

## 7.2.3. Carbon Reduction and Emission Reduction Process

### 2023–2024

AASTMT has annual plan and procedures for carbon management and reducing carbon dioxide emissions. Each year carbon footprint is measured and compared to previous' years emissions to confirm the effectiveness of the pre-set measures to reduce carbon emissions and verify AASTMT progress towards its long-term goal of achieving 50% emission reduction by 2040 which goes in accordance with the national goal towards emissions reduction. Annual related Plans and Progress Reports can be found in the link below.

[AASTMT Annual Climate Action Plans and Emissions Progress Reports](#) on AASTMT webpage

### 2023/2024 Process for Emissions Reduction and Climate Action

To support decarbonization within its campuses, AASTMT takes consistent measures that are continuously carried out, besides yearly updated measures which are reflected in carbon emissions reduction among its campuses.

#### 2024 AASTMT Measures Towards Carbon Emissions Reduction

Measures taken by AASTMT in 2024 to contribute to emissions reduction are discussed in details in AASTMT 2024 Climate Action Plan as well as AASTMT Carbon Emissions Reduction and Sustainability Progress Report (2024).

[AASTMT Climate Action Plan 2024](#) on AASTMT webpage

[AASTMT Carbon Emissions Reduction and Sustainability Progress Report \(2024\)](#) on AASTMT webpage

These measures can be summarized as;

#### 1. Regular Measures

- Conduct regular assessments of carbon emissions to implement strategies for reduction.
- Proceeding with the comprehensive recycling program implemented across all campuses, targeting paper, plastic, and electronic waste
- Consistent and expanded use of digital platforms to reduce paper consumption.

#### 2. AASTMT 2024 Process

- Different Scopes of emissions are tackled in 2024 as follows,

**Scope 1 (Direct):** Scope 1 covers emissions from university-controlled sources, principally refrigerant leakage from HVAC/refrigeration systems and fuel use in university-controlled equipment/vehicles. Thus, in 2024, Scope 1 is to be reduced by applying tighter refrigerant management and continued operational efficiency measures.

**Scope 2 (Purchased electricity):** Scope 2 accounts for emissions from grid electricity used by AASTMT. AASTMT efforts focuses on operational optimization and energy efficiency upgrades—when ~95% of conventional lighting had been replaced with LED and smart building management systems (BMS) had been deployed across major buildings. In 2024,

teams prioritized BMS tuning (scheduling, set-points, and alarms), targeting HVAC, and light controls in high-use spaces.

Besides, full dependence on about 230kW on-site solar output to lower grid dependence is achieved in 2024. This includes 150kW grid-tied PV station in AASTMT Aswan branch and 50kW grid-tied PV station in AASTMT Alex. Abukir campus, both feature net-metering systems as well as solar heaters in Pharmacy college and Students' dorms in AASTMT Alex. Abukir branch. This is detailed in

[AASTMT 2024 Plan towards Clean Sustainable Energy](#) on AASTMT webpage

**Scope 3 (Selected categories):** Scope 3 remains the largest share and includes waste, water, paper, and transmission & distribution (T&D) losses associated with purchased electricity. In 2024, AASTMT plans to implement measurable waste minimization targets and standardized protocols for sorting and collection across campuses, including: (i) expanding labeled collection points in high-traffic areas, (ii) reinforcing operating procedures with facilities teams, and (iii) running term-start refreshers for staff and students.

- Promote behavioral change among staff and students to reduce energy consumption, foster awareness, and encourage sustainable practices via initiatives, campaigns and workshops.

[Energy-related Events](#) on AASTMT webpage  
[Energy-related Activities](#) on AASTMT webpage

- Engage postgraduate students and faculty in conducting studies on climate adaptation, carbon footprint and decarbonization in AASTMT campuses, especially the largest AASTMT Alex. campus as per the latter, a study was conducted in 2024 and published in 2025 as shown in the link below.

[Sciencedirect](#)

This study proposed a roadmap toward total AASTMT - Alex campus sustainability through four dedicated energy and emissions management strategies-solar rooftop PV installation, electric bus conversion, smart building technology deployment, and biodiesel production from waste cooking oils. These measures theoretically reduce the carbon emissions of CMTT campus by 696.76 tCO<sub>2</sub>e per year, along with an annual cost-saving of about 87,500 dollars when implemented jointly. Each strategy was studied qualitatively and quantitatively, and the strengths were discovered to differ in regard to emissions effects, financial return, and convenience of implementation. The solar PV system creates a perfect impact on emissions, besides the financial argument, while smart building retrofits are quickly paid back. Biodiesel production has a small contribution, but has added value of closing the resource loop while demonstrating for educational purposes.

- Prioritizing fields of decarbonization and clean energy in 2024/2025 research and graduation projects.

