



Certificate Of Energy Audit

This is to certify that **The Madura College, Madurai**, has conducted a detailed **Energy Audit** of their campus for the academic year 2020 – 2021 and has submitted the necessary data and credentials for scrutiny. The activities and measures carried out by the College have been verified based on the field visit and reports submitted and were found to be **Good**. The efforts taken by the Management, faculty and students towards Energy Conservation and Energy Efficient appliances are appreciated and commendable.

LAKSHMANAKUMARAN S, B.Tech., M.Sc. (Env. Science), MBA
CQI IRCA Certified Lead Auditor ISO 14001:2015 EMS (UID: 351851)

C. JEBARAJ, B.Tech., PGDEM
EA- 9847 – BEE Certified Energy Auditor & Manager
IRCA Certified Lead Auditor - OHSMS
Internal Auditor – QMS
CH Certified Carbon footprint Professional

Alcheme Green Energy Company

Madurai Office: 6, Jawahar Nagar, 8th Street, Tirumangalam, Madurai - 625706 .

Coimbatore Office: #70, Race course Road, Gopalapuram, Coimbatore - 641018

Chennai Office: Plot #21B, 5th Cross Street, South Phase Industrial Estate, Guindy, Chennai - 600032





THE MADURA COLLEGE

Autonomous Institution
Reaccredited (3rd Cycle) with "A" Grade by NAAC
(Affiliated to Madurai Kamaraj University)
Madurai - 625 011
TAMILNADU, INDIA

ENERGY AUDIT REPORT 2020-2021



AUDIT / REPORT BY



ALCHEME GREEN ENERGY COMPANY ☎ 73977 64900
99948 45487

info@alchemegreenenergy.com

ACKNOWLEDGEMENT

We at ALCHEME GREEN ENERGY COMPANY, Madurai are thankful to the Principal for giving us the opportunity to carry out Energy audit at The Madura College, Madurai -625 011. Alcheme Green Energy Company team is also thankful to all other supporting Officers / Staffs of the above institute for their wholehearted support, hospitality and the courtesy extended to the Audit team during the course of the visit.

The following officers from Alcheme Green Energy Company under the guidance of Mr. C. Jebaraj, B.Tech., have carried out the Energy Audit.

Name	Qualifications	Certification Number
Mr. C. Jebaraj	B.Tech., PDGEM., DIS., BEE Certificated Energy Auditor, IRCA Certified Lead Auditor - OHSMS Internal Auditor-QMS CII Certified Carbon footprint Professional	EA-9847
Mr. S. Lakshmana Kumaran	B.Tech., MSc.,(Env. Science), MBA., IRCA Certified Lead Auditor ISO 14001 EMS	UID - 351851

The following staff from the Institution participated in the audit process

Name	Designation
Dr. J. Suresh	Principal
Mr. S. Sivaramakrishnan	Dean (Academics)
Dr. I. Sahul Hamid	Dean (Planning and Development)
Dr. S. Karuppusamy	Assistant Professor of Botany
Mr. P. Kumar	Electrical Supervisor

Energy Audit - Methodology

Energy audit consists of survey, analysis and inspection of the energy flow in the system. Its aim is to find the scope of energy conservation by implementing energy saving procedures without affecting the outputs of the system. Energy audit plays a significant role in finding opportunities to save energy and reduce electricity bills / carbon emissions. Energy audit recommends ways to implement renewable energy systems & energy efficiency enhancement technologies thereby reducing the overall carbon footprint and to achieve carbon “net zero” emissions.

Step 1: Pre-audit data collection

The main purpose of this step is to evaluate the characteristics of the energy systems and the energy use. Some of the tasks that can be performed in this step are presented below, with the key goals expected from each task:

- Identify the energy consumption
- Determine the consumption patterns of energy
- Understand utility rate structure (energy and demand)

Step 2: Walk-Through Survey

In this step we should identify potential for energy savings measures. The results of this step are important since they determine if it requires any further energy auditing work. Some of the tasks involved in this step are

- Identify the customer’s concerns and needs
- Check the current operating and maintenance procedures
- Determine the existing operating conditions of major energy use equipment
- Estimate the occupancy, equipment, and lighting (energy use density and hours of operation)

