



NALLAMUTHU GOUNDER MAHALINGAM COLLEGE

(Autonomous Institutions -Affiliated to Bharathiar University)

ISO 9001:2015 Certified and Re-Accredited with "B" Grade by NAAC

POLLACHI – 642 001



ENERGY AUDIT REPORT - 2022-2023

AUDIT / REPORT BY



ALCHEME GREEN ENERGY COMPANY ☎ 73977 64900
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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 Nallamuthu Gounder Mahalingam College, Pollachi -642 001. 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 | Qualification | Designation |
|--------------------------|--|--|
| Dr.R.Muthukumaran | M.A., M.Phil., B.Ed., Ph.D., | Principal |
| Dr.R.ManickaChezhian | M.Sc., M.S., Ph.D., | IQAC Co-Ordinator, Controller of Examinations, Head and Associate Professor, Department of Computer Science |
| Thiru.K.Srinivasan | M.C.A | Associate Professor Department of Computer Science ISO Co-Ordinator ERP Co-Ordinator |
| Dr.A.Srividhya | MA.M.Phil., Ph.D., NET | Assistant Professor Department of English |
| Dr.P.Archanaa | M.Com., M.Phil., PGDCA., Ph.D., M.A [Hindi] | Assistant Professor & Head UG Department of Commerce with Computer Applications |
| Ms.S.Shanthi | M.C.A., M.Phil., | Assistant Professor, PG Department of Computer Sciene |
| Ms.P.Uma Maheswari | M.Sc., Computer Science | IQAC Member |
| Selvan. S. Kumaraguru | 21CC135 | III B.Com CA |
| Selvan. G.Vishnu Prakash | 21CC150 | III B.Com CA |

Summary of Audit

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

During the visit it was observed that Nallamuthu Gounder Mahalingam 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.

Note Worthy

Installation of 90KW On Grid Roof Top Solar Power Plant to reduce conventional energy usage

The audit outputs and recommendations are summarised as follows

- Annual electricity consumption from TNEB GRID is around 2,87,718units during the year 2022-2023.
- Electrical Energy consumption from Diesel Generator – 10,860 units.
- Solar Power Electrical energy consumption- 10,167 units
- Total Electrical Energy consumption – 3,08,745 units
- LPG consumption - 5263 Kgs
- Solar Water heater installed capacity 4,100 LPD
- High Volume low speed fans are provided at auditorium to reduce energy consumption
- BEE Star rated appliances are being used.

ENERGY SAVING POTENTIALS

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

Replacement cost for 50 LED tube lights-Rs 180x50= RS 9,000

Cost savings for 50 LED tube lights-Rs 19,200 / year

Energy savings for 50 LED tube lights-2,000 units/ year

Payback period-5.6 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 1,45,900/ year

Energy savings for 100 Nos. ENERGY EFFICIENT FAN -15,200 units/ year

Payback period 23 months

- Remaining Conventional Tube lights shall be replaced with LED tube lights in a phased manner
- 5 Star rated Energy efficient electrical equipment 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 Nallamuthu Gounder Mahalingam College



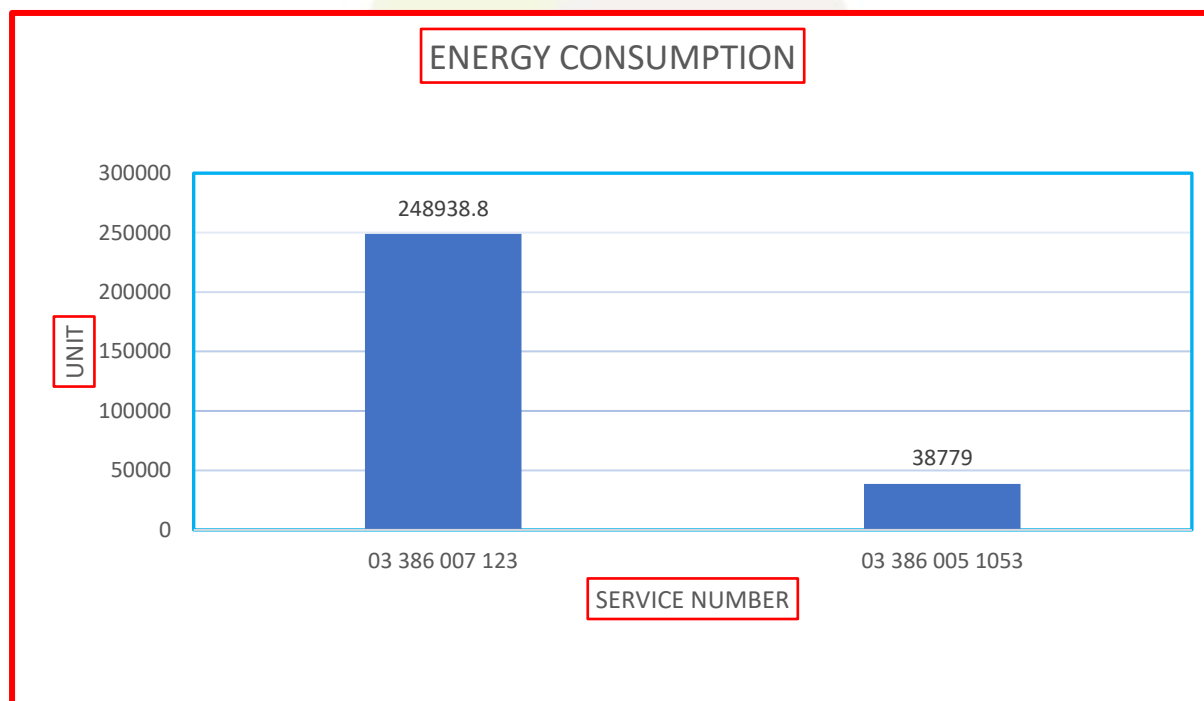
**Alcheme Green Energy Company
Madurai**