## Validation of 2024 AASTMT Measures Towards Emissions Reduction

As per Carbon Emissions, calculations were made to evaluate carbon emissions (kg CO<sup>2</sup>-e) in Alexandria campus for the years 2018 to 2024 as discussed in 2024 AASTMT Insights Report

[AASTMT 2024 Energy and Carbon Insights](#) on AASTMT webpage

Table 1 presents the emissions across Scope 1, Scope 2, and Scope 3, as well as total carbon emissions, within the period 2018-2024, while Fig. 2 zooms into emissions insights within 2021-2024. Using the Greenhouse Gas Protocol's framework, insights are provided into direct and indirect emissions, to identify key areas for improvement. Scope 1 emissions, which encompass direct emissions from university-controlled sources, include fuel usage for the campus transport fleet and emissions from refrigerant leaks in air conditioning and refrigeration systems. On the other hand, Scope 2 emissions arise from indirect emissions due to purchased electricity, while Scope 3 emissions account for indirect emissions from activities as waste disposal, water usage, and paper consumption.

Analyzing these emissions insights, it is concluded that by year-end 2024, AASTMT's total carbon footprint is 103,862,750 kg CO<sup>2</sup>-e, a further -3.0% from 2023's 107,075,000 kg CO<sup>2</sup>-e. Against the **2019** base year (154,594,380.99 kg CO<sup>2</sup>-e), this equates to a -32.8% reduction—keeping AASTMT comfortably on track to maintain the ≥30% reduction by 2025 required by the Climate Action Plan and aligned with the longer-term -50% by 2040 goal.

Reductions were achieved across Scope 1, Scope 2, and Scope 3, driven by improved refrigerant management, energy-efficiency upgrades (including the 2023 LED/BMS program), incremental on-site solar generation, and continued waste and paper minimization. Consistent with the published series, Scope 3 remains the dominant share while showing gradual improvement due to resource-efficiency measures and procurement practices as discussed in details in 2024 AASTMT Carbon Emissions Report.

[2024 AASTMT Carbon Emissions Progress Report](#) on AASTMT webpage

Table 1: AASTMT-Alexandria campus- Carbon Emissions from 2018 to 2024 (kg CO<sup>2</sup>-e)

Year	Scope 1 (kg CO <sup>2</sup> -e)	Scope 2 (kg CO <sup>2</sup> -e)	Scope 3 (kg CO <sup>2</sup> -e)	Total Emissions (kg CO <sup>2</sup> -e)
2018	1,244,230.50	1,240,286.52	98,997,739.78	101,482,256.80
2019	1,374,252.42	1,151,281.20	152,068,847.38	154,594,380.99
2020	972,551.04	869,471.36	87,130,328.87	88,972,351.27
2021	1,561,942.92	1,008,256.20	112,858,633.63	115,428,832.75
2022	1,300,000.00	950,000.00	110,000,000.00	112,250,000.00
2023	1,150,000.00	925,000.00	105,000,000.00	107,075,000.00
2024	1,092,500	897,250	101,873,000	103,862,750.00

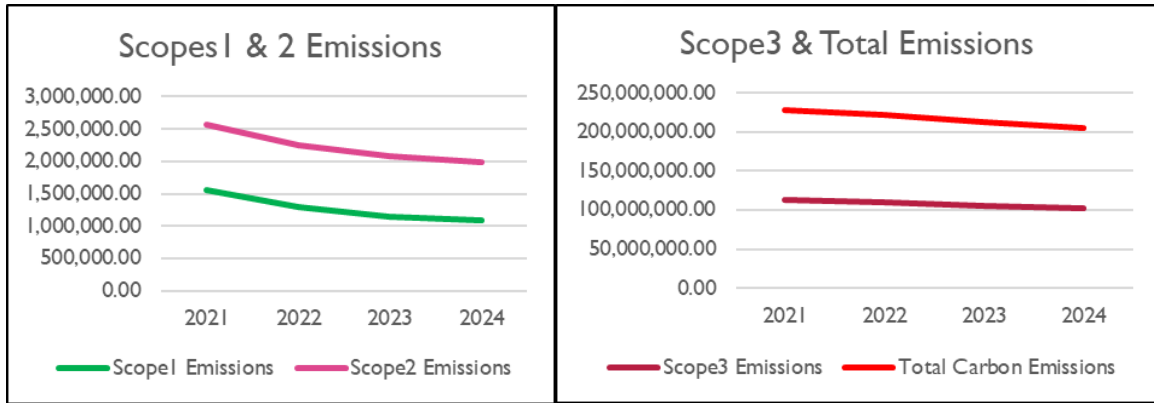


Figure 1: Zooming into AASTMT-Alexandria campus- Carbon Emissions (kg CO<sub>2</sub>-e) within 2021- 2024

