

**ENERGY, ENVIRONMENT &
GREEN AUDIT REPORT**

PART-B: ENVIRONMENT AUDIT REPORT

**ESTIMATION OF CO₂ EMISSION &
NEUTRALIZATION
(ELECTRICITY, DIESEL, LPG & MATURE TREES)**





1.2 : Assessment of Annual Energy Usage:

Table-2 Shows the types of energy carriers used for the irregular operation in the college campus along with application area and their source.

Table-2: Energy Carriers, Application area and their sources used for College Operation.

| S. No. | Type of Energy Carrier | Application Area | Source of Procurement |
|--------|------------------------------------|---|--|
| 1. | Electricity LT Service for College | Powering to all electrical & electronic/HVAC/Motors/Pumps | From TANGEDCO Captive power plant |
| 2. | Diesel | Transport vehicles and Diesel Generator(Captive Generation) | From authorized distributor |
| 3. | Liquefied Petroleum Gas(LPG) | Used for cooking application | |
| 4. | Coconut Bat(Agri Bio-fuel) | | Internally generated+ Locally purchased |
| 5. | Mature Trees | Nearly 259 Nos of different varieties with more than 20 years old. | |
| 6. | Bio gas Plat | From food and vegetable waste generated in the hostels | |

1.3: Environmental System: CO2 Balance Sheet:

The following tables provide the balance sheet indicating various energy carriers associated with the regular activities and their CO₂ mapping.



Table-3: Environmental System: CO₂ Balance Sheet (2018-19)

| S. No | Annual Energy Consumption & CO ₂ Emission | | | Annual CO ₂ Neutralization | | |
|--|--|-------------|---------------------------------|---------------------------------------|----------|------------------------------------|
| | Description | Usage | CO ₂ Emission (Tons) | Description | Usage | CO ₂ Neutralized (Tons) |
| 1. | Diesel | 4375 Liters | 12.8 | Mature Trees | 210 No's | 12.9 |
| 2. | Electrical Energy | 41,124 kwh | 79.7 | | | |
| 3. | Wood | 15.09 Tons | 25.5 | Biogas | - | -- |
| 4. | LPG | 2,103 kg | 16.6 | | | |
| Total Emission | | | 134.7 | Total-Neutralized | | 12.9 |
| Balance CO ₂ to be Neutralized = 134.7 Tons / Annum & Per Capita CO ₂ Consumption = 0.30 Tons / Annum ¹ | | | | | | |

Table-4: Environmental System: CO₂Balance Sheet (2019-20)

| S. No | Annual Energy Consumption & CO ₂ Emission | | | Annual CO ₂ Neutralization | | |
|--|--|--------------|---------------------------------|---------------------------------------|----------|------------------------------------|
| | Description | Usage | CO ₂ Emission (Tons) | Description | Usage | CO ₂ Neutralized (Tons) |
| 1. | Diesel | 4,451 Liters | 13.4 | Mature Trees | 185 No's | 10.5 |
| 2. | Electrical Energy | 47195.3 kWh | 98.4 | | | |
| 3. | Wood | 11.5Tons | 29.1 | Biogas | - | - |
| 4. | LPG | 1,714 kg | 15.9 | | | |
| Total Emission | | | 155.8 | Total- Neutralized | | 10.5 |
| Balance CO ₂ to be Neutralized = 155.8 Tons/Annum & Per Capita CO ₂ Consumption = 0.19 Tons Annum ² | | | | | | |



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Table-5: Environmental System: CO₂ Balance Sheet (2020-21)

| S. No. | Annual Energy Consumption & CO ₂ Emission | | | Annual CO ₂ Neutralization | | |
|---|--|--------------|---------------------------------|---------------------------------------|----------|------------------------------------|
| | Description | Usage | CO ₂ Emission (Tons) | Description | Usage | CO ₂ Neutralized (Tons) |
| 1. | Diesel | 4974 Liters | 11.2 | Mature Trees | 185 No's | 10.6 |
| 2. | Electrical Energy | 47,321.2 kWh | 172.5 | | | |
| 3. | Wood | 09.6Tons | 12.6 | Biogas | --- | --- |
| 4. | LPG | 1,816kg | 11.5 | | | |
| Total Emission | | | 207.8 | Total- Neutralized | | 10.6 |
| Balance CO ₂ to be Neutralized = 207.8 Tons / Annum & Per Capita CO ₂ Consumption = 10.6 Tons / Annum³ | | | | | | |