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1. Service connection, Tariff, Load and Energy consumption details

| TNEB SERVICE CONNECTION DETAILS | | | | |
|---------------------------------|-----------------|---------------------|--------|----------------------|
| Sl. No | Service Number | BLOCK/BUILDING NAME | Tariff | Connected load in KW |
| 1 | 03 386 007 123 | College | LM2B2 | 149.52 |
| 2 | 03 386 005 1053 | Hostel | LM2B2 | 14.48 |
| | Total | | | 164.00 |

| Sl. No | Service Number | Tariff | Units Consumed |
|--------|-----------------|--------|----------------|
| 1 | 03 386 007 123 | LM 2B2 | 2,48,939 |
| 2 | 03 386 005 1053 | LM 2B2 | 38,779 |
| | Total | | 2,87,718 |

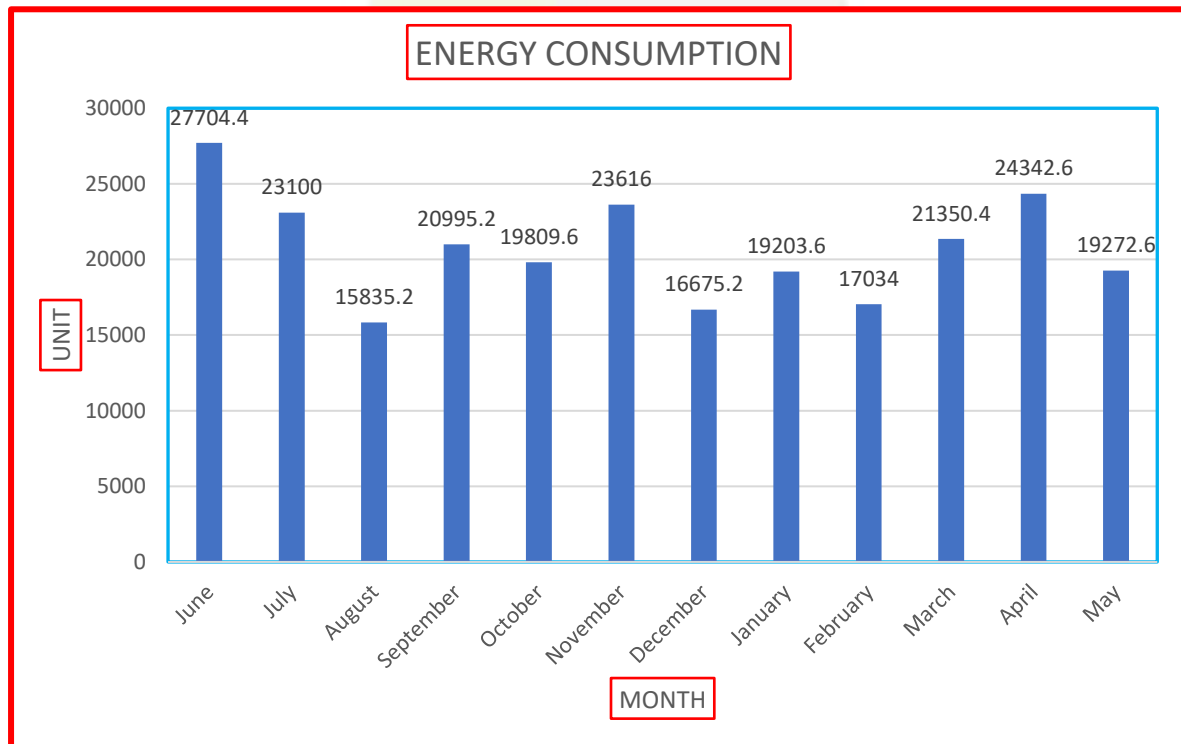


College and Hostel Energy consumption during the year 2022-2023

2. Electrical Energy consumption in the college service number

03 386 007 123

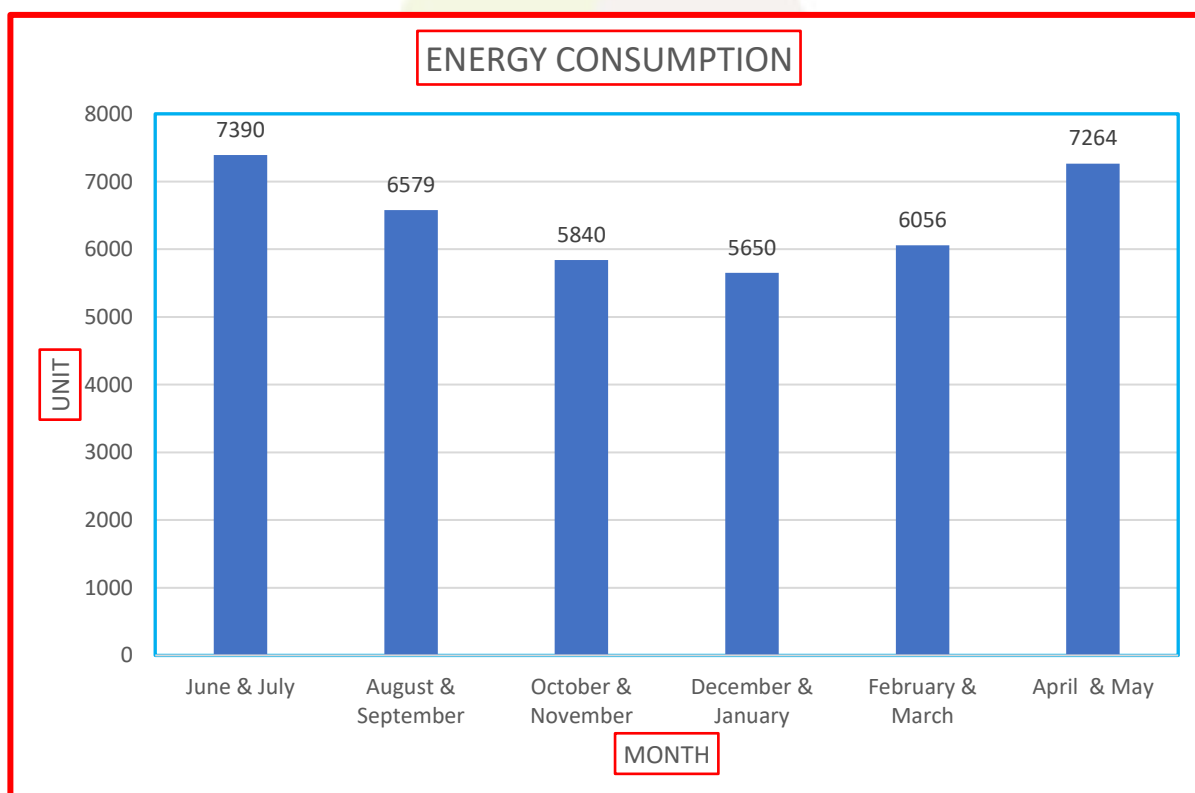
