically sustainable materials, processes and sources of energy. The advantages of solar power are:

- The solar energy is more evenly distributed in the world than wind or bio-mass.
- It is well proven and demonstrated technology
- It promises to be most cost effective renewable power at high volumes.
- 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.

The College has installed 4kw off grid solar system, which consists of 16panels. The solar system is The charge controller and module details given below:

TABLE 10: CHARGE CONTROLLER DETAILS

Sl. No.	Details	Particulars
1.	Make	Power scan
2.	Model	MPPT -5000W
3.	Capacity	5000w

TABLE 11: MODULE DETAILS

Sl. No.	Details	Particulars
1.	Module make	Waree
2.	Module type	Mono
3.	Rated maximum power	250W
4.	Number of modules	16
5.	Module efficiency	18

ELECTRICITY UTILITY DESCRIPTION

LIGHT & FAN

The light and fan loads connected in the college tabulated in the following section.

TABLE 12: LIGHT & FAN LOADS

Sl. No:	Particulars	Rated Power	Quantity	Total Power
		Watts	Nos	kW
1	Ceiling Fan	60	350	21.0
2	Wall Fan	60	4	0.2
3	Spot Light	36	7	0.3
4	T12	40	100	4
5	T8	36	108	3.9
6	T5	28	1	0.03
7	LED Tube Light	20	222	4.4
8	CFL	12	2	0.02
9	CFL	18	39	0.7
10	LED Bulb	20	11	0.2
11	LED Bulb	9	12	0.1
12	LED Bulb	6	106	0.6
	Total			**36.26**

Inference

- Total light and fan come about 36.26 **kW**.

Suggestions

- The fluorescent light (Tube) shares the majority of the load in the light with 38% of total light and fan loads. By replacing the fluorescent lights with LEDs, the overall electricity consumption can reduced.
- The Ceiling fan shares 55% of the total connected load of light and fan loads. By replacing existing fans with energy efficient fans BLDC fans, the net consumption would reduce considerably.
- From the graph it is clear that more than 90% of the light, fan loads from fluorescent lights and ceiling fans,

AIR CONDITIONERS

The details of the Air-Conditioner installed in the College tabulated below:

TABLE 13: AIR CONDITIONER LOAD

Location	Make	Type	Capacity (TR)	EER	Rated Power (kW)
Principal room	LG	Split	1.5	3.68	1.75
Board room	LG	Split	1.5	3.68	1.75
Board room	LG	Split	1.5	3.68	1.75
Manager room	LG	Split	1.5	3.68	1.75
Total					**5.26**

COMPUTER & ACCESSORIES

The computer accessories and other power loads of the college given below:

TABLE 14: COMPUTER ACCESSORIES & OTHER POWER LOADS

Sl. No:	Particulars	Rated Power	Quantity	Total Power
		Watts	**Nos**	**kW**
1	PC	120	44	5.28
2	Laptop	60	13	0.78
3	Projector	100	3	0.3
4	CCTV	10	17	0.17
5	Scanner	20	1	0.02
6	Printer	300	15	4.5
7	3 In 1 Printer	400	1	0.4
8	Xerox	600	6	3.6
9	Fridge(Single door)	180	1	0.18
10	Fridge(Double door)	350	2	0.7
11	Induction Cooker	1500	1	1.5
12	Motor	1119	1	1.119
13	Amplifier	150	6	0.9
14	TV	70	2	0.14
15	TV	120	2	0.24
	Total			**19.8**

Inference

- Total connected load of computer accessories and other power loads of the College is **19.8 kW**.

ANNEXURE-1

ENERGY SAVING PROPOSAL – 1

REPLACEMENT OF 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. A commutation is the technique of changing the direction of current in the motor for the rotational movement. In a BLDC motor, as there are no brushes, so the commutation done by the driving algorithm in the Electronics. The main advantage is that over a period, due to mechanical contact in a brushed motor, the commutators can undergo wear and tear; this thing eliminated in BLDC Motor making the motor more rugged for long-term use. To explain, BLDC technology in simpler terms, BLDC uses a combination of Permanent Magnets and Electronics to achieve the kind of efficiency and performance, it delivers.

