



PERIYAR ARTS COLLEGE

Devanampattinam, Cuddalore - 607001



An Educational Institution run by the Government of Tamil Nadu
Affiliated to Annamalai University. Re-Accredited by NAAC with 'B' Grade

ENERGY AUDIT REPORT 2022-2023



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AUDIT / REPORT BY



ALCHEME GREEN ENERGY COMPANY

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ACKNOWLEDGEMENT

We at ALCHEME GREEN ENERGY COMPANY, Madurai are thankful to the principal for giving us the opportunity to carry out Energy audit at Periyar Arts College Devanampattinam, Cuddalore-607001. 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

Sl. No.	Name	Designation
1	Dr. R. Rajendiran	Principal
2	Dr. K. Geetha	HOD of Computer Science, IQAC Coordinator
3	Mrs. Ramakrishnan Santhi	Associate Professor & HOD of Economics
4	Dr. K. Nirmal Kumar	Associate Professor & HOD of Botany, Green Club Coordinator
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6	Dr. M. Paul Arokiadass Jerald	Associate Professor of Computer Science
7	Dr. N. Sethuraman	Associate Professor of History, Disaster Management System Coordinator
8	Dr. Michael Antony Prabhu Arachi	Assistant Professor of Zoology, GCC Coordinator
9	Dr. K. Aruldoss	Associate Professor of Zoology, NSS Co- Ordinator
10	Dr. S. Mithra	Associate Professor of Chemistry, NSS Coordinator
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12	Dr. Krishnamurthi	Associate Professor of Commerce, NSS Coordinator
13	Dr. R. Manogarane	Assistant Professor of Tamil, Associate NCC Officer, Division 6 Periyar Arts College.
14	Dr. K. Umadevi	Guest Faculty, Social Work Department
15	Mrs. G. Malathy	Office Superintendent

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

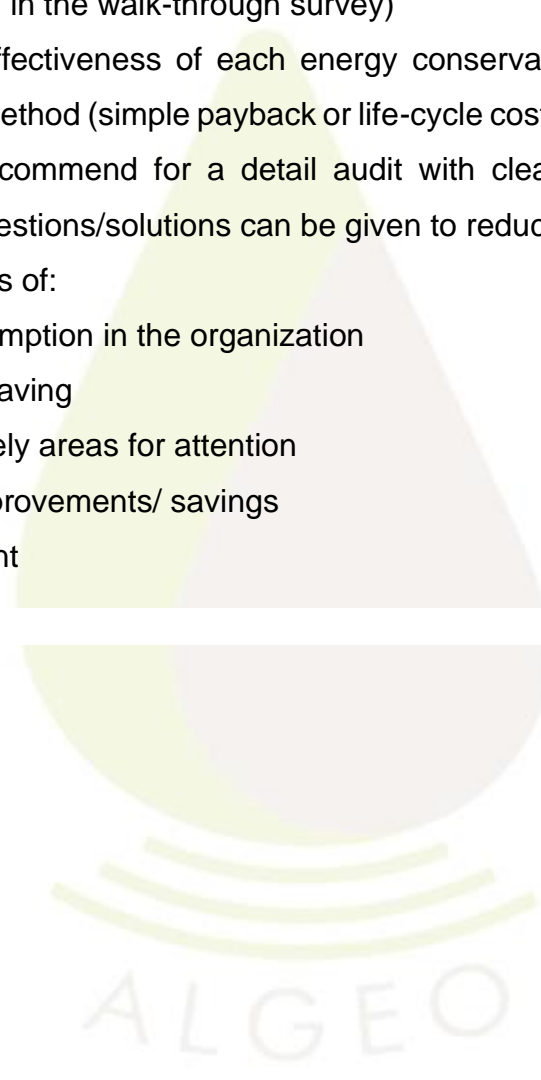
In this step, a list of cost-effective energy conservation measures is determined using both energy savings and economic analysis. To achieve this goal, the following tasks are recommended:

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 at Periyar Arts College Devanampattinam, Cuddalore was carried 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 Periyar Arts College Devanampattinam, Cuddalore 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 GRID during the year 2022-2023 –66,451 units.