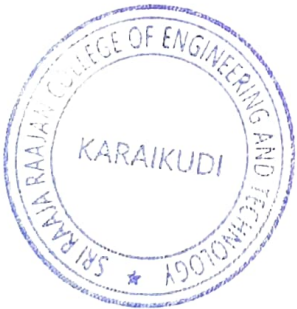


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Table-6: Environmental System: CO₂ Balance Sheet (2021-22)

| S. No | Annual Energy Consumption & CO ₂ Emission | | | Annual CO ₂ Neutralization | | |
|---|--|--------------|---------------------------------|---------------------------------------|----------|------------------------------------|
| | Description | Usage | CO ₂ Emission (Tons) | Description | Usage | CO ₂ Neutralized (Tons) |
| 1. | Diesel | 4231 Liters | 12.5 | Mature Trees | 170 No's | 10.2 |
| 2. | Electrical Energy | 48,156.5 kWh | 167.1 | | | |
| 3. | Wood | 19.2 Tons | 17.1 | Biogas | --- | --- |
| 4. | LPG | 16757kg | 12.8 | | | |
| Total Emission | | | 209.5 | Total- Neutralized | | 10.2 |
| Balance CO ₂ to be Neutralized = 209.5 Tons / Annum & Per Capita CO ₂ Consumption = 10.2 Tons / Annum ⁴ | | | | | | |




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Table-7: Environmental System: CO₂ Balance Sheet (2022-23)

| S. No. | Annual Energy Consumption & CO ₂ Emission | | | Annual CO ₂ Neutralization | | |
|--|--|--------------|---------------------------------|---------------------------------------|----------|------------------------------------|
| | Description | Usage | CO ₂ Emission (Tons) | Description | Usage | CO ₂ Neutralized (Tons) |
| 1. | Diesel | 1195 Litres | 5.1 | Mature Trees | 197 No's | 14.1 |
| 2. | Electrical Energy | 21,115.4 kWh | 160.1 | | | |
| 3. | Wood | 3.8 Tons | 5.2 | Biogas | ---- | ----- |
| 4. | LPG | 210 kg | 0.9 | | | |
| Total Emission | | | 171.3 | Total-Neutralized | | 14.1 |
| Balance CO₂ to be Neutralized = 171.3 Tons / Annum & Per Capita CO₂ Consumption = 14.1 Tons / Annum⁵ | | | | | | |

Note: Due to COVID Lock down; all the energy consumption during 2019-20 & 20-21 are less

1.3: Calculation Table:

| |
|---|
| For Electricity = $\left[\text{k Wh} \times \frac{0.82 \text{ kg of CO}_2 \text{ emission}}{\text{kWh}} \right]$ |
| For Diesel = $\left[\text{Diesel Consumption (Liter)} \times \frac{2.64 \text{ kg of CO}_2 \text{ emission}}{\text{Liter of Fuel Consumption}} \right]$ |
| For LPG = $\left[\text{LPG Consumption (kg)} \times \frac{3.0 \text{ kg of CO}_2 \text{ emission}}{\text{Kg of LPG Consumption}} \right]$ |
| A mature tree is able to absorb nearly CO ₂ at a rate of 21.8 kg / annum; hence total CO ₂ to be neutralized. Is $(21.8 \times 1009) = 22.0$ Tons 1,000 Anum |



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1.3 Observations:

- From the above table: it is evident that the college is now trying to neutralize their CO₂ emission through various initiatives like i) Installation of roof top solar PV system & solar thermal hot water generation (cooking & bathing application), ii) Reduction of LPG consumption, iii) Planting more number of trees and iv) implementing various energy conservation measures (FTL to LED conversion, conventional fan to BLDC fans, Energy efficient motor replacement, judicious use of all types of energy etc.,)
- Reduction of electricity consumption by replacing the entire boiler cooking system into LPG based or Wood pellets which reduces considerable amount of amount of CO₂. The management has to think and go for fuel substitution

1.3: References:

1. <https://ecoscore.be/en/info/ecoscore/co2>
2. <http://www.tenmilliontrees.org/trees/#:-:text=A%20mature%20tree%20absorbs%20carbon.the%20average%20car's%20annual%20mileage.>




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ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

**PART - B: ENVIRONMENT AUDIT
REPORT**

**TRANSPORT & REFRIGERANT GASES
IN AC SYSTEM**





1.3: List of Transport Vehicles:

Pollution level of all vehicles is regularly monitored and is maintained within the prescribed limit since the college is committed to provide green environment for better atmosphere.