Step 3: Baseline for Building Energy Use

The main purpose of this step is to develop a base model that represents the existing energy use and operating conditions. This will be used as a reference to estimate the energy savings due to appropriately selected energy conservation measures. The major tasks to be performed during this step are

- Inspect, test, and evaluate equipment for efficiency, performance, and reliability
- Obtain all energy consuming equipment (including lighting, fans, HVAC systems, motors, pumps etc.,)

Step 4: Evaluation of Energy-Saving Measures

In this step, a list of cost-effective energy conservation measures is determined using both energy savings and economic analysis. To achieve this goal, the following tasks are recommended:

Prepare a comprehensive list of energy conservation measures (using the information collected in the walk-through survey)

Evaluate the cost-effectiveness of each energy conservation measure using an economic analysis method (simple payback or life-cycle cost analysis) The outcome of this audit can recommend for a detail audit with clear evidence and easily implementable suggestions/solutions can be given to reduce energy consumption.

Energy audit consists of:

- Scout energy consumption in the organization
- Find the scope for saving
- Identify the most likely areas for attention
- Identify areas of improvements/ savings
- Set a 'reference point



Summary of Audit

Energy audit of The Madura College was carried on 25.02.2022 by Alcheme Green Energy Company. The Audit team has gone through the data related to TNEB GRID Electrical Energy, Diesel and LPG consumption. A study was also carried out on Energy Conservation measures to reduce energy consumption.

During the visit it was observed that The Madura College strictly follows reduce, reuse and recycle policy to limit energy usage. The concept of energy conservation is disseminated among the students and staffs through various seminars/workshops and training programs.

We hope that the results presented in the energy auditing report will serve as a guide for the institution on the existing energy related practices and resource usage.

The audit outputs and recommendations are summarised as follows

- Electrical Energy consumption from TNEB during the year 2020-2021 –1,11,993 units.
- Electrical Energy consumption from Diesel Generator – 1,800 units.
- Total Electrical Energy consumption from EB and DG –1,13,793 units.
- LPG consumption -1,425 Kgs
- Lot of Energy conservation initiatives are taken.
- Solar Power plant shall be planned to reduce electrical energy consumption from TNEB Grid.

ENERGY SAVING POTENTIALS

1. Conventional tube lights shall be replaced with LED tube lights

Replacement cost for 100 LED tube lights-Rs 180x100= RS 18,000

Payback period-16 months

Cost savings for 100 LED tube lights-Rs 13,300 / year

Energy savings for 100 LED tube lights-2,200 units/ year

2. Conventional fans shall be replaced with energy efficient fans

Replacement cost for 100 Nos. ENERGY EFFICIENT FAN-Rs 2,800x100= RS 2,80,000

Cost savings for 100 Nos. ENERGY EFFICIENT FAN -Rs 30,800 / year

Energy savings for 100 Nos. ENERGY EFFICIENT FAN -5,100 units/ year

Payback period 107 months

- Remaining Conventional Tube lights shall be replaced with LED tube lights in a phased manner
- 5 Star rated Energy efficient electrical equipments shall be procured in future

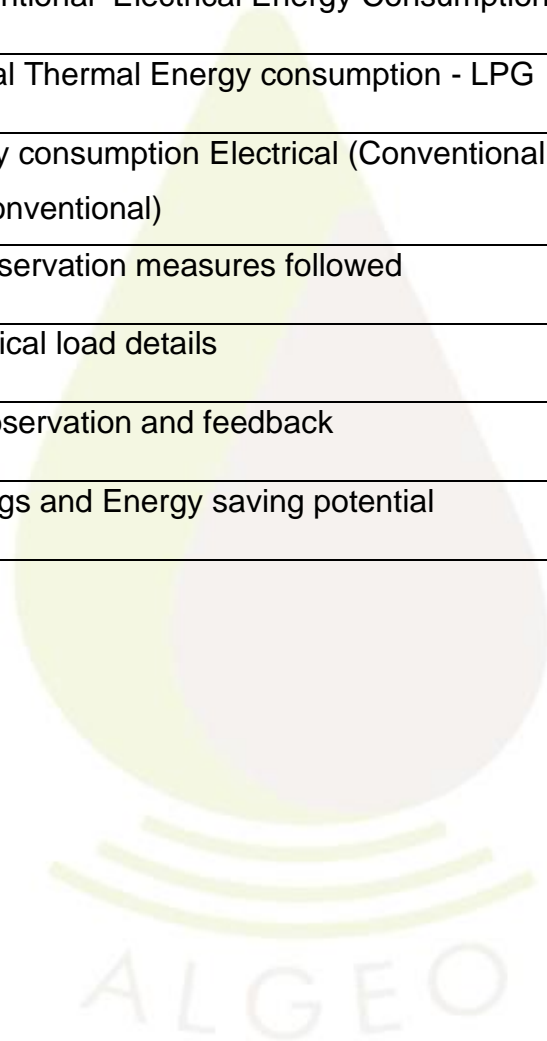
We are happy to submit this detailed energy audit report to The Madura College