| 1.Service No 03 386 007 123 150 KW 3 Phase Tariff LM2B2 | | | | | |
|---|-----------------|-----------|----------------|-----------------|--------------|
| Sl. No. | Assessment Date | Months | Units Consumed | Bill Amount -Rs | Unit cost-Rs |
| 1 | 27-06-2022 | June | 27704.4 | 272877 | 9.85 |
| 2 | 27-07-2022 | July | 23100 | 187007 | 8.10 |
| 3 | 25-08-2022 | August | 15835.2 | 178900 | 11.30 |
| 4 | 27-09-2022 | September | 20995.2 | 260571 | 12.41 |
| 5 | 29-10-2022 | October | 19809.6 | 271331 | 13.70 |
| 6 | 29-11-2022 | November | 23616 | 306644 | 12.98 |
| 7 | 28-12-2022 | December | 16675.2 | 241655 | 14.49 |
| 8 | 30-01-2023 | January | 19203.6 | 265212 | 13.81 |
| 9 | 27-02-2023 | February | 17034 | 244515 | 14.35 |
| 10 | 28-03-2023 | March | 21350.4 | 285713 | 13.38 |
| 11 | 27-04-2023 | April | 24342.6 | 314095 | 12.90 |
| 12 | 29-05-2023 | May | 19272.6 | 266500 | 13.83 |
| | Total | | 248938.8 | 3095020 | 12.43 |