Diesel consumption for Diesel Generator-30 litres

Electrical Energy consumption from Diesel Generator – 90 units.

Total Electrical Energy consumption – 66,541 units.

LPG consumption – 323 Kgs

BEE Star rated appliances are being used.

Energy conservation initiatives are taken.

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

Cost savings for 100 LED tube lights-Rs 15,600 / year

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

Payback period-11.5 months

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 36,000 / year

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

Payback period 78 months

- Remaining Conventional Tube lights shall be replaced with LED tube lights in a phased manner
- 5 Star rated Energy efficient electrical equipment's shall be procured in future
- Automatic power switch off systems may be introduced in the required areas

We are happy to submit this detailed energy audit report to the Periyar Arts College Devanampattinam, Cuddalore.



**Alcheme Green Energy Company
Madurai**



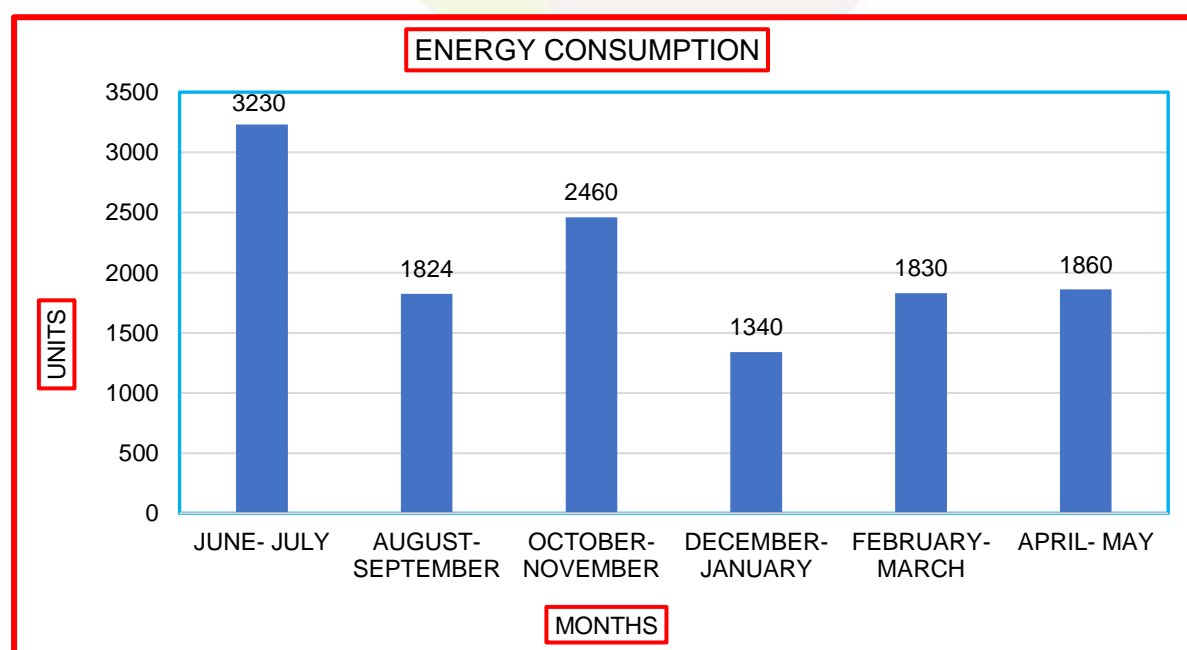
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1. TNEB Service connection Number, Tariff and Load details

Sl. No	Service Number	Phase	Tariff	Sanctioned load - KW
1	02 003 011 145	Three	LM 2B1	57
2	02 003 011 146	Three	LM 2B1	36
	Total			93