All the transport vehicles are having pollution certificates and maintaining the emission level within the Pollution Control Board limits

The no. of vehicles available in the college campus is represented in Table-8.

Table-8: List of Transporting Vehicles available in the College

| S. No. | Type of Vehicle | Quantity | Purpose |
|--------|-----------------|----------|-----------------------------------|
| 1. | Bus | 15 | Students & Faculty Transportation |
| 2. | Jeep | 02 | Office and Administrative Works |
| 3. | Car | 03 | Good Transportation |



1.3: List of Air Conditioning System along with its Refrigerant:

Most of the AC system has R-22 as refrigerant which has Global Warning Potential (GWP) of 1,810 and Ozone Depletion Potential (ODP) is Medium. Some of the newly installed AC system are having R-32 as refrigerant which has Global Warning Potential (GWP) of 675 and Ozone Depletion



[See rules 115 (2)]

Pollution Under Control Certificate

Authorised By
State Transport Department

Date : 18/05/2022
Time : 16:09:04 PM
Validity upto : 17/11/2022



Certificate SL No : TN06300150011404
Registration No : TN03AZ0798
Date of Registration : 21/Sep/2011
Month & Year of Manufacturing : June-2011
Valid Mobile Number : *****1358
Emission Norms : BHARAT STAGE I
Fuel : DIESEL
PUC Code : TN0630015
GSTIN :
Fees :
Mil observation :

Shree Amman Emission Testing Centre
P-14, Anna Nagar, GST Road, Karaikudi
(Approved by Govt. of Tamil Nadu)
No. 24, Suramanapuram 1st Street South East,
Karaikudi - 1. Phone: 224709

Vehicle Photo with Registration plate

60 mm x 30 mm

TN-69
AZ-0798

| Sr. No. | Pollutant (as applicable) | Units (as applicable) | Emission limits | Measured Value (upto 2 decimal places) |
|-----------------------|------------------------------|-----------------------|-----------------|--|
| 1 | 2 | 3 | 4 | 5 |
| Idling Emissions | Carbon Monoxide (CO) | percentage (%) | | |
| | Hydrocarbon, (THC/HC) | ppm | | |
| High idling emissions | CO | percentage (%) | | |
| | RPM | RPM | 2500 ± 200 | |
| | Lambda | - | 1 ± 0.03 | |
| Smoke Density | Light absorption coefficient | 1/metre | 2.45 | 0.46 |

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note: 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://www.pucportal.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20mm

Shree Amman Emission Testing Centre
Authorisation No. 3/SVG/2001
(Approved by Govt. of Tamil Nadu)
No. 24 Suramanapuram 1st Street South East,
Karaikudi - 1. Phone: 224709



Pollution Under Control Certificate

Authorised By
State Transport Department

Date : 18/05/2022
Time : 16:13:28 PM
Validity upto : 17/11/2022

Certificate SL. No. : TN06300150011405
Registration No. : TN63AY9439
Date of Registration : 08/Oct/2012
Month & Year of Manufacturing : August-2012
Valid Mobile Number : *****1356
Emission Norms : BHARAT STAGE I
Fuel : DIESEL
PUC Code : TN0630015
GSTIN :
Fees :
MIL observation :

Shree Anand Emission Testing Centre
: Authorisation No. 0635 VG/2001
(Approved by Govt. of Tamil Nadu)
6/24, Subramaniam Street, South Extn.
Karaikudi - 1. Phone: 224709

Vehicle Photo with Registration plate
60 mm x 30 mm

TN-63
AY-9439

| Sr. No. | Pollutant (as applicable) | Units (as applicable) | Emission limits |
|-----------------------|------------------------------|-----------------------|-----------------|
| 1 | Carbon Monoxide (CO) | percentage (%) | |
| | Hydrocarbon, (THC/HC) | ppm | |
| | CO | percentage (%) | |
| High Idling emissions | RPM | RPM | 2500 ± 200 |
| | Lambda | - | 1 ± 0.03 |
| Smoke Density | Light absorption coefficient | 1/metre | 2.45 |

This PUC certificate is system generated through the national register of motor v
not require any signature

n Potential (ODP) is Zero.

