ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

"EMS is certified by TUV SUD according to ISO 14001:2015"

3rd PERFORMANCE REPORT

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University under section 3 of UGC Act 1956)

www.srmist.edu.in

Kattankulathur, Chengalpattu District – 603 203

Tamil Nadu, India

Report Control:

Report No	Description	Effective From	Approved by
01	EMS Performance Report (April 2023 – December 2023)	30.01.2024	Registrar
02	EMS Performance Report (April 2023 – March 2024)	07.05.2024	Registrar
03	EMS Performance Report (April 2024 – March 2025)	19.05.2025	Registrar

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1 Clarification of Concepts

Per capita– Actual consumption/generation of EMS facility. Per capita is determined for every year (n) and compared with previous year (n – 1). Since the context of EMS considers the information of EMS facilities from the month of April 2022, the per capita span is fixed as April to March of every year.

Population – The total population of the year 2024-25 is 12% higher than total population of the year 2023-24.

Period – April 2024 to March 2025

2 Abbreviations

GoI – Government of India

MoEFCC – Ministry of Environment, Forest and Climate Change

CPCB – Central Pollution Control Board

TNPCB – Tamil Nadu Pollution Control Board

PESO – Petroleum & Explosive Safety Organization

EB – Electricity Board

VS – Valliammai Society

DCA – Directorate of Campus Administration

MHS – Medical and Health Sciences

E&T Hostels – Engineering & Technology Hostels

TDS – Total Dissolved Solids

TSS – Total Suspended Solids

RO – Reverse Osmosis

3 Overview

The Environmental Management System (EMS) of SRM Institute of Science and Technology, Kattankulathur Campus attained the ISO 14001:2015 accreditation in June 2023. The ISO 14001:2015 is an international standard for the EMS. The scope of the EMS includes all the activities related to the environmental aspects and facilities being performed at the Kattankulathur Campus.

The performance of the EMS activities is continuously monitored and improved. The EMS performance report is developed with the performance indicators for all the EMS objectives. The EMS performance report is communicated to the internal stakeholders as per the clause of 7.4.2, ISO 14001:2015 standard, to enable person(s) doing work under the organization's control to contribute to continual improvement.

4 Continuous Improvement

As per Clause 10.3, internal audits and surveillance audits have been conducted to continually improve the suitability, adequacy, and effectiveness of the environmental management system and to enhance environmental performance. Figure 1 depicts the timeline of ISO14001:2015 certification and the continual improvement process.

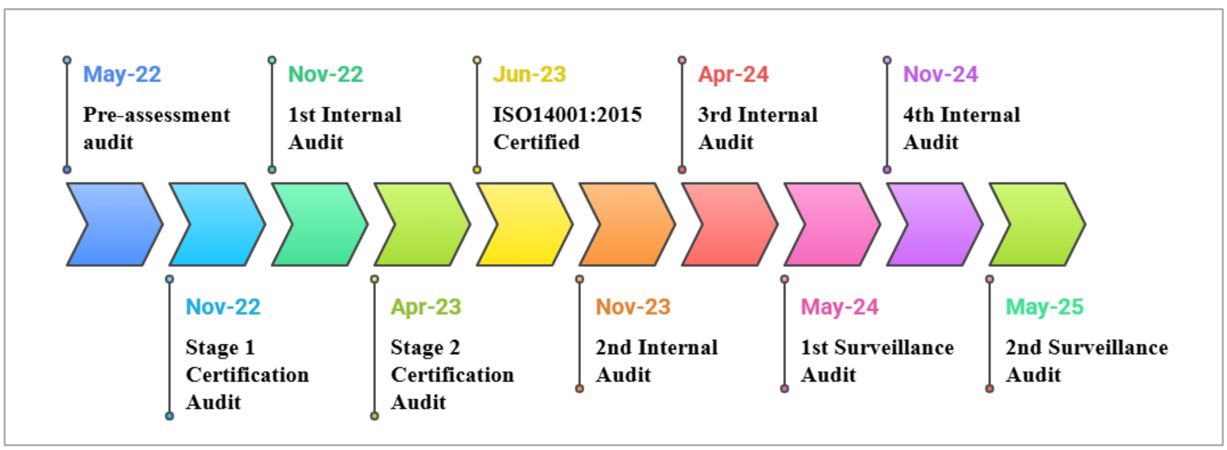


Figure 1 ISO14001:2015 certification and continual improvement

5 Significant activities

The significant EMS activities carried out are given in the following figure 2.

Figure 2 Significant environmental and sustainability practices

6 EMS Objectives and Performance Indicators

The EMS objectives were established based on the significant impact of the EMS aspects. Attaining the EMS objectives leads to the neutralization of these impacts. The targets of the EMS objectives were finalized at the 3rd Management Review Meeting held on 17.05.2024. Both short-term and long-term objectives have been set to reach net zero by 2050 and to encourage sustainable practices. Table 1 shows the short-term environmental objectives and their performance indicators.

Table 1 Short-term environmental objectives

Obj. No.	EMS Objectives	Target	Units	Performance Indicators
Primary Objectives (Due: 17/05/2025)				
P1	To quantify energy use intensity of every building and other facilities	Every buildings & facilities	kWh/sqm	Energy use intensity, Per capita consumption
P2	To quantify the water use intensity of every buildings and other facilities	Every buildings & facilities	kLD/sqm	Water use intensity, Per capita consumption
P3	To maintain the qualitative parameters of air, water, and noise levels	Within permissible limits	Respective units	Parameters within standard limits
Secondary Objectives (Due: 17/05/2025)				
S1	To increase the electricity consumption through renewables	5%	kWh	Total consumption
S2	To minimize the diesel consumption for transit facilities	3%	Litres	Total consumption
S3	To increase the recycling recovery rate	10%	kg	Total solid waste segregation
S4	To minimize the LPG consumption through biogas and solar steam	2%	kg	Total consumption
S5	To conduct training programs for the CFT members	10 Nos.	Nos.	Total Numbers

Long-term objectives are also set to track the monitoring progress for a 5-year period. Table 2 shows the long-term environmental objectives.