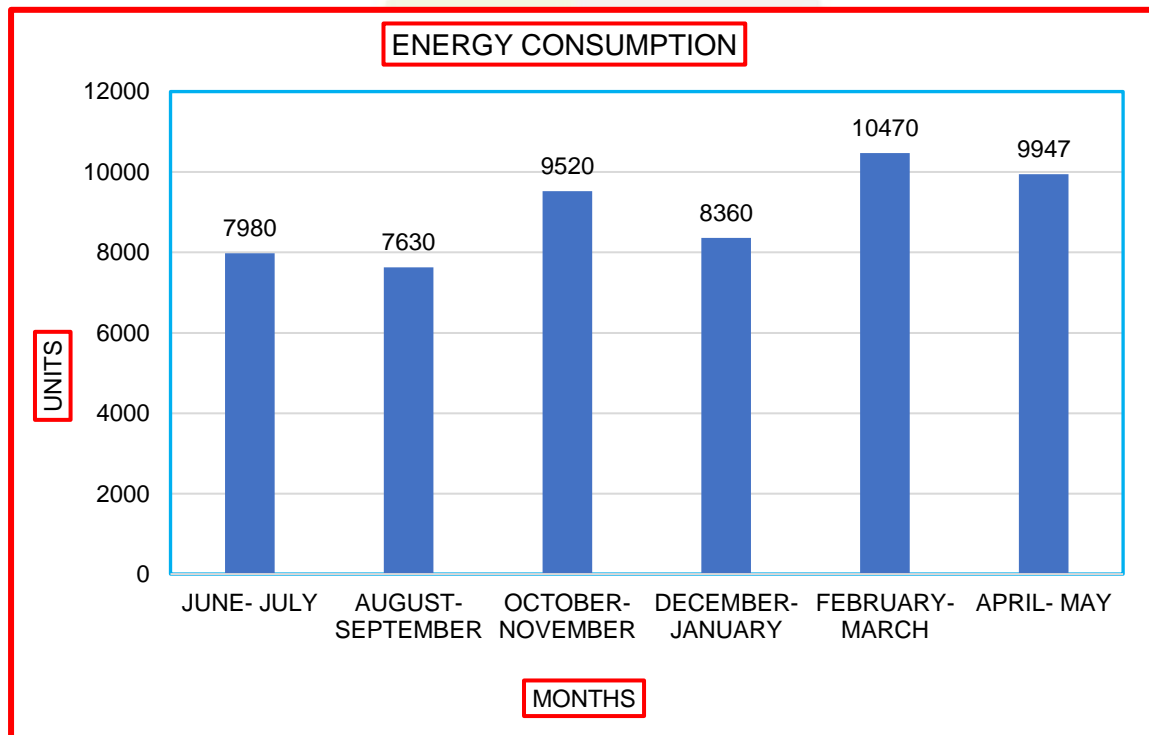
2. Electrical Energy consumption in Service Number 02 003 011 145

Sl. No.	Assessment Date	Months	Units Consumed	Bill Amount - Rs	Unit cost- Rs
1	26-07-2022	JUNE- JULY	3,230	21,130	6.54
2	29-09-2022	AUGUST- SEPTEMBER	1,824	15,448	8.47
3	25-11-2022	OCTOBER- NOVEMBER	2,460	24,660	10.02
4	28-01-2023	DECEMBER- JANUARY	1,340	16,275	12.15
5	29-03-2023	FEBRUARY- MARCH	1,830	20,277	11.08
6	27-05-2023	APRIL- MAY	1,860	43,263	23.26
	Total		12,544	1,41,053	