Proposal

Replace the ceiling fans with BLDC in the as per preference of operating hours as office areas and in security cabin. The wholesale price for one BLDC fan is Rs 3000. The average cost per unit is Rs 7.15. The calculation for the savings given in the table below.

TABLE 15: EC PROPOSAL 1

Particulars	Unit	BLDC FAN
Power of existing ceiling fans at full speed	Watts	60
Power of BLDC fans at full speed	Watts	28
Difference in Wattage	Watts	32
Avg No: of working hours/day	Hrs	6
No: of working days per year (Average)	Nos	210
No: of working hours per annum	Hrs	1260
Number of Ceiling Fans operating	Nos	116
kWh Saving per Annum	**Rs**	4677.1
Cost per kWH (Average)	Rs	7.15
Annual Financial Savings	**Rs**	33441.4
Cost of BLDC Fans	Rs	3500
Investment for BLDC Fans	**Rs**	406000
Simple Payback period	**Months**	146

Note: BLDC fans used mainly in the areas where the continuous running is required like classrooms, Hostel, etc.

ENERGY SAVING PROPOSAL – 2

REPLACEMENT OF FLUORESCENT LIGHT FITTINGS WITH LED

Background

The present light fittings are mainly been the fluorescent light of different ratings. By replacing these light fittings with LED, the consumption of electricity will reduce considerably.

TABLE 16: EC PROPOSAL 3

Particulars	Units	T12	T8
Power of Fluorescent lights	Watts	36	40
Power of proposed LED tube	Watts	20	20
Difference in Wattage	Watts	16	20
Avg No: of working hours/day	Hrs	4	4
No: of working days per year (Average)	Nos	210	210
Number of Lights operating	Nos	80	47
kWh Saving per Annum	Rs	1075	790
Cost per kWH (Average)	Rs	7.15	7.15
Annual Financial Savings	Rs	7688	5646
Cost of LED tube	Rs	300	300
Investment for LED lights	Rs	24000	14100
Simple Payback period	Months	**37**	**30**

Summary of the proposal

Annual unit savings	**kWh**	**1865**
Total savings	**Rs**	13333
Total investment	**Rs**	38100
Payback period	**months**	34

ANNEXURE-2

LED specification

The Department of Electronics and information technology issued "Electronics and information Technology goods order 2012" on 3rd October 2012 the following standards for LED lamps are covered.

1. IS 15885 (Part -2/section 13)
2. IS 16102 (Part 1): 2012

As per this order, LED manufactures to get their product tested from BIS recognised labs.

Thus, the following electrical parameters and standards should ensure while purchasing LED in future based on the BIS standards. These are the minimum technical requirements for the acceptance of LED. In addition, the LED test certificates as per the various standards mentioned below should examined while purchasing.

TABLE 17: LED SPECIFICATION

Sl no	Parameters	Requirements	Applicable IS
1	Light source	SMD LED chip	LM 80/IS 16106
2	System Efficacy	>= 110 lumen /watt	IS 16106:2012
3	LED Driver Efficiency	Minimum 85%	
4	**Harmonics**	**Maximum 10%**	**IS 16102-2-2012**
5	**Power factor**	**Minimum 0.95**	**IS 16102-2**
6	Frequency	50 Hz ±3%	LM-79 report
7	Operating voltage	110V – 320V	LM 79 report
8	Surge voltage	>4 kV	LM 79 report
9	Ambient temp	-10 to 50 deg C	LM 79 report
10	Degree of protection	IP 66	IS 10322
11	CRI	Minimum 70	IS 16102 - 2

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
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