**Alchemer Green Energy Company
Madurai**



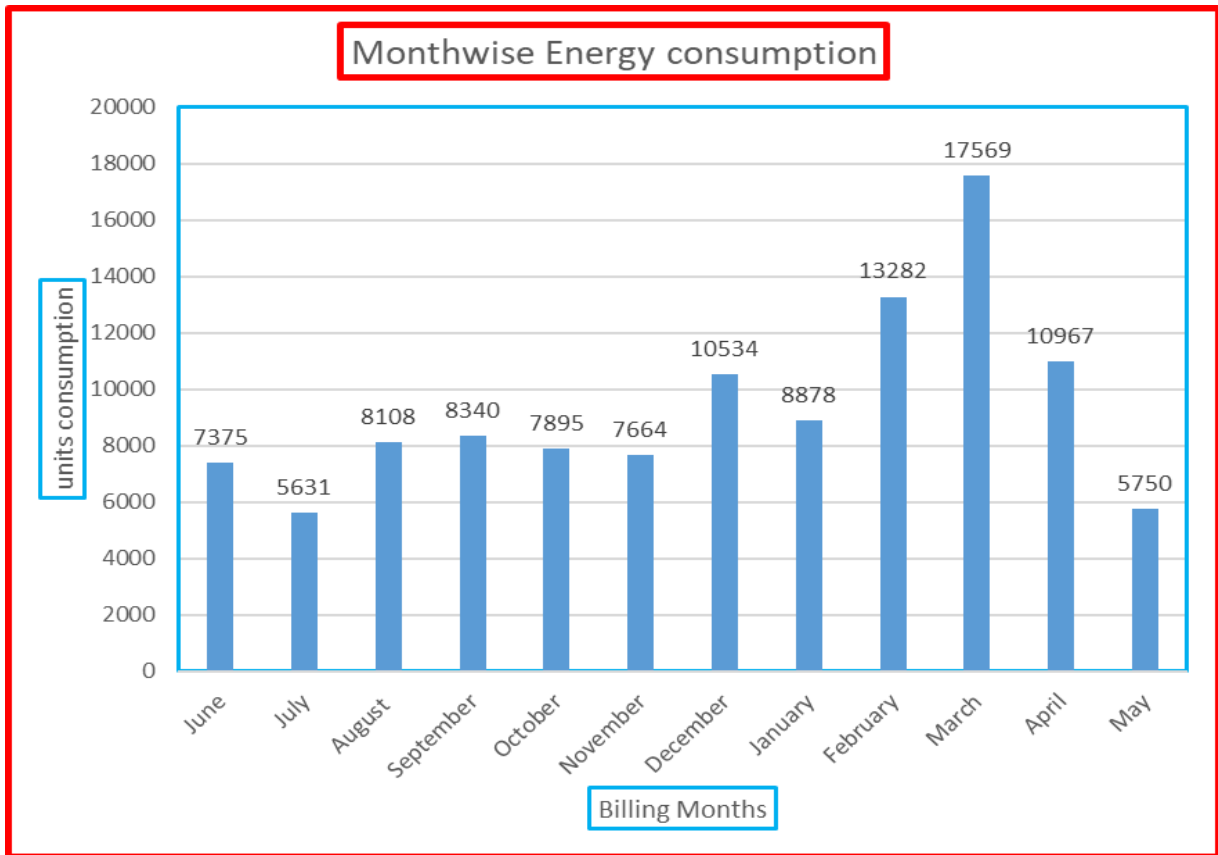
Sl. No.	Content	Page No.
	Summary of Energy Audit	5
1	College TNEB LT Service connection Tarif , Connected Load, Energy Cost and consumption details	8
2	DG set Electrical Energy consumption	9
3	Total Conventional Electrical Energy Consumption	10
4	Conventional Thermal Energy consumption - LPG	11
5	Total Energy consumption Electrical (Conventional) and Thermal (Conventional)	11
6	Energy Conservation measures followed	12
7	Major Electrical load details	13
8	Common observation and feedback	14
9	Audit Findings and Energy saving potential	15