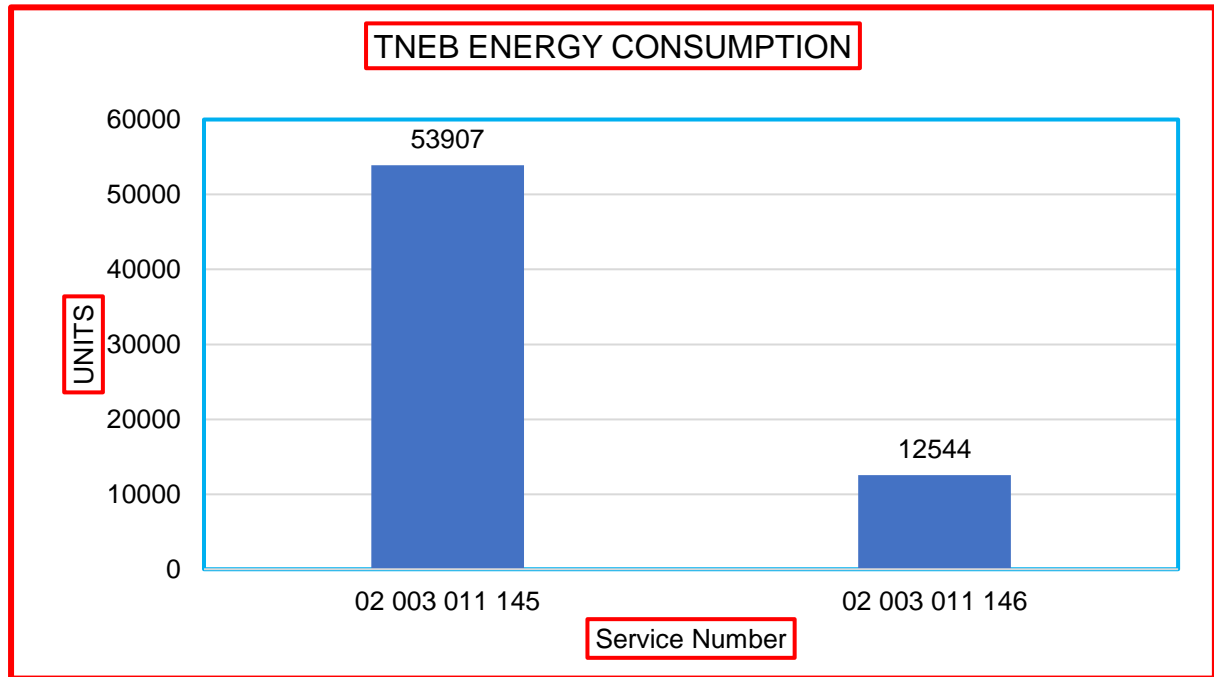
3.Electrical Energy consumption in Service Number 02 003 011 146

Sl. No.	Assessment Date	Months	Units Consumed	Bill Amount -Rs	Unit cost-Rs
1	26-07-2022	JUNE- JULY	7,980	49,365	6.19
2	29-09-2022	AUGUST- SEPTEMBER	7,630	54,638	7.16
3	25-11-2022	OCTOBER- NOVEMBER	9,520	91,772	9.64
4	28-01-2023	DECEMBER- JANUARY	8,360	76,024	9.09
5	29-03-2023	FEBRUARY- MARCH	10,470	97,498	9.31
6	27-05-2023	APRIL- MAY	9,947	89,355	8.98
	Total		53,907	4,58,652	



4.TNEB Electrical Energy consumption

SI. No	Service Number	Tariff	Units Consumed
1	02 003 011 145	LM 2B1	12,544
2	02 003 011 146	LM 2B1	53,907
	Total		66,451