INSTRUMENTS USED

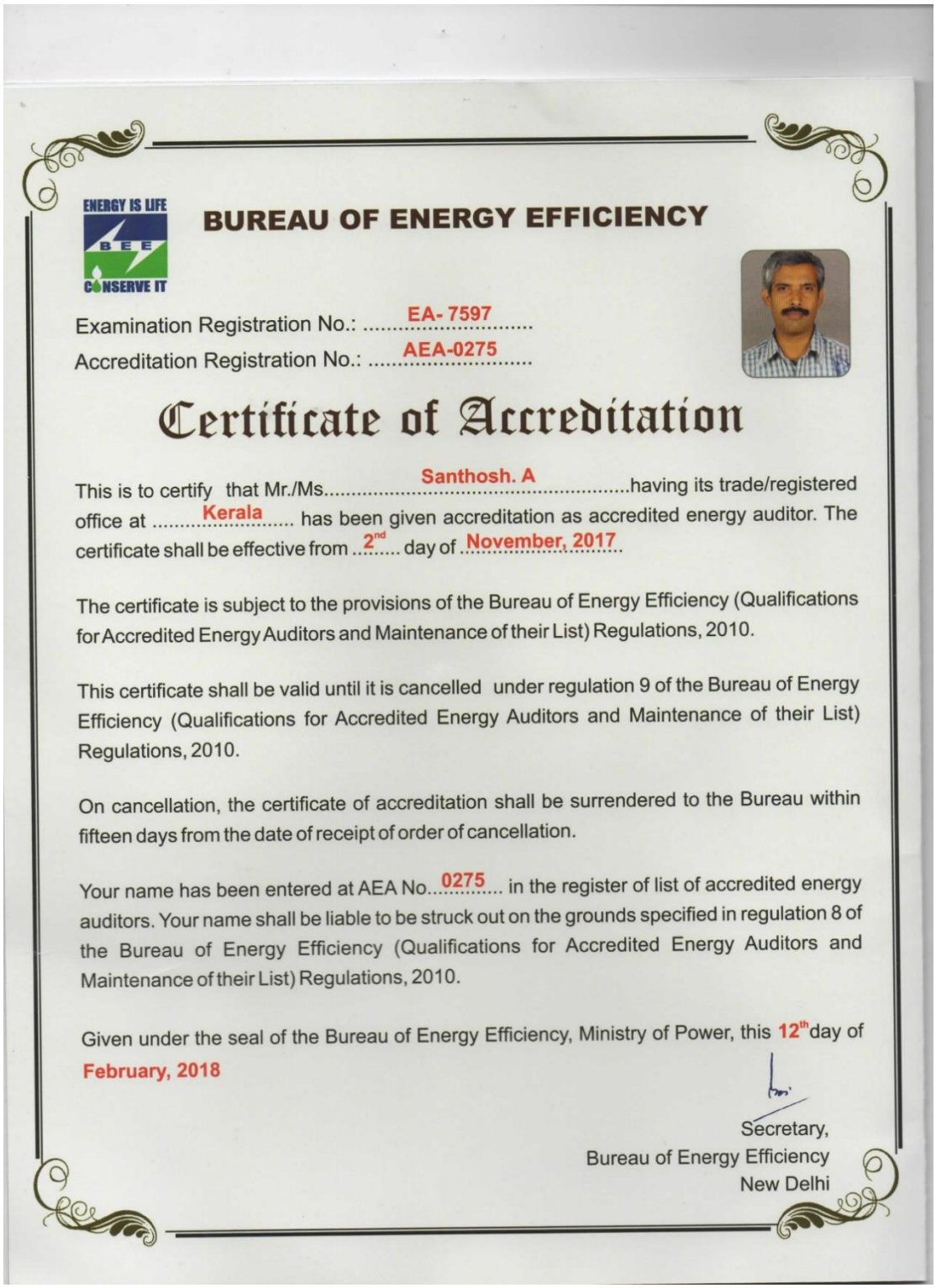
SL.NO	EQUIPMENT DESCRIPTION	MAKE & MODEL
1	Power energy & harmonic Analyser	Krykard ALM 31 Krykard ALM 35

TABLE 18: INSTRUMENTS USED

REFERENCES

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

CERTIFICATES



ENERGY IS LIFE
BEE
CONSERVE IT

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

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, Rouund North, Thrissur)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:
EMCEEA-0811F-3

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

This empanelment is valid up to 01/02/2024
Issuing Date: 02/02/2021
Place: Thiruvananthapuram

Director,
Energy Management Centre - Kerala