Month wise Energy consumption in the college

3. Electrical Energy consumption in the hostel service number 03 386 005 1053

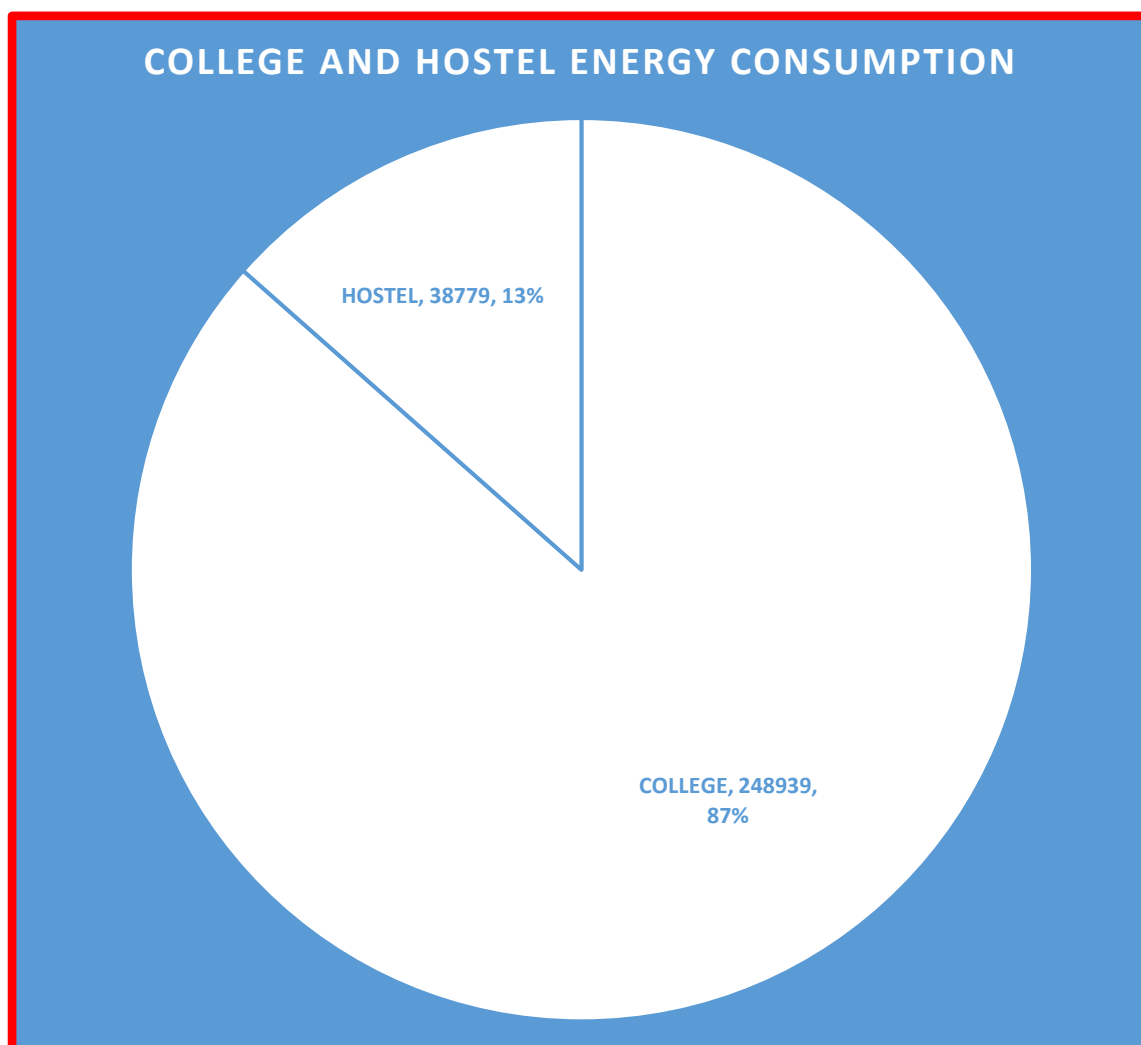
| 2.Service No 03 386 005 1053 15 KW 3 Phase Tariff LM2B2 | | | | | |
|---|-----------------|--------------------|----------------|------------------|---------------|
| Sl. No. | Assessment Date | Months | Units Consumed | Bill Amount - Rs | Unit cost- Rs |
| 1 | 27-07-2022 | June & July | 7390 | 60050 | 8.13 |
| 2 | 30-09-2022 | August & September | 6579 | 57637 | 8.76 |
| 3 | 28-11-2022 | October & November | 5840 | 59064 | 10.11 |
| 4 | 27-01-2023 | December & January | 5650 | 57423 | 10.16 |
| 5 | 29-03-2023 | February & March | 6056 | 60056 | 9.92 |
| 6 | 29-05-2023 | April & May | 7264 | 71270 | 9.81 |
| | Total | | 38779 | 365500 | |



Bi Monthly Energy consumption in the Hostel

4.TNEB Grid Energy consumption in College and Hostel

| SL.NO | PLACE | SERVICE NUMBER | UNITS CONSUMED |
|-------|---------|-----------------|----------------|
| 1 | COLLEGE | 03 386 007 123 | 248939 |
| 2 | HOSTEL | 03 386 005 1053 | 38779 |
| | TOTAL | | 287718 |