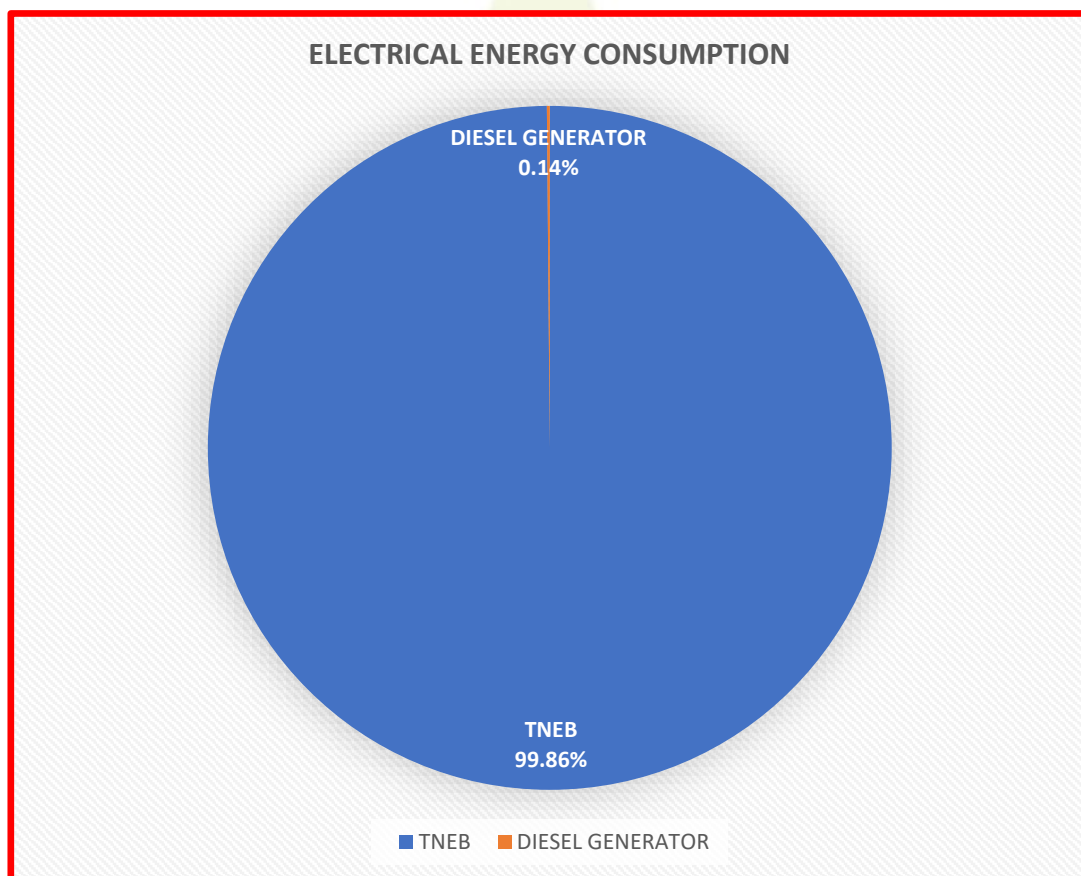


5.Diesel Generator - Electrical Energy consumption

- Total Diesel consumption during the year 2022-2023 -30 litres
- Power generation -90 units

6.Total Conventional Electrical Energy Consumption

Sl. No	Source	Units Consumed	Percentage
1	TNEB	66,451	99.86
2	Diesel Generator	90	0.14
	Total	66,541	100.00



7. Conventional Thermal Energy consumption – LPG



LPG gas is used in the canteen for cooking and used in the college lab for heating

LPG cylinders used in the Canteen -commercial cylinders of 19 kgs capacity -10 Nos

LPG cylinders used in the College laboratories - cylinders of 19 kgs capacity – 7 Nos