1. TNEB LT Service connection Tariff, Connected Load and Energy Cost and consumption details

TNEB LT SERVICE CONNECTION DETAILS	
Service Number	05 021 001 618
Maximum Demand Permitted	112 KW
Tariff	LM 2B1
Energy Cost	Rs 5.75/ unit
Fixed Cost	Rs 120/KW for every two months

1.Service No 05 021 001 618 112 KW 3 Phase Tariff LM2B1					
Sl. No.	Assessment Date	Months	Units Consumed	Bill Amount -Rs	Unit cost-Rs
1	27.06.2020	June	7375	51185	6.94
2	27.07.2020	July	5631	40616	7.21
3	27.08.2020	August	8108	55636	6.86
4	27.09.2020	September	8340	57010	6.84
5	27.07.2020	October	7895	54511	6.90
6	27.11.2020	November	7664	53114	6.93
7	28.12.2020	December	10534	70513	6.69
8	28.01.2021	January	8878	60509	6.82
9	27.02.2021	February	13282	87174	6.56
10	29.03.2021	March	17569	132542	7.54
11	28.04.2021	April	10967	73207	6.68
12	27.05.2021	May	5750	41531	7.22
	Total		111993	777548	6.94



2.DG set Electrical Energy consumption

No of DG set- One

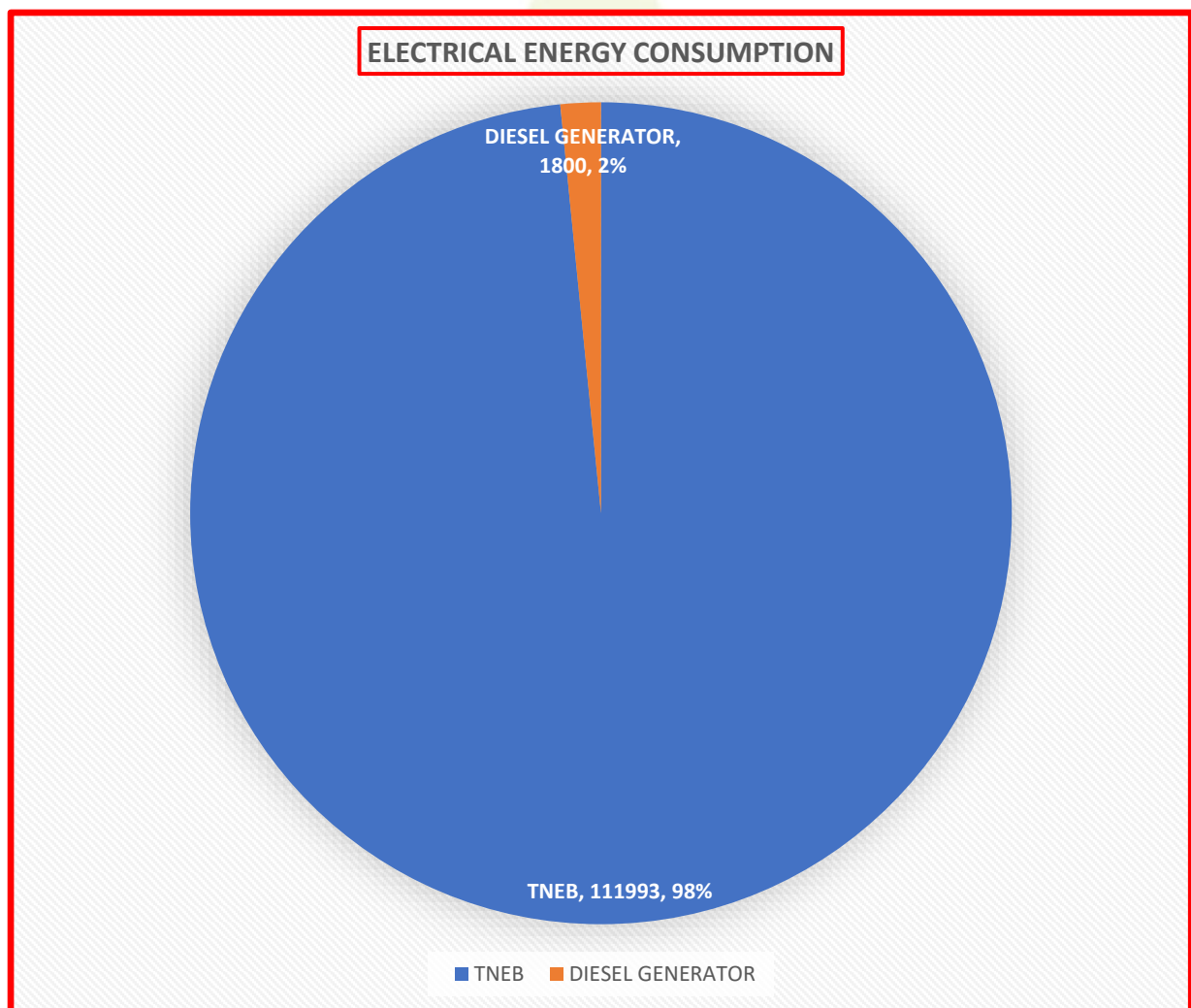
Capacity-125 KVA

Electrical Energy Consumption from DG sets- 1,800 units



3.Total Conventional Electrical Energy Consumption details

Sl. NO	Source	Consumption in Units	Percentage
1	TNEB	1,11,993	98.4
2	DG	1,800	1.6
	Total	1,13,793	100



4. Conventional Thermal Energy consumption - LPG

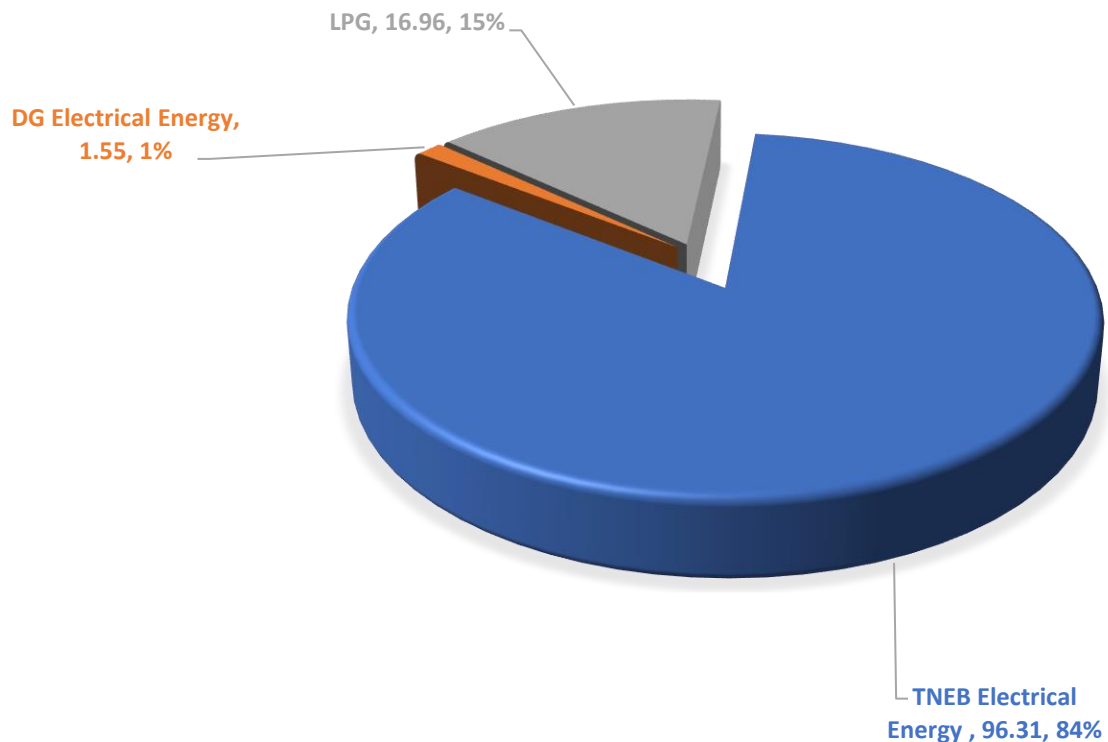
- LPG cylinders used- commercial
LPG cylinders consumed in the college during the year 2020-2021-4
LPG cylinders consumed in the canteen during the year-2020-2021-71
- Total LPG consumption during the year 2020-2021- 1,425 Kgs