5.DG set Electrical Energy consumption

College Diesel Generator



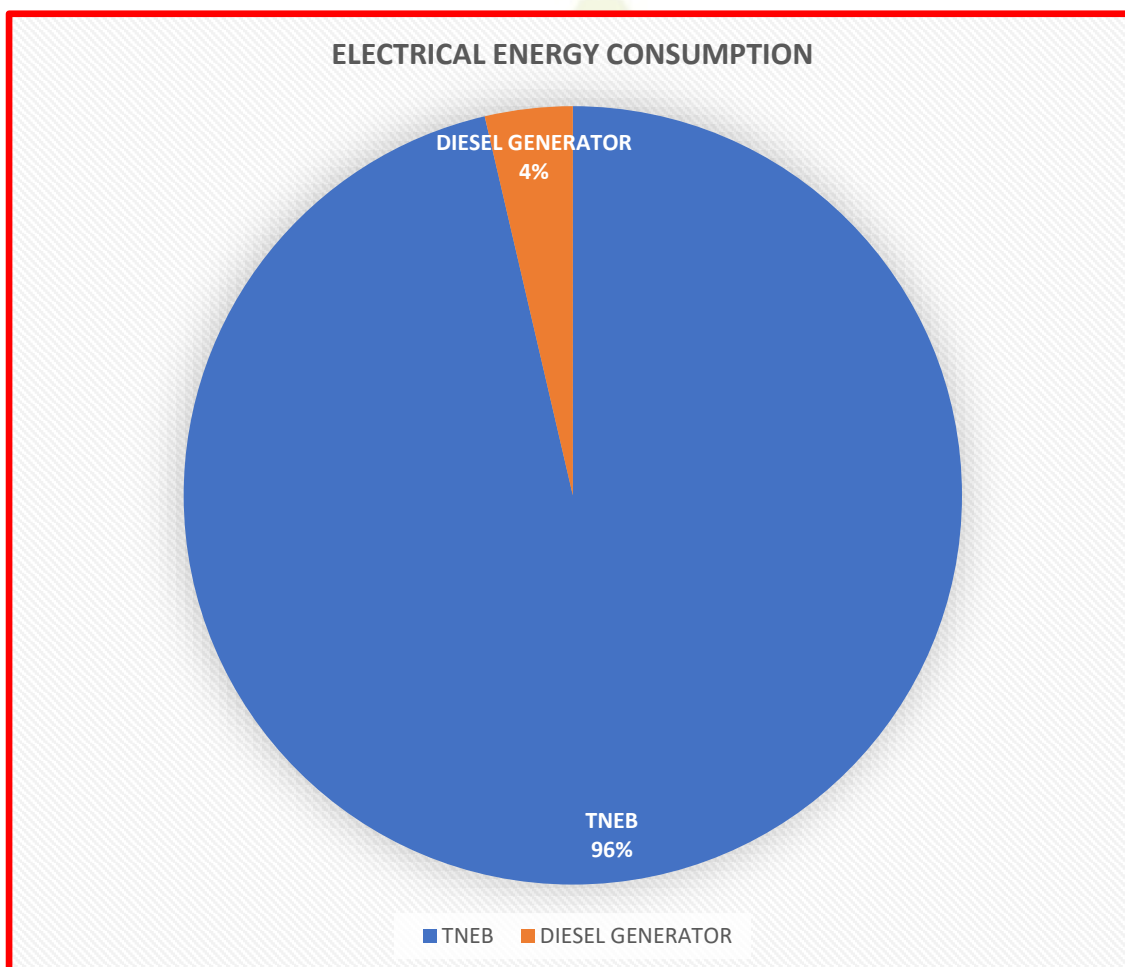
Hostel Diesel Generator



- Total Diesel consumption-3620 litres
- Power generation -10860 units

6.Total Conventional Electrical Energy Consumption details

| SL.NO | SOURCE | UNITS CONSUMED |
|-------|------------------|----------------|
| 1 | TNEB | 2,87,718 |
| 2 | DIESEL GENERATOR | 10,860 |
| | Total | 2,98,578 |



7.Renewable Electrical Energy-Solar Electrical energy Consumption

90KW -ON GRID ROOF TOP SOLAR POWER PLANT

Commissioned on 1st May 2022

Solar Energy generated up to 31.05.2023- 10,167 Units

Inverter Make-Growatt, capacity-80KW

Solar PV Panel- SWELECT-HHV

Capacity of PV panel- 380Wp

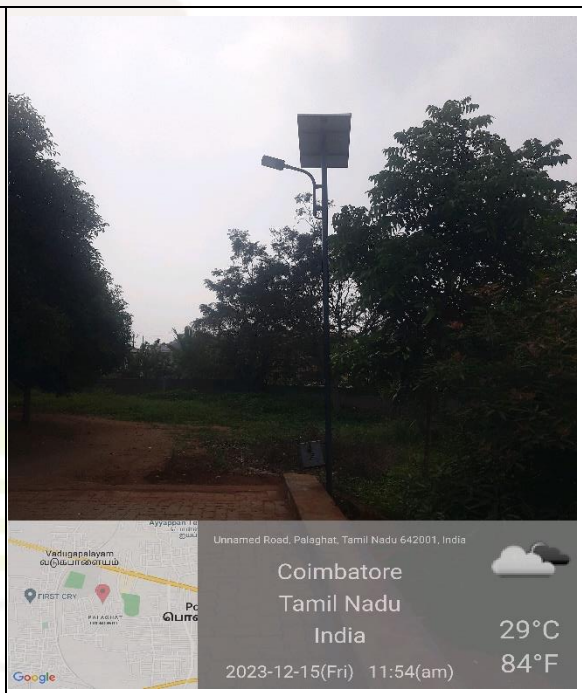
No of panels-238

Total PV panel capacity-90.44 KWp





Solar Street Lights



- Solar Street Lights -5 Nos
- Power of LED lamp-20watts
- Total power generation - 438 units

8. Conventional Thermal Energy consumption – LPG

LPG cylinders used- commercial cylinders of 19 kgs capacity




- LPG consumption in the hostel mess during the year 2022-2023- 275 cylinders
- LPG consumption in the college during the year 2022-2023- 2 cylinders
- **Total LPG consumption during the year 2022-2023- 5,263 KGs (277 Cylinders)**