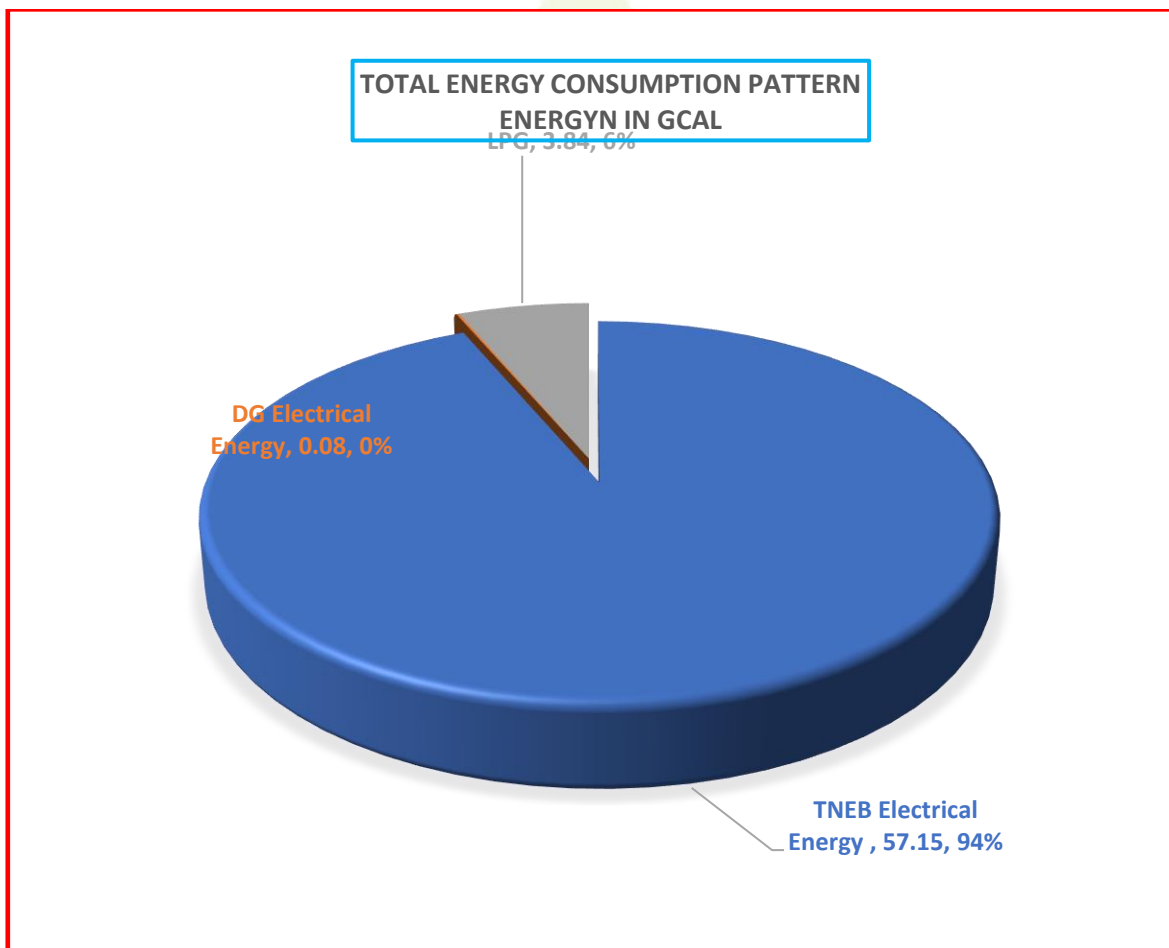
- LPG consumption in the college canteen-190 Kgs
- LPG consumption in the college laboratories-133 Kgs

Total LPG consumption during the year 2022-2023 - 323KGs

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8.Total Energy consumption

SI. No	TYPE OF ENERGY	ENERGY -GCAL	Percentage
	TNEB Electrical Energy	57.15	93.58
	DG Electrical Energy	0.08	0.13
	LPG	3.84	6.29
	Total	61.1	100



9.The energy conservation measures followed

- Maximum utilisation of day lights at the college class room
- Staff and Students are made aware of using public transport and individual vehicle usage is reduced to the minimum level
- Periodical maintenance and overhauling of generators are being carried out
- The fans, lights, air-conditioners and other electronic and electrical equipment's are switched off when not in use.
- Replacing conventional electrical light fittings with energy efficient Light-Emitting Diode (LED) bulbs.
- Replacing old high energy consuming appliances with star rated energy efficient appliances.
- 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.
- Lights and fans are switched off by the students whenever they are out of rooms