Table-9: List of Multi-variant AC System available in the College

| S. No. | Tonnage Capacity (TR) | Quantity |
|--------------|-----------------------|---------------|
| 1. | 1.5 | 10 Nos |
| 2. | 2.0 | 06 Nos |
| Total | | 16 Nos |

Note: The most environment-friendly refrigerants that are available in Indian market currently are “R- 290” and “R-600A”. They are Hydrocarbons and their chemical names are “Propane” for R-290 and “Iso- Butane” for R-600A

They are completely halogen free, have no ozone depletion potential and are lowest in terms of global warming potential. They also have high-energy efficiency but are highly flammable as they are hydrocarbons. (Kindly refer: <https://www.bijlibachao.com/air-conditioners/comparison-of-various-refrigerants-r-410a-r-22-r-290-r-134a-used-for-air-conditioners-and-refrigerators.html>).

| Refrigerant | Global Warming Potential | Ozone Depletion Potential |
|-------------|--------------------------|---------------------------|
| R-22 | 1810 | Medium |
| R-410A | 2088 | Zero |
| R-32 | 675 | Zero |
| R-134A | 1430 | Zero |
| R-290 | 3 | Zero |
| R-600A | 3 | Zero |



**ENERGY, ENVIRONMENT &
GREEN AUDIT REPORT**

**PART-B: ENVIRONMENT AUDIT
REPORT**

**USAGE OF CHEMICALS, SALTS & ACIDS
(STORAGE, HANDLING & BEST OPERATING PRACTICES)**





1.3: Handling of Chemicals / Salts / Acids used in the Laboratories:

- The science departments use chemicals for experimental applications and are having strict safety rules as follows;
- Well trained faculty and lab assistants who have knowledge about the hazardous nature of each and every chemical are only allowed to handle the chemicals safely.
- Strictly follow the manufacturer's instruction on the container in order to prevent accidents.
- Volatile or highly odorous chemicals, fuming acids are stored in a ventilated area. Chemicals are stored in eye level and never on the top shelf of storage unit.
- All stored chemicals; especially flammable liquids are kept away from heat and direct sunlight. Reactive chemicals are not stored closely.
- Hazardous and corrosive chemicals are kept on sand platform to avoid corrosion.

First aid box and fire extinguishers are readily available in the laboratory.

1.3 Storage of Chemicals / Salts / Acids:

- Less concentrated chemicals, salts and acids are stored in proper racks; cupboard and high concentrated acids are stored in separate area filled with sand.
- Most of the chemicals, salts and acids used in the science departments are inorganic in nature and no harmful effects are created during the experiment process.
- However after completion of each experiment, the wastes are washed in the water sink and are rooted to common STP.
- Only trained teaching and non-teaching staffs are handling the chemicals and also they are well trained to handle any abnormal situations.
- Laboratories with chemicals are well ventilated with proper emergency exits. Adequate and correct sequence of fire extinguishers is placed near all the laboratories.





Fig.2: Storage of Chemicals /Salts /Acids& Laboratory Equipments (Rack & Sand Bed)



1.3 Use of Chemical for Vessels & Floor Cleaning:

In order to maintain hygiene in the College campus; the administration regularly clean the floor and restrooms. In addition to this, the hostel management has to monitor the cleaning of vessels, kitchen floor, dining hall, store room and gas station. Table-10 shows the cleaning agents used to clean the above mentioned area;