5. Total Energy consumption

Electrical (Conventional & Renewable) and Thermal(Conventional & Renewable)

SL.NO	TYPE OF ENERGY	ENERGY -GCAL	Percentage
1	TNEB Electrical Energy	96.31	83.88
2	DG Electrical Energy	1.55	1.35
3	LPG- Thermal	16.96	14.77
	Total	114.8	100

TOTAL ENERGY CONSUMPTION PATTERN



6.The energy conservation measures followed

- Regular monitoring of air conditioners is done in order to maintain a temperature of 24°C in all the places that they are installed in
- Replacing conventional electrical light fittings with energy efficient Light-Emitting Diode (LED) bulbs is going on as continuous process.
- Switching off the fans and tube lights in the classroom and faculty rooms are done after the working hours
- Staff and Students are made aware of using public transport and individual vehicle usage is reduced to the maximum.
- Periodical maintenance and overhauling of generators is being carried out.
- Periodical maintenance of UPS and Battery systems are carried out.
- The air-conditioners and other electronic and electrical equipments are switched off when not in use.
- Computers are switched to sleep mode or hibernate mode automatically when not in use.
- At the end of every practical session, Computer monitors and UPS are switched off.
- Soft copies are maintained instead of hard copies, to reduce power consumption and paper.
- Work supervisor and electrician regularly check the usage of lights, fans and all other energy sources during and out of the college hours.

7.Major Electrical loads

S.I.No	Equipments	Numbers	Load in KW
1	Fans	904	54.240
2	Tube Lights	2247	80.892
3	Computers	311	77.750
4	ACs	50	
5	Refrigerators		8.800
6	Street Lights		5.050
7	Pumps		32.625
8	Online Ups KVA	71	
9	Generator KVA	125	
10	Batteries 150AH	30	
11	Batteries 65AH	104	

LED Lighting loads

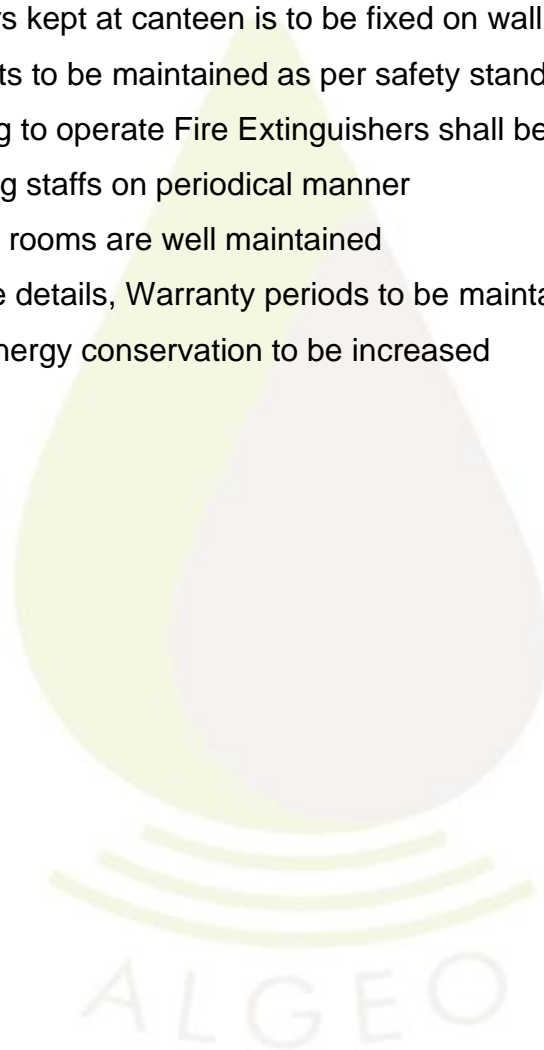
S.I.No	LED Bulbs/Tube -watts	Numbers	Total watts
1	15	69	1035
2	22	69	1518
3	25	5	125
4	30	10	300
5	50	42	2100
6	80	13	1040
7	100	3	300
8	200	1	200
9	300	33	9900
Total		345	16518