10.Major Electrical load details

S.N.	Description	Quantity
1.	Conventional Tube Light	200
2.	LED Tube Lights- 20Watts	300
3.	Street Lights -50Watts	20
4.	Ceiling Fan	300
5.	Exhaust Fan	2
6.	Voltage stabilizer	16
7.	Air conditioner (1.5 ton)	10
8.	Computers	200
9.	Auto power factor control panel	1
10.	Hot Air Oven	2
11.	5KVA online ups	1
12.	10KVA Online UPS	2
14.	Water Treatment Plant 1000 Litter Capacity	2
15.	Water Purifier	1
16.	Pump Motor 5HP	8
17.	Refrigerator 190 litre-300 w	6
18.	BOD Incubator	1
19.	Laminar Flow equipment	1

Lighting Load

- Conventional Lighting Load- 8000 watts
- LED lighting load- 7000 watts
- Total Lighting load- 15000 watts
- LED lighting load on total lighting load -46.6%
- Total Connected Load- 50 KW
- Lighting load on total load -30 %
- LED lighting load on total load-14%

11.COMMON OBSERVATION AND FEEDBACK

1. In coming voltage is less in all the three phases (370-380v). To be raised to 410 V in coordination with TNEB



2. Dry Vegetation around Main power supply room to be removed to avoid fire hazard



PQRM+X43, Devanampattinam, Cuddalore, Tamil Nadu 607001, India

Devanampattinam

Tamil Nadu

India

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33°C

91°F

3. Earth pits to be maintained properly. Vegetation around the pits to be removed



4. Proper earthing and cable dressing to be done for borewell pump



5. Fire Extinguishers to be serviced on periodically as per safety norms



6. Fire sand buckets to be filled with dry sand
7. Hands on training to operate Fire Extinguishers shall be given to all teaching and non- teaching staffs on periodical manner
8. Lightning system is not available. To be provided at the top most point of the building
9. Energy conservation awareness program /workshop for staffs and students shall be conducted on continuous basis
10. More numbers of energy conservation awareness display shall be provided
11. History card to be maintained for UPS and batteries.
12. Battery Purchase details, Warranty periods to be maintained.
13. Unwanted materials not to be kept in the Batteries storage area



14. Five star rated energy efficient appliances to be procured in the future
15. Air conditioners to be serviced on regular basis



16. Electrical safety to be improved



17. RO unit -Structure support to be strengthened. Motor fan cover to be fixed



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12. AUDIT FINDINGS & ENERGY SAVING POTENTIAL

Findings

- Annual electricity consumption from TNEB during the year 2022-2023 is 66,451 units
- Electrical Energy consumption from Diesel Engine Generator -90 units.
- Total Electrical Energy consumption – 66,541 units.
- LPG consumption – 323 Kgs
- Renewable energy utilisation shall be planned in the coming years.
- 5 Star rated Energy efficient electrical equipments shall be procured in future
- Conventional Tube lights are 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= 21,600 WH=22 units

Average energy cost- Rs 8.55/unit (including tax)

Cost saving per year per tube light-22 x 8.55 = Rs 188

Cost savings per month-Rs 15.6

Approximate Cost of LED tube light -Rs 180

Payback period-11.5 months

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

Cost savings for 100 LED tube lights-Rs 15,600/ year

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

Payback period-11.5 months

2. Conventional fans shall be replaced with energy efficient fans

Conventional FAN energy consumption-75 watts/hr

ENERGY efficient fan energy consumption-28 watts/ hr

Savings per fan -47 watts/hr

No of hours usage per day – 6hrs

No of college working days -180 days

Energy savings per fan per year - $180 \times 6 \times 47 = 50,760 \text{WH} = 51$ units

Average energy cost- Rs 8.55 /unit (including tax)

Cost saving per year per FAN= 51 units x Rs 8.55= Rs 436

Cost saving per month-Rs 36

Cost of ENERGY EFFICIENT FAN -Rs 2800

Payback period 78 months

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

Cost savings for 100 Nos. ENERGY EFFICIENT FAN -Rs 36,000 / year

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

Payback period 78 months