Table-10: Cleaning Agents used for Floor and Vessel Cleaning

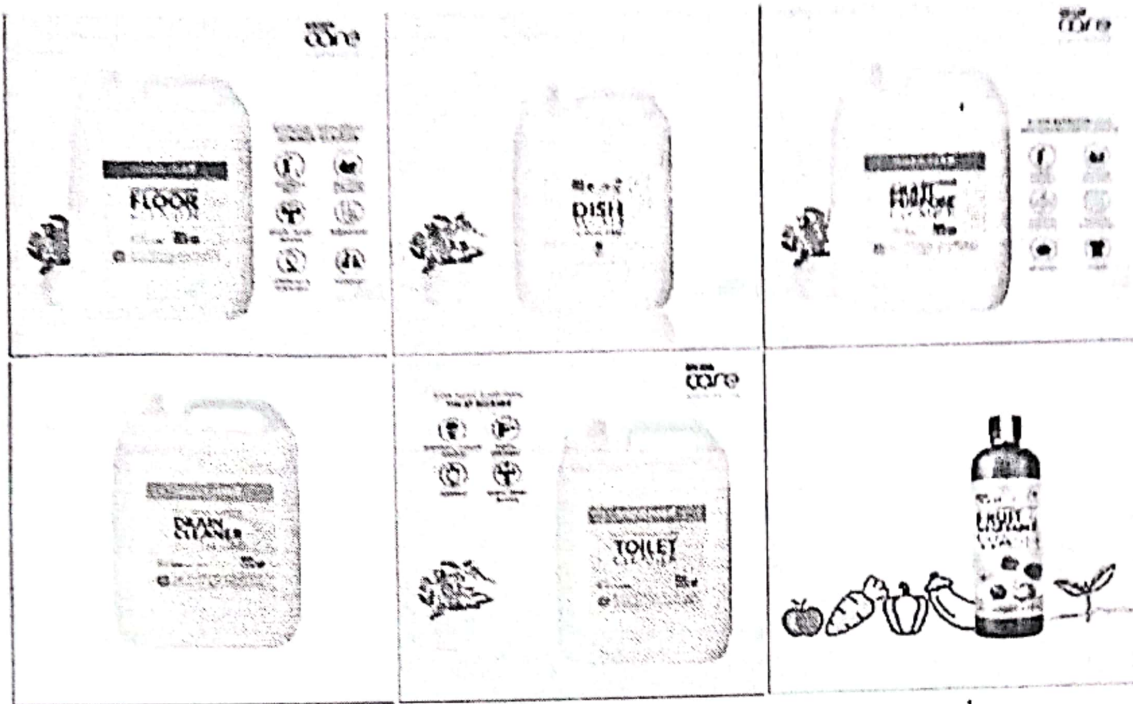
| S. No. | Cleaning Agent | Application |
|--------|-----------------------------|-----------------|
| 1 | Soap & Washing Power | Vessel Cleaning |
| 2 | Soap Oil & Bleaching Powder | Floor Cleaning |

1.3: Recommendations: Eco Friendly – Green Cleaning Agents:

- On an average; the cleaning agents used today have about 62 harmful chemicals like Paraben, Phosphates or Chlorides. A lot of them are multi-purpose cleaners
- It is recommended to use natural ingredients like orange peel extract & vinegar. It leaves a mild and pleasant fragrance after use. The formula is free from all harmful chemicals & toxins. It is pH-neutral, gentle on the skin as well as on the surface where it is used
- Also these products are **IGBC GreenPro** certified. GreenPro is a mark of guarantee that the product is environment friendly throughout its life cycle
- Fig.3 shows the sample eco-friendly Green Pro certified cleaning agents.



Fig.3: Green Pro Certified Eco Friendly Cleaning Agents (ZERODER)



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 Amaravathipudur, Karaikudi - 630 301
 Sivagangai Dist. Tamil Nadu



[Signature]
 5/5/2023

Dr. A. ARUMUGAM
 PROFESSOR &
 DEPARTMENT OF BOTANY
 ALAGAPPA UNIVERSITY
 KARAIKUDI - 630 003. TAMIL NADU, INDIA



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COLLEGE OF ENGINEERING AND TECHNOLOGY

(APPROVED BY AICTE, NEW DELHI & AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

146/14B1, Amaravathi Village, Amaravathiputhur Post,

Karaikudi -630301, Sivagangai Dt, Tamilnadu

Website: www.srirajaraajan.in. E - Mail: srrcet2010@gmail.com. Ph: 04565-234230

Beyond the Campus Environmental Promotion activities



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COLLEGE OF ENGINEERING AND TECHNOLOGY

(APPROVED BY AICTE, NEW DELHI & AFFILIATED TO ANNA UNIVERSITY, CHENNAI.)

146/14B1, Amaravathi Village, Amaravathiputhur Post,
Karaikudi -630301, Sivagangai Dt, Tamilnadu

Website: www.sriraaajaraajan.in. E - Mail: srrcet2010@gmail.com. Ph: 04565-234230