Table 2 Long-term environmental objectives

Obj. No.	EMS Objectives	Target	Units	Performance Indicators
Long-term Objectives (Due: 17/05/2029)				
L1	To minimize energy use intensity of every building	5%	kWh/sqm	Energy use intensity, Per capita consumption
L2	To increase the electricity consumption through renewables	15%	kWh	Total consumption
L3	To minimize the water consumption	5%	kLD	Total consumption
L4	To increase the recovery rate from solid waste management	40%	kg	Total solid waste segregation
L5	To minimize the diesel consumption for transit facilities	10%	Litres	Total consumption
L6	To minimize the LPG consumption through biogas and solar steam	10%	kg	Total consumption
L7	To increase the number of trees	3%	Nos.	Total numbers

7 Compliance Requirements

The compliance requirements are the legal aspects that are essential to be maintained by the organization. The terms and conditions, as mentioned in the compliance requirements, are implemented for the environmental facilities. The compliance identification and requirement registers are maintained to identify the relevant compliance requirements and their applicability to the organization's context. They are evaluated periodically to ensure compliance.

8 EMS Objectives and level of attainment

8.1 To quantify energy use intensity of every building and other facilities (Obj. No. P1)

The campus meets its electricity demand through several sources, including High-Tension Supply (EB Supply), diesel generators (gensets), rooftop solar panels, and a Power Purchase Agreement (PPA) for solar energy. The total connected load for the campus is 10,999 kVA, while the combined capacity of the gensets is 19,215 kVA. One of the primary objectives is to quantify the energy use intensity across all buildings on campus.

Therefore, the installation of energy meters for all the buildings were expedited and the energy use intensity is quantified. Energy use intensity is defined as the amount of energy consumed per square meter of total floor area. It is calculated as per the following equation (1)

$$\text{Energy use intensity} = \frac{\text{Total energy consumption of a building (kWh)}}{\text{Total gross floor area of the building (m}^2\text{)}} \quad \text{---- eqn (1)}$$

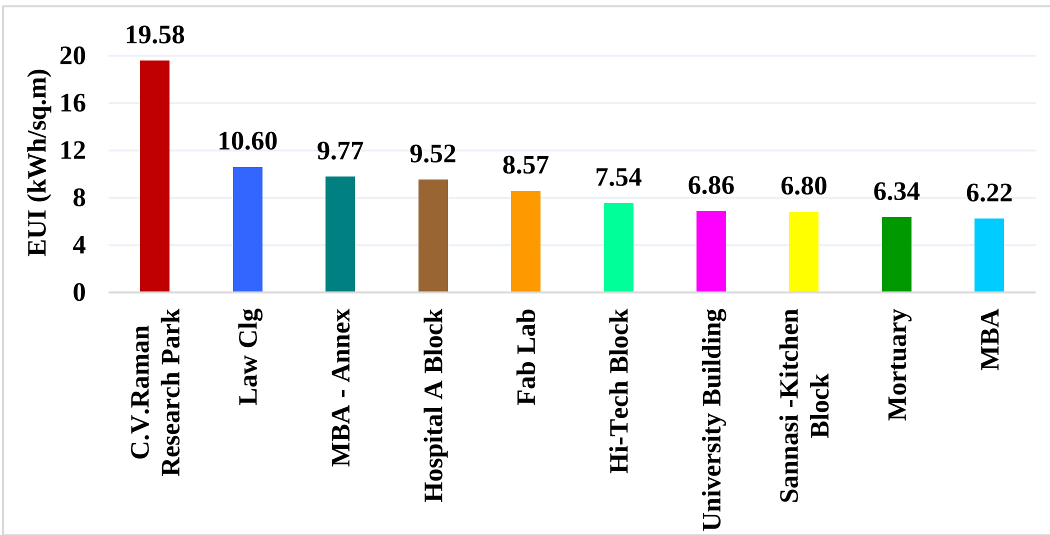


Figure 3 The top 10 buildings with high Energy Use Intensity

The energy use intensity (EUI) remained relatively consistent throughout the year for all academic and hospital buildings, with the exception of the hostels. Fluctuations in energy use intensity were noted, primarily due to the varying occupancy levels of students during holidays and class hours. While it is not feasible to present the EUI values for all buildings graphically, Figure 3 highlights the top ten buildings with the highest EUI values. Notably, C.V. Raman Research Park has the highest EUI, averaging approximately 19.36 kWh/sqm. This variation may be attributed to the operation of advanced research equipment and ongoing research activities. The per capita electricity consumption for the years 2023-24 and 2024-25 is 743 kWh and 721 kWh, respectively. Despite the increase in population, per capita electricity consumption has decreased by 3% in 2024–25. The reduction is due to the installation of energy-efficient appliances such as BLDC fans and Energy Star-rated air conditioners and the replacement of fluorescent lights with LED lights.

8.2 To quantify the water use intensity of every buildings and other facilities (Obj. No. P2)

The water consumption is measured and used optimally. Around 100 water meters were installed across campus to assess water use, and the installation is still in progress. The wastewater generated all across the campus is diverted to the sewage treatment plants present within the campus premises. The overall wastewater generation and the treated wastewater are measured using electromagnetic flowmeters. Assuming that wastewater accounts for 80% of the water consumption, we derive the water consumption value from the total wastewater generation. Therefore, the per capita water consumption for the year 2023-24 is observed to be 71.84 KLD, and the year 2024-25 is 55.96 KLD, which is 22% less than 2023-24 (Figure 4). The installation of sensor taps, the facilitation of dual flushing systems, and raising awareness have all significantly decreased water consumption. Moreover, the use of treated wastewater for gardening and bus servicing ensures a zero-liquid discharge. Furthermore, the Online Continuous Emission Monitoring System (OCEMS) is implemented to monitor the quantity and quality of the wastewater.