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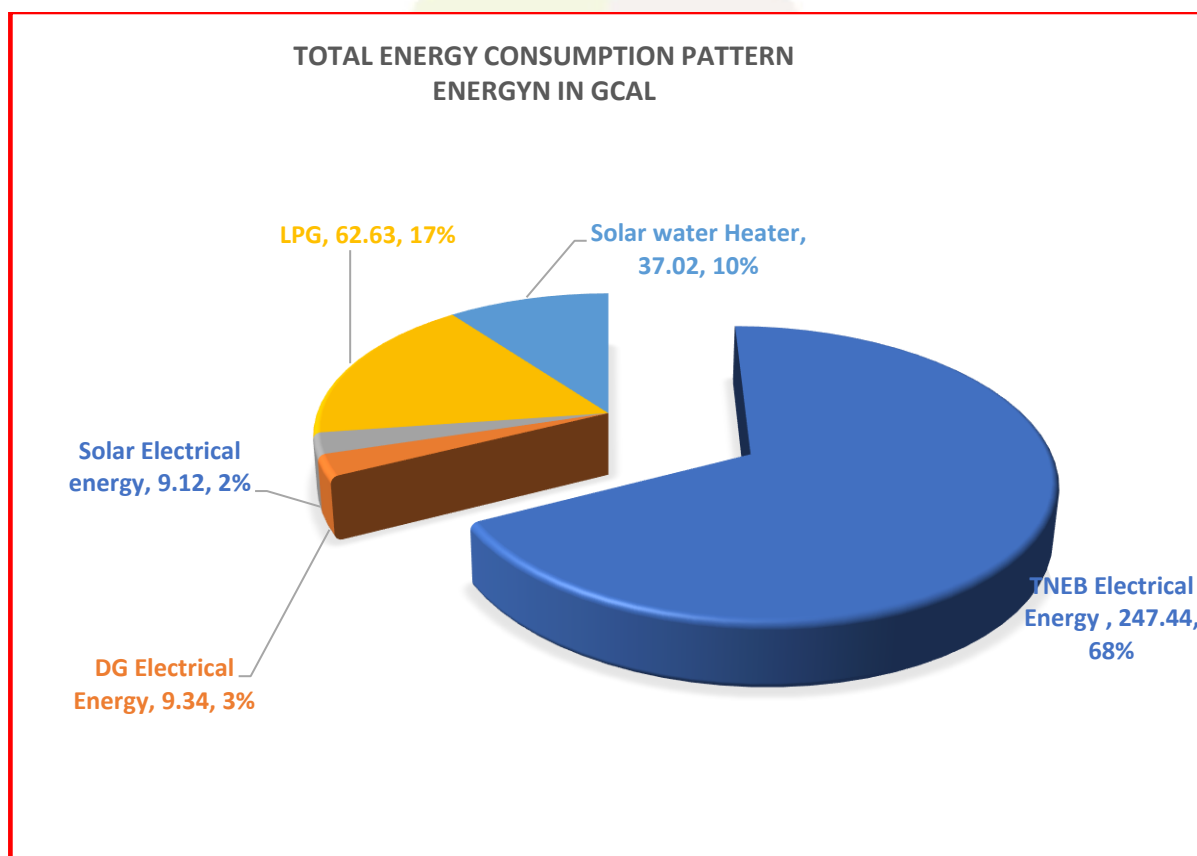
9. Renewable Thermal Energy

Total capacity of Solar Water Heaters-4100 Litters Per Day

| | |
|---|--|
|  | <p>Boys Hostel 1000 LPD X 1</p> |
|  | <p>Girls Hostel 1000 LPD X 1</p> |
|  | <p>Girls Hostel 1000 LPD X 2 100 LPD X 1</p> |