Lighting Load

- LED lighting load- 16.518 KW
- Conventional Tube light Load- 80.892 KW
- Total Lighting Load- 97.41 KW
- LED lighting load on total Lighting load -16.95%

8.COMMON OBSERVATION AND FEEDBACK

1. Three numbers lightning arrestor was provided at the highest point of the college campus.
2. Vegetation around Earth pits to be removed periodically.
3. Earth pits maintenance to be carried out periodically
4. Service of Fire Extinguishers are carried out as per schedule
5. Fire Extinguishers kept on college walls are easily accessible and operable
6. Fire Extinguishers kept at canteen is to be fixed on wall for easy access
7. Fire stand buckets to be maintained as per safety standards
8. Hands on training to operate Fire Extinguishers shall be given to all teaching and non- teaching staffs on periodical manner
9. UPS and Battery rooms are well maintained
10. Battery Purchase details, Warranty periods to be maintained
11. Sign board for Energy conservation to be increased



9.AUDIT FINDINGS & ENERGY SAVING POTENTIAL

Findings

- Electrical Energy consumption from TNEB during the year 2020-2021 – 1,11,993 units.
- Electrical Energy consumption from Diesel Generator –1,800 units.
- Total Electrical Energy consumption from EB and DG–1,13,793 units.
- LPG consumption -1,425 Kgs
- Lot of Energy conservation initiatives are taken.
- Solar Power Plant shall be planned in future
- Conduct more awareness programs on importance of energy saving for students and staff
- Remaining Conventional Tube lights shall be replaced with LED tube lights in a phased manner
- 5 Star rated Energy efficient electrical equipments shall be procured in future
- In total Lighting loads, 16.95 % lighting loads are converted into LED lighting system. Remaining Conventional Tube lights shall be replaced with LED tube lights in a phased manner

Energy saving potentials

1. Conventional tube lights shall be replaced with LED tube lights

Conventional tube light (with electronic choke) energy consumption-40 watts/hr

LED Tube lights energy consumption-20 watts/ hr

Savings per tube light -20 watts/hr

No of hours usage per day – 6 hrs

No of college working days -180 days

Energy savings per tube light per year -180 x6x20= 21,600wh=22 units

Average energy cost- Rs 6.04 /unit

Cost saving per year per tube light-21.6 x 6.04 = Rs 133

Cost savings per month-Rs 11

Approximate Cost of LED tube light -Rs 180

Payback period-16 months

Replacement cost for 100 LED tube lights-Rs 180x100= RS 18,000

Cost savings for 100 LED tube lights-Rs 13,300 / year

Energy savings for 100 LED tube lights-2,200 units/ year

Payback period-16 months

2. Conventional fans shall be replaced with energy efficient fans

Conventional FAN energy consumption-75 watts/hr

ENERGY efficient BLDC fan energy consumption-28 watts/ hr

Savings per fan -47 watts/hr

No of hours usage per day– 6 hrs

No of college working days -180 days

Energy savings per fan per year -180x6x47= 50,760 Wh=51 units

Average energy cost- Rs 6.04 /unit

Cost saving per year per FAN=51 units x 6.04 = Rs 308

Cost saving per month-Rs 26

Cost of ENERGY EFFICIENT BLDC FAN -Rs 2800

Payback period 107 months

Replacement cost for 100 Nos. ENERGY EFFICIENT FAN-Rs 2,800x100= RS 2,80,000

Cost savings for 100 Nos. ENERGY EFFICIENT FAN -Rs 30,800/ year

Energy savings for 100 Nos. ENERGY EFFICIENT FAN -5,100 units/ year

Payback period 107 months