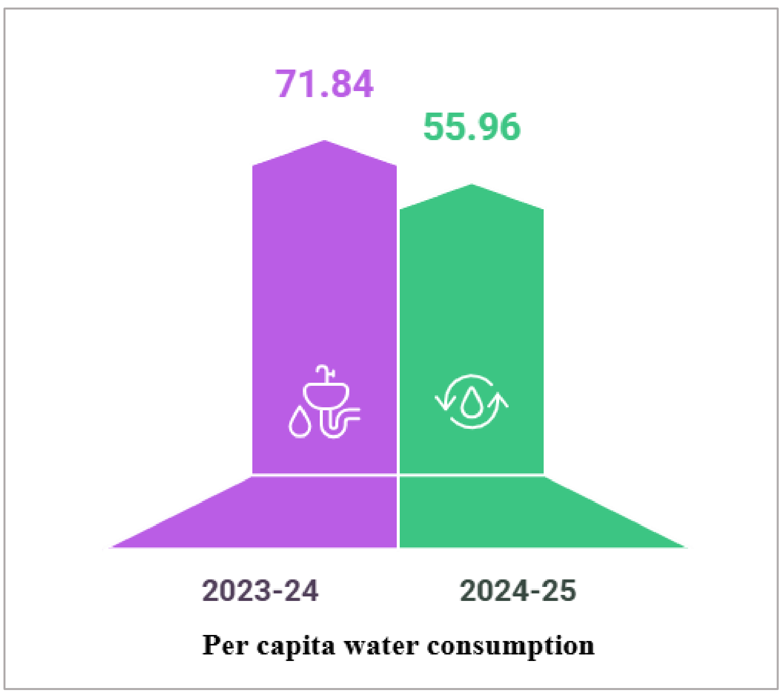


Figure 4 Per capita water consumption for the year 2023-24 and 2024-25

8.3 To maintain the qualitative parameters of air, water, and noise levels within permissible limits (Obj. No. P3)

The qualitative parameters of air, water and noise are periodically measured to maintain a sustainable campus and the observed parameters are within the standard limits.

8.3.1 Air quality

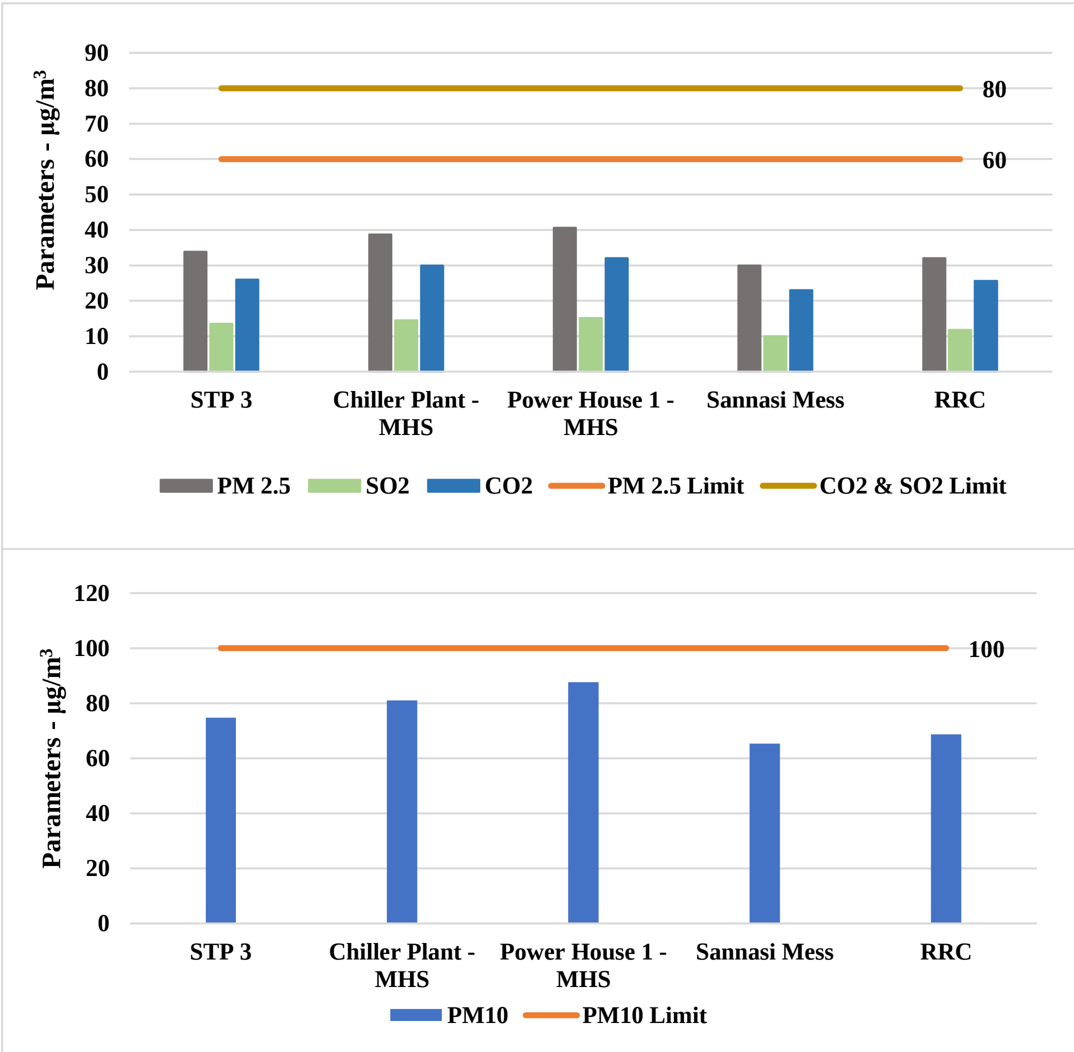
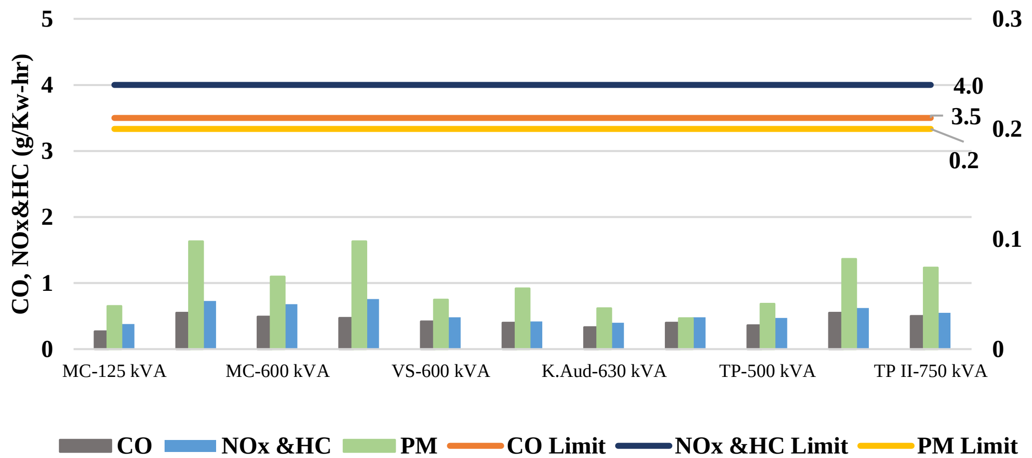
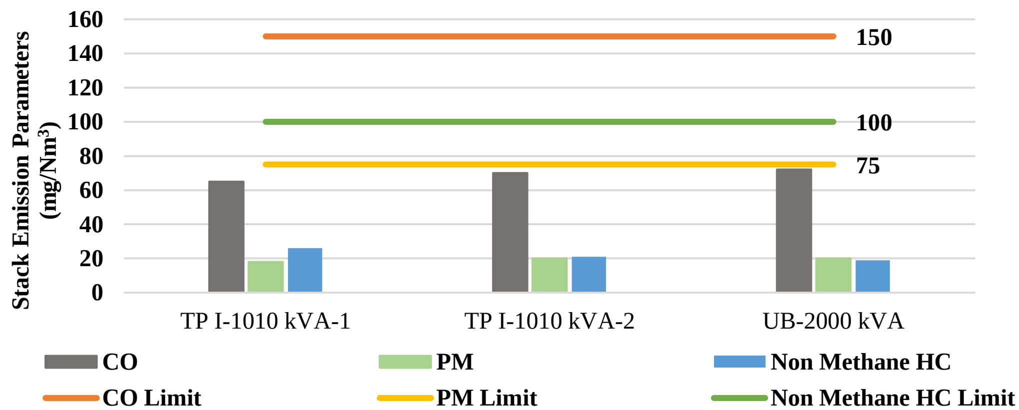