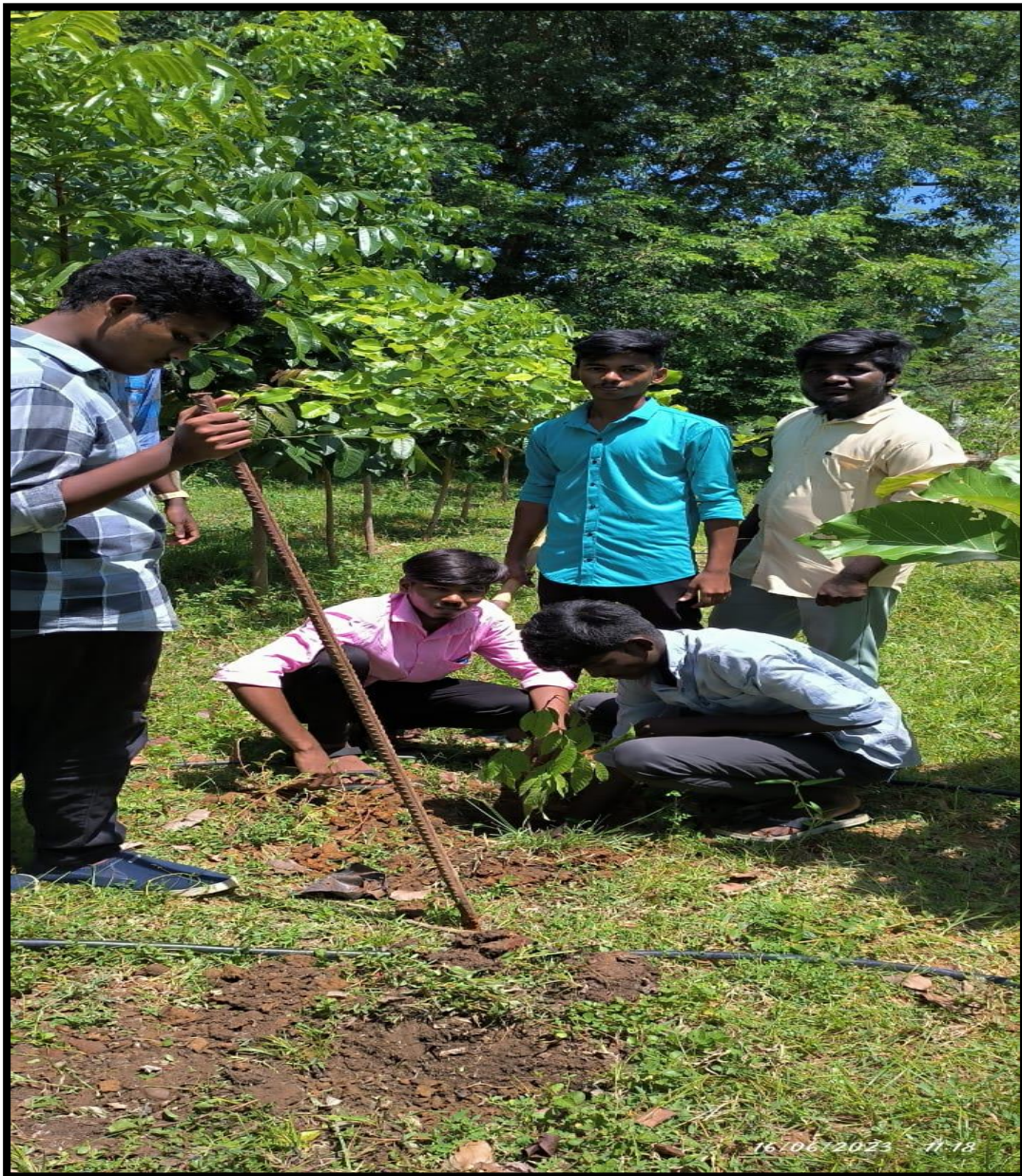
REPORT

On March 16, 2022, SRR CET organized a tree-planting ceremony.

The primary goal was to finish planting 200 seedlings. The major guest of this event was our college's academic adviser, who was invited in order to support the college's efforts to emphasize the value of tree planting. Just after the morning assembly, at around 10 a.m., the tree planting programme began. The principal and the academic advisor planted the first tree at our campus. Around 100 saplings were distributed to students from various classes to plant throughout the campus, and the remaining seedlings were planted by faculty members in sadayangadu. The principal delivered lecture on the importance of trees and the event ended with vote of thanks delivered by Dean of our college.



TREE SAPLING







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146/14B1, Amaravathi Village, Amaravathiputhur Post,

Karaikudi -630301, Sivagangai Dt, Tamilnadu

Website: www.srirajaraajan.in. E - Mail: srrcet2010@gmail.com. Ph: 04565-234230

REPORT

A very auspicious tree plantation programme was organized by our Sri Raaja Raajan College of Engineering and Technology (SRRCET) on 05.09.2020. Nearly 40 students to create an awareness regarding climate change and its adverse effect on us. A range of 200 plants were planted in the visalayankottai. To create an awareness about sapling trees. We as a college pledged to plant as many trees as possible near our areas so as to create a very healthy environment and contribute in minimizing the climatic changes. We hope that everybody plants a tree in their lifetime & contribute in conserving the nature.





TREE PLANTATION



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