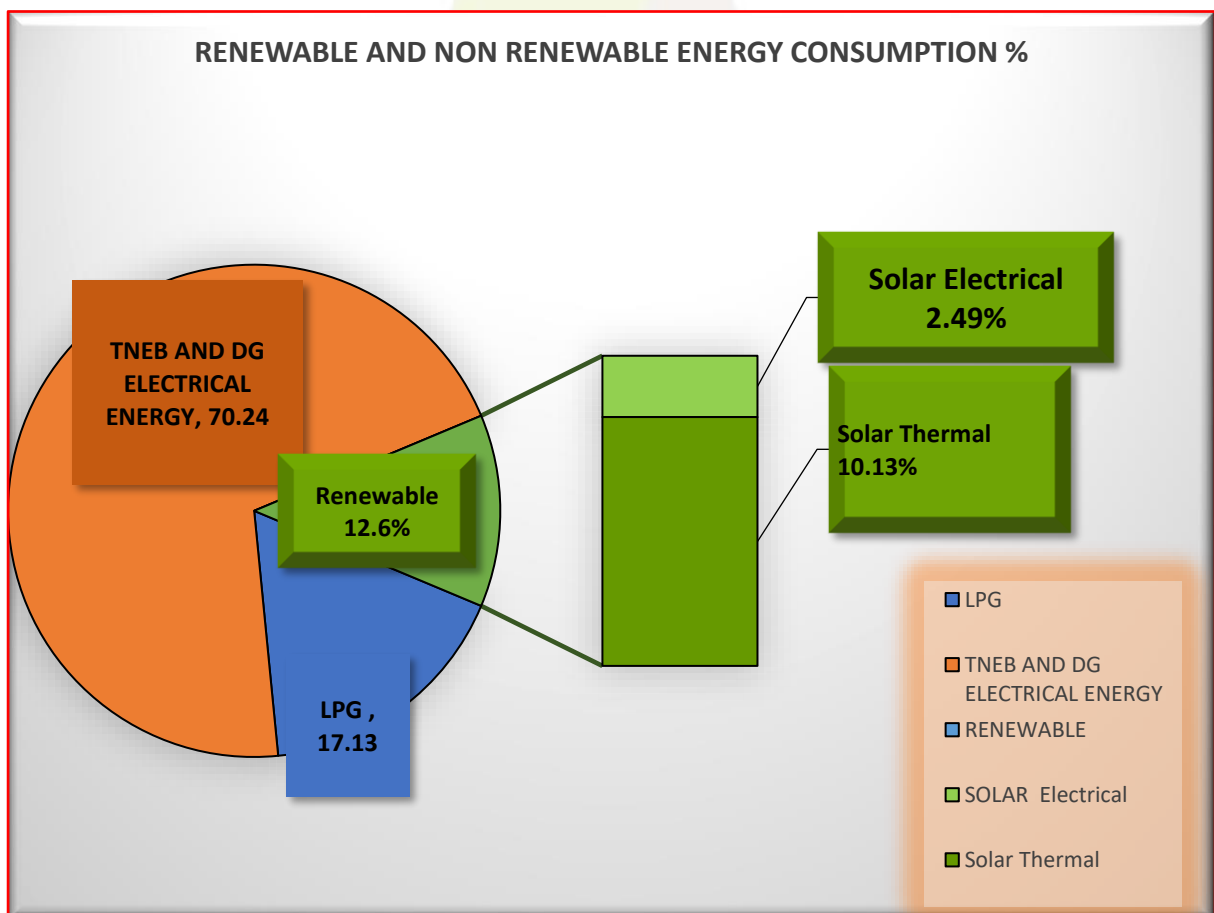
10.Total Energy consumption

| SL.NO | TYPE OF ENERGY | ENERGY -GCAL |
|-------|-------------------------|--------------|
| 1 | TNEB Electrical Energy | 247.44 |
| 2 | DG Electrical Energy | 9.34 |
| 3 | Solar Electrical energy | 9.12 |
| 4 | LPG | 62.63 |
| 5 | Solar water Heater | 37.02 |
| | | |
| | Total | 365.60 |



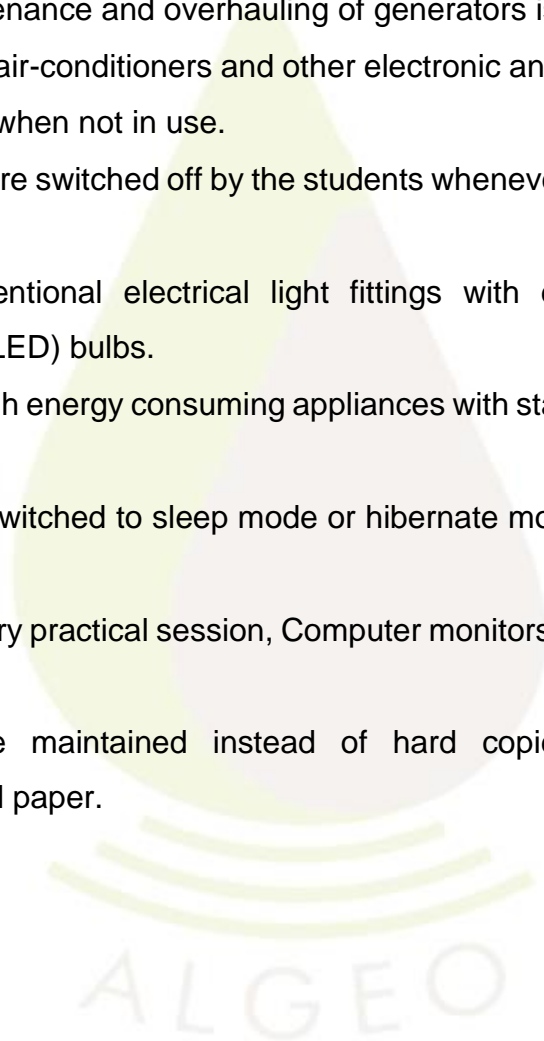
11. Renewable and Non-Renewable(conventional) energy distribution

| ENERGY CONSUMPTION | PERCENTAGE |
|-------------------------------|------------|
| NON RENEWABLE | |
| LPG | 17.13 |
| TNEB AND DG ELECTRICAL ENERGY | 70.24 |
| RENEWABLE | |
| Solar Electrical | 2.49 |
| Solar Thermal | 10.13 |



12.The energy conservation measures followed

- High volume Low Speed fans are provided in the auditorium
- Maximum utilisation of day lights at auditorium, hostel and colleges
- Staff and Students are made aware of using public transport system
- Individual vehicle usage is reduced to the minimum level
- Periodical maintenance and overhauling of generators is being carried out
- The fans, lights, air-conditioners and other electronic and electrical equipments are switched off when not in use.
- Lights and fans are switched off by the students whenever they are out of hostel rooms
- 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.