Figure 5 Ambient air quality level

Every year, the ambient air quality is checked to ensure that the parameters are within the National Ambient Air Quality Standards (NAAQS) limits (Figure 5). The other source of air pollution is the stack emission resulting from the operation of diesel generators. Therefore, the stack emission is monitored every 6 months, and the measured parameters fall within the CPCB standard limits (Figure 6).



(a) Emission parameters level of gensets below 800 kVA



(b) Emission parameters level of gensets above 800 kVA

Figure 6 Stack emission monitoring of gensets

8.3.2 Water quality

The raw groundwater, treated water, and reject water from the RO plants are tested once every six months, and the qualitative parameters are analyzed. The qualitative parameters of treated water are presented in Figures 7 and 8. Altogether 44 parameters are tested, and all the parameters of the treated water are within their limits as recommended in the IS 10500: RA 2023 standard for drinking water requirements.

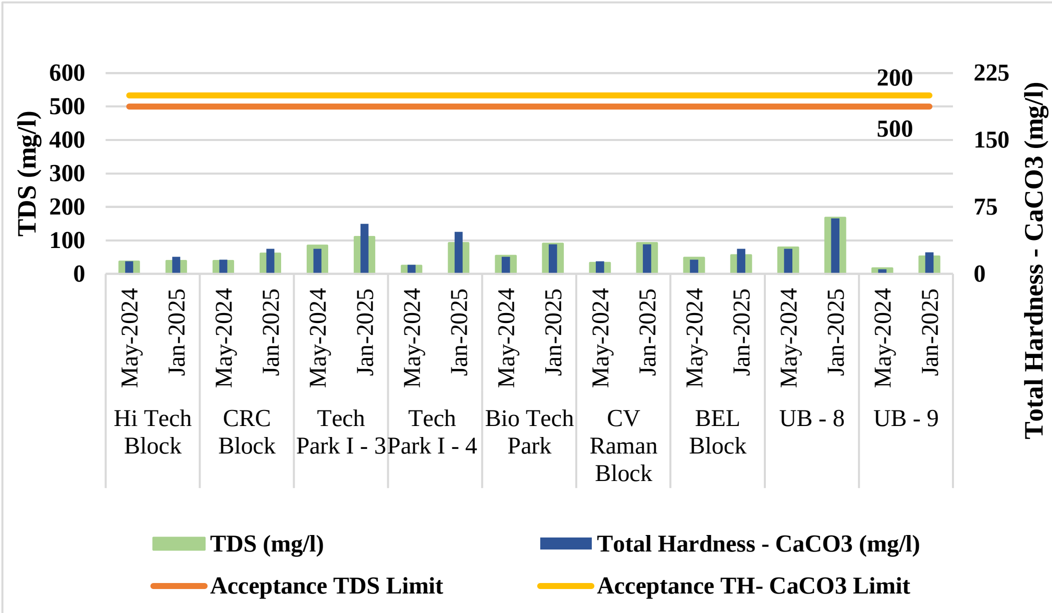


Figure 7 TDS and Total Hardness of treated RO water

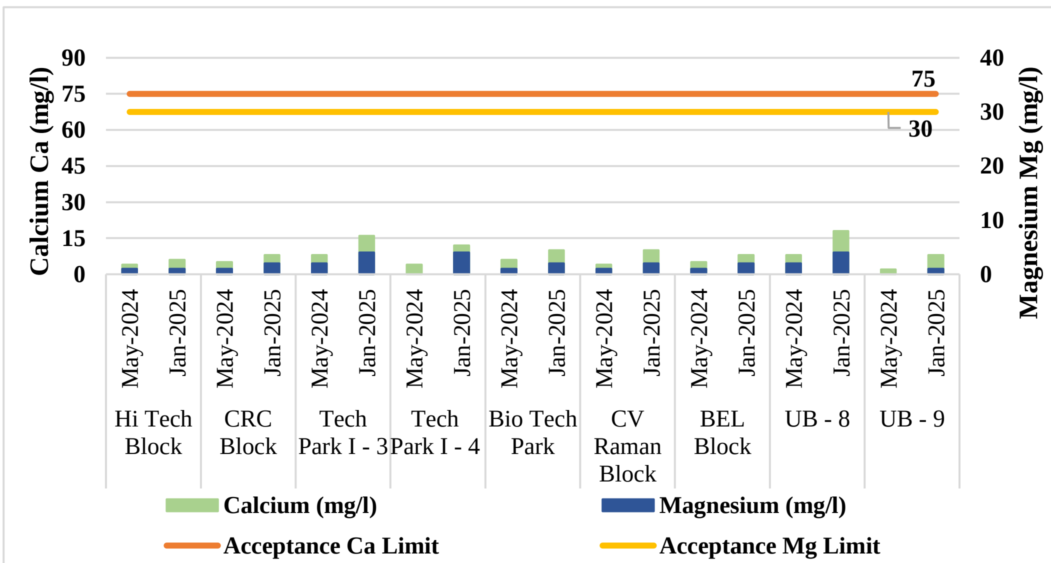


Figure 8 Ca and Mg of treated RO water

The raw and treated wastewater from the STP and ETP plants are tested once every six months, and the qualitative parameters are analyzed. The qualitative parameters of treated wastewater and treated effluent are presented in Figures 9 and 10, respectively. Altogether 40 parameters are tested, and all the parameters of the treated effluent are within their limits as recommended in the general standard for discharge of environmental pollutants (Schedule VI) requirements.

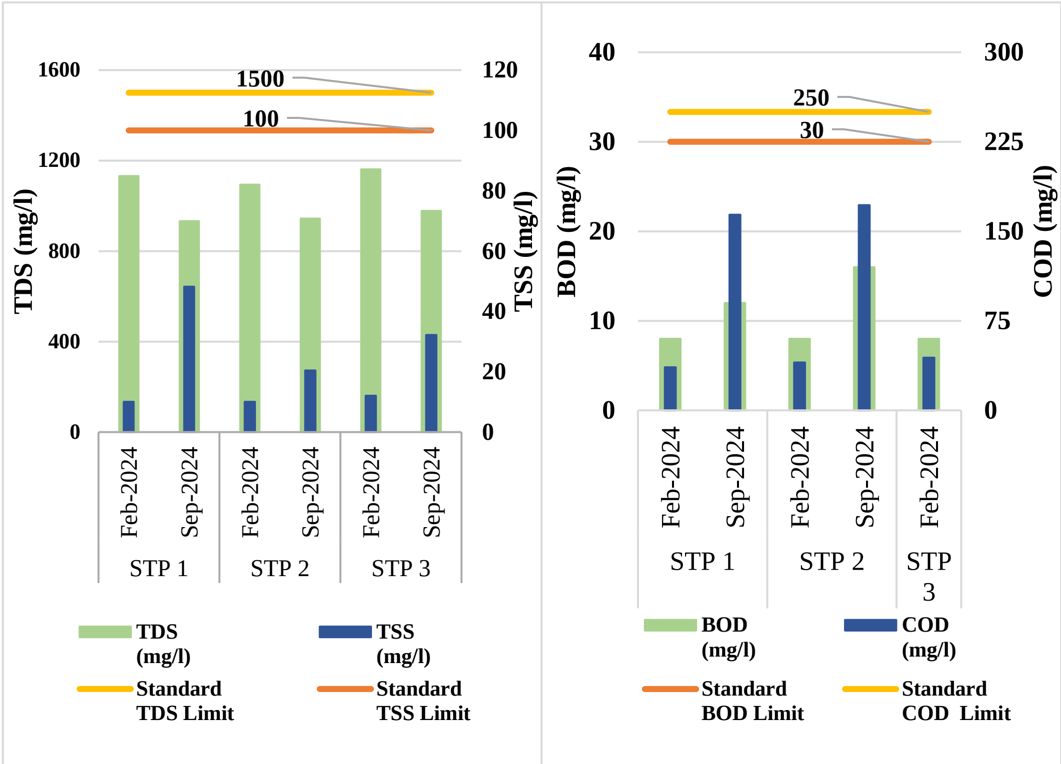


Figure 9 TDS, TSS, BOD and COD of treated wastewater

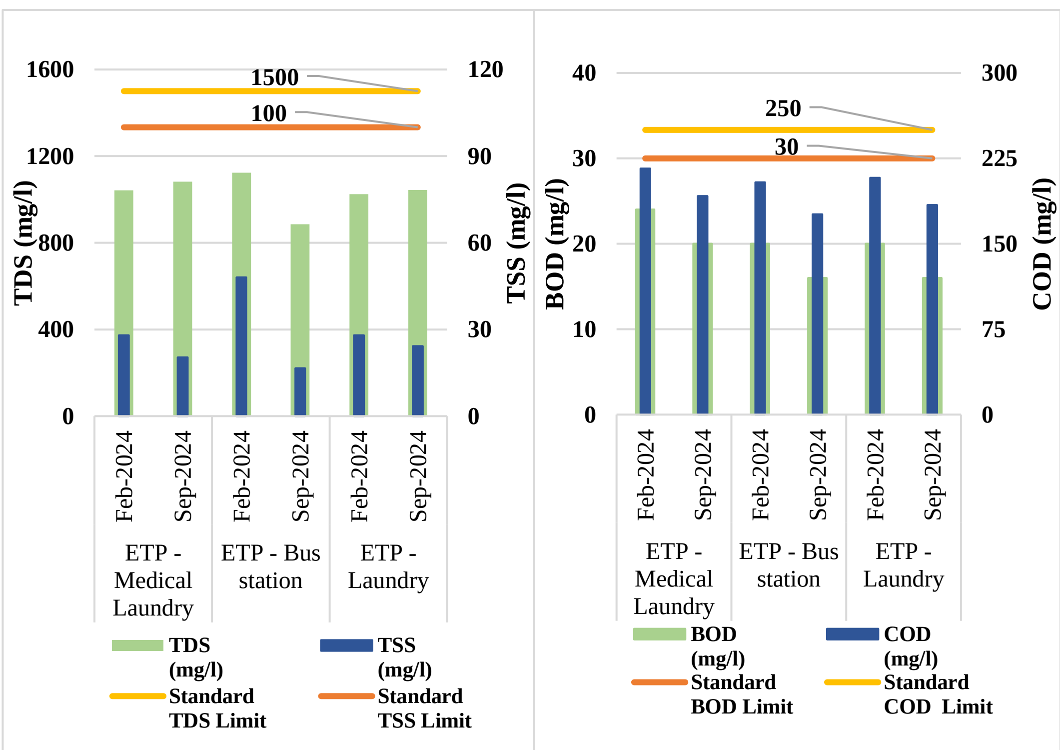


Figure 10 TDS, TSS, BOD and COD of treated effluent

8.4 To increase the electricity consumption through renewables by 5% (Obj. No. S1)

Conventional electricity is being replaced by renewable sources of energy. In 2023, a total of 865 kWp in solar panels was installed. To further expand our renewable energy sources, an additional 2.5 MW of solar panels was installed in April 2024. As a result, the total capacity of solar panels installed across the campus now stands at 3.3 MW, generating approximately 1,55,93,196 kWh of electricity annually. Additionally, the campus purchases green power to supplement conventional electricity.

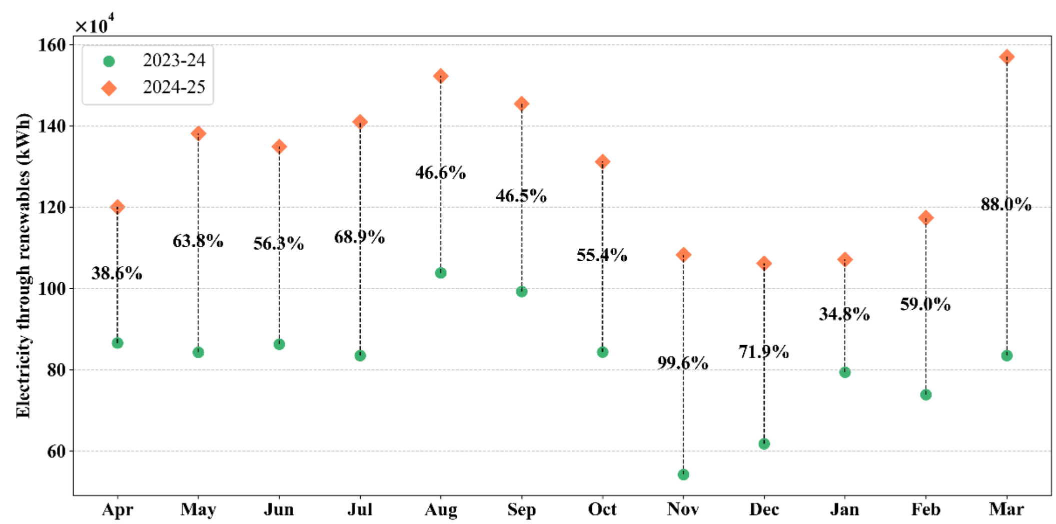


Figure 11 Electricity consumption through renewable sources

An objective was set to increase the electricity consumption through renewables by 5%, compared with the previous year, 2023-24. The total electricity consumption through renewables in the year 2023-24 is 98,13,723 kWh. In 2024-25, the electricity generated through renewables is 1,55,93,196 kWh, which is 59% greater than that of the previous year (Figure 11). Thus, we have exceedingly achieved the target of increasing electricity consumption through renewables.

8.5 To minimize the diesel consumption for transit facilities by 3% (Obj. No. S2)

Twelve electric golf vehicles are available for transportation within the campus to replace conventional fuel-based vehicles. To limit vehicular emissions, the university has acquired fourteen Bharat VI stage vehicles. Figure 12 illustrates the diesel consumption for transportation facilities in 2024-25.

In 2023-24, the total diesel consumed for transportation facilities was 7,15,264 liters. In 2024-25, the total diesel consumption increased to 7,53,194 liters, which represents a 5% rise compared to the previous year. Round trips to numerous events and functions contributed to this increase in diesel consumption. Therefore, it is planned to reduce the diesel consumption by identifying optimal solutions.