13.Major Electrical load details

| SI. No | Equipment | Watts | Nos | Total watts | KW |
|---------------|------------------|-------|-----|-------------|--------|
| 1 | Ceiling Fan | 75 | 932 | 69900 | 69.9 |
| 2 | Computer | 180 | 560 | 100800 | 100.8 |
| 3 | Printer | 115 | 30 | 3450 | 3.45 |
| 4 | LCD | 240 | 30 | 7200 | 7.2 |
| 5 | Light | 36 | 59 | 2124 | 2.124 |
| 6 | light | 18 | 68 | 1224 | 1.224 |
| 7 | Light | 16 | 4 | 64 | 0.064 |
| 8 | Light | 11 | 131 | 1441 | 1.441 |
| 9 | LED | 32 | 88 | 2816 | 2.816 |
| 10 | LED | 18 | 193 | 3474 | 3.474 |
| 11 | LED | 20 | 335 | 6700 | 6.7 |
| 12 | LED | 9 | 236 | 2124 | 2.124 |
| 13 | CFL | 27 | 3 | 81 | 0.081 |
| 14 | CFL | 18 | 13 | 234 | 0.234 |
| 15 | CFL | 12 | 6 | 72 | 0.072 |
| 16 | CFL | 4 | 4 | 16 | 0.016 |
| 17 | Sodium Light | 250 | 27 | 6750 | 6.75 |
| 18 | Pedestal Fan | 60 | 12 | 720 | 0.72 |
| 19 | Wall mounted fan | 55 | 10 | 550 | 0.55 |
| 20 | Xerox Printer | 2100 | 5 | 10500 | 10.5 |
| 21 | Water Doctor | 750 | 12 | 9000 | 9 |
| 22 | 1 Ton AC | 1000 | 9 | 9000 | 9 |
| 23 | 1.5 T AC | 1500 | 20 | 30000 | 30 |
| HOSTEL | | | | | |
| | H | HP | Nos | | KW |
| 1 | Ceiling Fan | 3 | 2 | 6 | 4.5 |
| 2 | Motor | 3 | 1 | 3 | 0.003 |
| 3 | Motor | 7.5 | 3 | 22.5 | 0.0225 |
| 4 | Motor | 5 | 1 | 5 | 0.005 |
| 5 | Motor | 2 | 1 | 2 | 0.002 |
| 6 | Motor | 1 | 1 | 1 | 0.001 |
| Hostel | | | | | |
| | Equipment | Watts | Nos | Watts | KW |
| 1 | Wet Grinder | 1300 | 1 | 1300 | 1.3 |
| 2 | Wet Grinder | 750 | 1 | 750 | 0.75 |
| 3 | Mixie | 1500 | 1 | 1500 | 1.5 |
| 4 | Mixie | 750 | 1 | 750 | 0.75 |
| UPS | | | | | |
| | 30 KVA | 1 | | | |
| | 20 KVA | 6 | | | |
| | 10KVA | 1 | | | |
| | 6 KVA | 1 | | | |
| | 3KVA | 10 | | | |

Lighting Load

| | | | |
|-------------------------------------|-------|----|-------|
| Total Lighting load | 27.92 | KW | |
| Contribution on Total lighting Load | | | % |
| LED Load | 15.92 | KW | 57.02 |
| CFL load | 0.40 | KW | 1.43 |
| Conventional lights | 11.60 | KW | 41.55 |

Diesel Generators

1. 200 KVA- 1- College
2. 62.5 KVA- 2 - College
3. 25 KVA-1- Hostel



14.COMMON OBSERVATION AND FEEDBACK

1. Periodical Cleaning of Solar panels to be carried out to get maximum output from solar power plant



2. Battery terminals in corroded condition. Proper maintenance is required
3. Fire hydrant to be operated on periodical manner. Immediate service of pump and motor is required



4. STP pump's suction and discharge lines to be set right

5. Oil spill inside the 200 KVA DG set to be cleaned properly and spill/leak to be avoided
6. Power Cables to be laid properly under the earth. Not to be exposed to sunlight and walkway near DG set area.



7. Power cable entry to Electrical panel to be done properly at Room No A 127



15. AUDIT FINDINGS & ENERGY SAVING POTENTIAL

Findings

- Annual electricity consumption from TNEB GRID is around 2,87,718 units during the year 2022-2023.
- Electrical Energy consumption from Diesel Generator – 10,860 units.
- Solar Power Electrical energy consumption- 10,167 units
- Total Electrical Energy consumption – 3,08,745 units.
- LPG consumption – 5,263 Kgs
- Solar water heater installed capacity 4,100 LPD
- High Volume low speed fans are provided at auditorium to reduce energy consumption
- 5 Star rated Energy efficient electrical equipments shall be procured in future
- In total Lighting loads, 57.02 % lighting loads are converted into LED lighting system. Remaining Conventional Tube lights shall be replaced with LED tube lights in a phased manner
- Lightning arrestor was provided inside the campus at higher elevation
- Students and staff may be encouraged to shift over to E- Vehicle
- Automatic power switch off systems may be introduced in the required areas

Renewable Energy

90KW On Grid Roof Top Solar Power Plant was installed and commissioned on 1st May 2022

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 in the hostel– 8 hrs

No of days hostel occupied with students-250 days

Energy savings per tube light per year -250 x8x20= 40000wh=40 units

Average energy cost- Rs 8.7/unit + 5% Tax + peak hr charges = Rs 9.6/unit

Cost saving per year per tube light- $40 \times 9.6 = \text{Rs } 384$

Cost savings per month-Rs 32

Approximate Cost of LED tube light -Rs 180

Payback period-5.6 months

Replacement cost for 50 LED tube lights-Rs $180 \times 50 = \text{RS } 9,000$

Cost savings for 50 LED tube lights-Rs 19,200 / year

Energy savings for 50 LED tube lights-2,000 units/ year

Payback period-5.6 months

2. Conventional fans shall be replaced with energy efficient fans

Conventional FAN energy consumption-60 watts/hr

ENERGY efficient fan energy consumption-28 watts/ hr

Savings per fan -32 watts/hr

No of hours usage per day in the hostel– 16 hrs

No of days hostel occupied with students-250 days

Energy savings per fan per year - $250 \times 16 \times 32 = 128,000 \text{wh} = 128 \text{ units}$

Average energy cost- Rs 8.7/unit + 5% Tax + peak hr charges = Rs 9.6/unit

Cost saving per year per FAN- $128 \text{ units} \times 9.6 = \text{Rs } 12288$

Cost saving per month-Rs 1024

Cost of ENERGY EFFICIENT FAN -Rs 2800

Payback period 23 months

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

Cost savings for 100 Nos. ENERGY EFFICIENT FAN -Rs 1,22,880/ year

Energy savings for 100 Nos. ENERGY EFFICIENT FAN -12,800 units/ year

Payback period 23 months