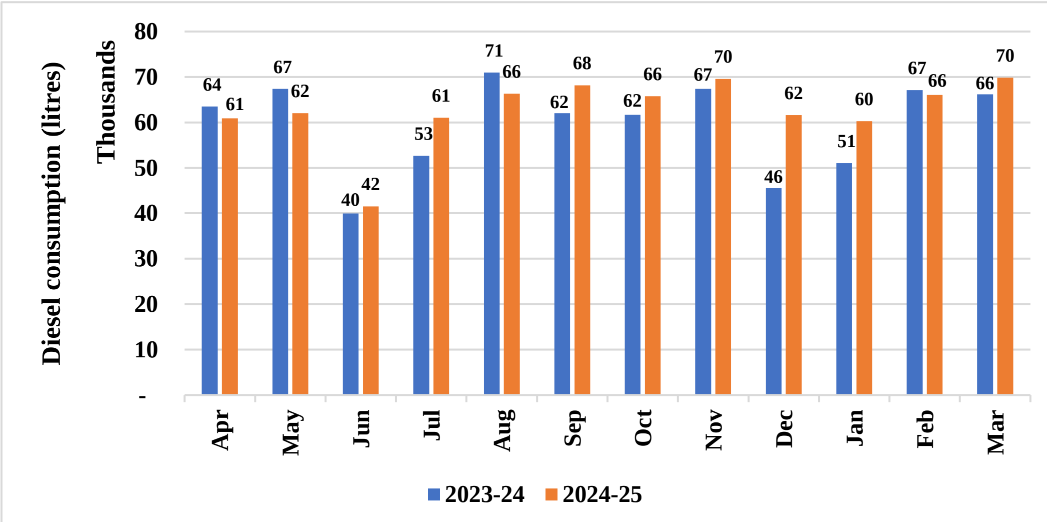


Figure 12 Diesel consumption for transit facilities

8.6 To increase the recycling recovery rate by 10% (Obj. No. S3)

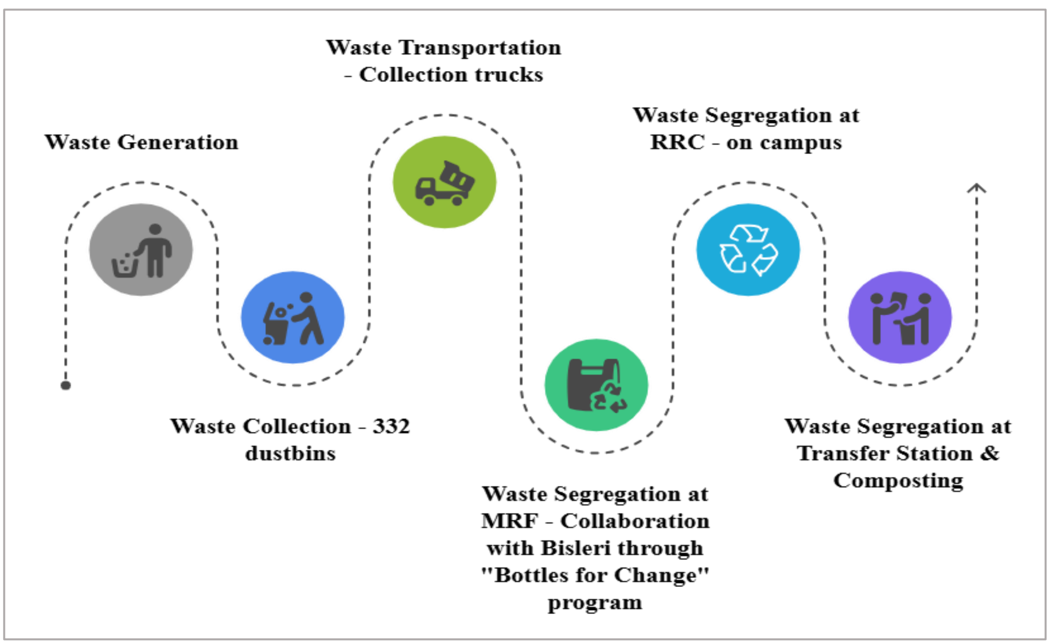


Figure 13 Solid waste management process at SRMIST, Kattankulathur Campus

The solid waste management process established on campus is illustrated in Figure 13. The total amount of solid waste segregated was 2,25,198 kg in 2024-25, compared to 52,259 kg in 2023-24 (Figure 14). The recycling rate for 2023-24 was approximately 2%. However, by implementing sustainable waste management practices in 2024-25, the recycling rate increased to around 10%. Therefore, the objective of increasing the recycling rate by 10% has been successfully achieved.

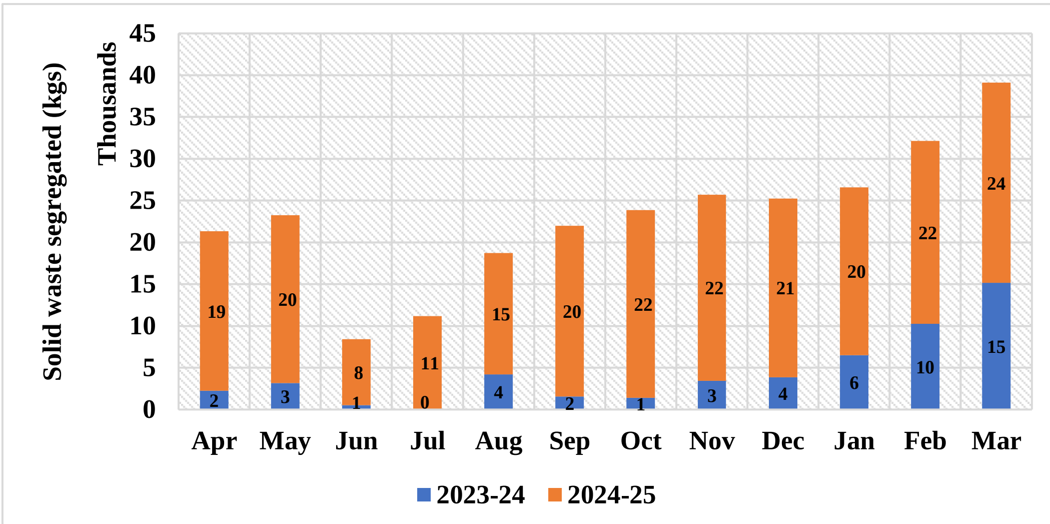


Figure 14 Solid waste segregated

8.7 To minimize the LPG consumption through biogas and solar steam by 2% (Obj. No. S4)

Liquefied petroleum gas (LPG) serves as the primary fuel source for cooking facilities in the mess and canteens. Because LPG is a non-renewable energy source, biogas and solar steam are utilized as renewable alternatives. In the year 2024-25, a total of 13,377 kg of biogas is produced, representing a 57% increase compared to the 8,497 kg produced in 2023-24. This amount of biogas is approximately equivalent to the consumption of 700 LPG cylinders, each weighing 19 kg.

Steam is generated by harnessing solar radiation, which is then used for boiling water and preparing hot beverages. In 2024-25, 51,265 kg of solar steam is produced, marking a 95% increase from the 26,263 kg produced in the previous year. This quantity of solar steam is roughly equivalent to the use of 370 LPG cylinders of 19 kg each. Consequently, these initiatives have resulted in a 1.4% reduction in the consumption of LPG cylinders compared to the year 2023-24 (Figure 15).

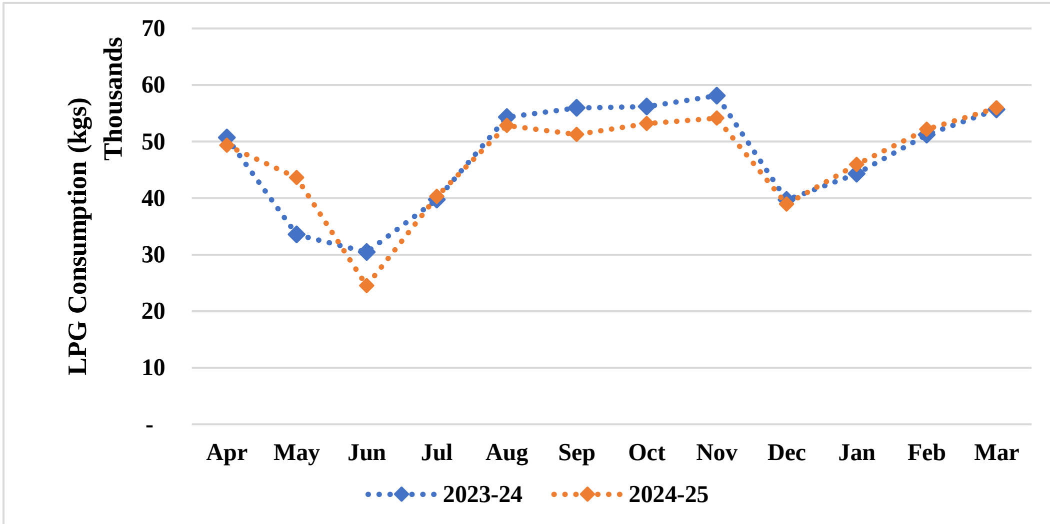


Figure 15 LPG Consumption

8.8 To conduct 10 numbers of training programs for the CFT members (Obj. No. S5)

Training sessions were conducted to enhance the competence of cross-functional team members. During the year 2024-25, a total of 11 competence training sessions, 6 awareness programs, and 1 internal auditor training for ISO 14001:2015 certification were held. The major topics covered included plumbing applications, electrical applications, fire safety, solid waste management, horticulture waste management, and computer applications. Thus, the objective of conducting 10 training programs was successfully exceeded.

9 Summary

The primary objective of quantifying energy use has been achieved by calculating the energy use intensity (EUI) for all buildings and identifying those with high EUI values. Further analysis will be conducted on the buildings with high EUI values to pinpoint the factors contributing to elevated energy consumption and to propose measures for reducing electricity usage. The goal of quantifying water use has been partially accomplished. The installation of water meters is currently in progress and will be expedited to meet this objective. Air and water quality parameters are regularly tested and remain within the prescribed standard limits. Therefore, the third primary objective has been met.

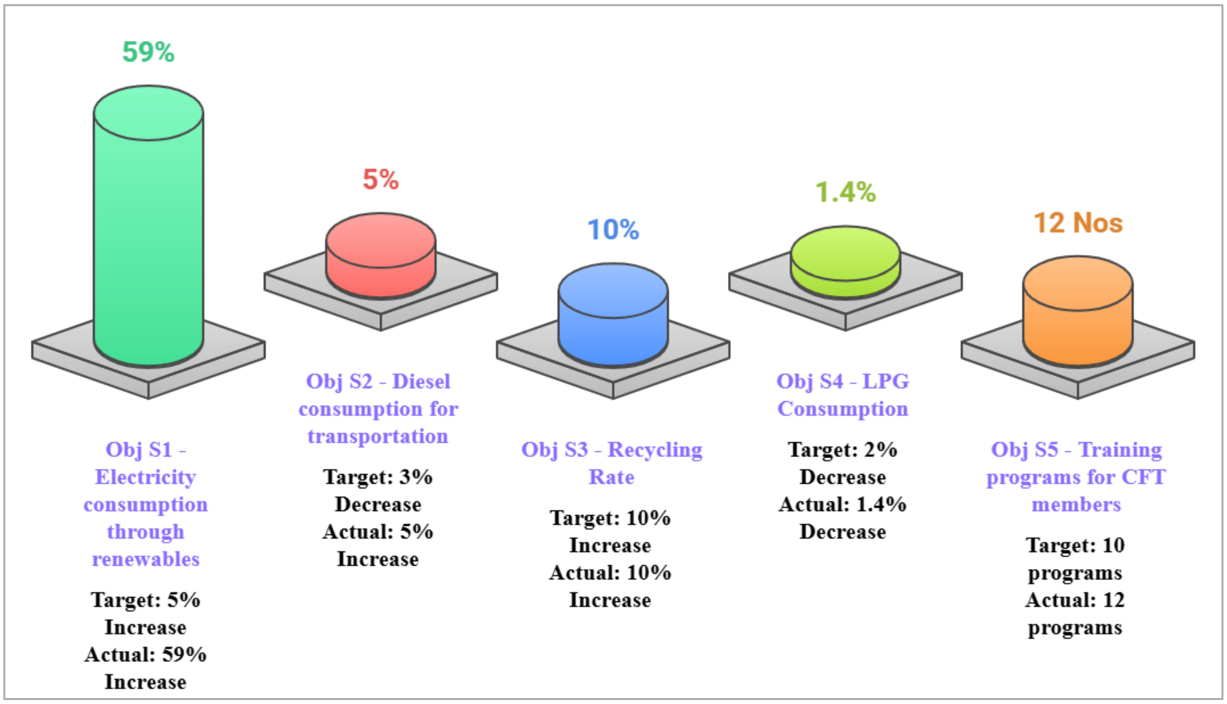


Figure 16 Objectives set and current level of attainment

The secondary objective of increasing electricity consumption through renewables by 5% has been achieved. Electricity consumption from renewable sources has surged by 59% due to the installation of additional solar panels (Figure 16). However, diesel consumption has risen by 5% compared to the previous year, attributed to the additional round trips for numerous events. In the coming years, further measures will be implemented to reduce diesel consumption. The solid waste recycling rate has increased to 10% as a result of effective solid waste management practices. Moreover, LPG consumption has decreased by 1.4%, facilitated by the increased production of renewable sources such as biogas and solar steam. Additionally, 12 competency training sessions have been conducted for cross-functional team members to enhance their skills and raise awareness about sustainability practices.

***************** End of the Report*****************