## 2022/2023 Process for Emissions Reduction and Climate Action

Measures taken by AASTMT in 2022/2023 to contribute to emissions reduction are discussed in details in AASTMT 2022/2023 Progress Report of Carbon emissions and Climate Action as well as AASTMT 2022/2023 Climate Action Plan found in the link below

[AASTMT 2022/2023 Climate Action Plan](#) on AASTMT webpage

[AASTMT 2022/2023 Emissions Progress Report](#) on AASTMT webpage

These measures are summarized as;

- Conduct regular assessments of carbon emissions to implement strategies for reduction.
- Prioritize renewable energy projects and the exploration of available clean energy sources.
- Implement efficiency measures such as upgrading to LED lighting, enhancing HVAC systems, and incorporating smart building technologies.
- Towards Zero-Waste Strategy, a comprehensive recycling program was implemented that expanded across all campuses, targeting paper, plastic, and electronic waste. By 2023, AASTMT had achieved a 50% waste diversion rate, a significant milestone in reducing the amount of waste sent to landfills.
- In addition to recycling, the university introduced composting facilities in dining areas in 2022. These composting stations allowed for the proper disposal of food waste, diverting approximately 10% of organic waste from landfills in 2023. Combined with increased recycling efforts, this led to a total reduction in landfill waste by 15% compared to 2020 levels.
- The university also made progress in reducing paper consumption by encouraging the use of digital platforms. By 2023, paper usage had decreased by 25% compared to 2020.
- Additionally, AASTMT introduced an electronic waste recycling program, ensuring that all obsolete electronic equipment was disposed of sustainably, further contributing to its zero-waste goals.

- Promote behavioral change among staff and students to reduce energy consumption, foster awareness, and encourage sustainable practices.
- Engage students and faculty in research on climate adaptation, with a focus on vulnerable regions such as the Middle East and North Africa.
- Integrating sustainability topics into 90% of AASTMT undergraduate and postgraduate programs.

The previously discussed measures towards emissions reduction as well AASTMT 2022/2023 measures towards higher energy efficiency, energy saving and expansion in renewable energy employment, as discussed in details in [AASTMT 2022/2023 Plan towards Clean Sustainable Energy](#), have effectively resulted in total carbon emissions reduction in 2023 by 4.6% from 2022, 7.2% from 2021, and notably by 30% from 2019 emissions, as demonstrated in [AASTMT 2022/2023 Insights](#). This is explained below.

Calculations were made to evaluate carbon emissions (kg CO<sup>2</sup>-e) in Alexandria campus for the years 2018 to 2023 as shown in Table 1. Table 1 presents the emissions across Scope1, Scope2, and Scope3, using the Greenhouse Gas Protocol's framework. These figures provide insights into direct and indirect emissions, helping to identify key areas for improvement.

[AASTMT 2022/2023 Emissions Progress Report](#) on AASTMT webpage

Table 1: AASTMT-Alexandria campus- Carbon Emissions from 2018 to 2023 (kg CO<sup>2</sup>-e)

Year	Scope 1 (kg CO <sup>2</sup> -e)	Scope 2 (kg CO <sup>2</sup> -e)	Scope 3 (kg CO <sup>2</sup> -e)	Total Emissions (kg CO <sup>2</sup> -e)
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2022	1,300,000.00	950,000.00	110,000,000.00	112,250,000.00
2023	1,150,000.00	925,000.00	105,000,000.00	107,075,000.00

**Scope 1 emissions**, which encompass direct emissions from university-controlled sources, include fuel usage for the campus transport fleet and emissions from refrigerant leaks in air conditioning and refrigeration systems. In 2022, AASTMT recorded 1,300,000 kg CO<sup>2</sup>-e in Scope 1 emissions, which represents a modest reduction from previous years. This reduction was primarily driven by the electrification of a portion of the university's vehicle fleet, reducing reliance on fossil fuels. Scope 1 emissions decreased further to 1,150,000 kg CO<sup>2</sup>-e in 2023 due to continuous efforts to replace fuel-dependent vehicles and improvements in refrigerant management.

**Scope 2 emissions** arise from indirect emissions due to purchased electricity. In 2022, Scope 2 emissions were 950,000 kg CO<sup>2</sup>-e, reflecting a substantial decrease from previous years due to the installation of solar panels and photovoltaics. By 2023, the university reduced Scope 2 emissions further to 925,000 kg CO<sup>2</sup>-e.

**Scope 3 emissions** account for indirect emissions from activities as waste disposal, water usage, and paper consumption. These emissions represented the largest share of AASTMT's carbon footprint, but significant reductions were achieved, with Scope 3 emissions totaling 110,000,000 kg CO<sup>2</sup>-e in 2022 decreasing more to 105,000,000 kg CO<sup>2</sup>-e in 2023 due to improved waste management and reduced paper consumption.

In summary, the total emissions for 2023 reflect a steady decrease by 4.6% from 2022 emissions and 7.2% from 2021 emissions, while a notable reduction of 30% from 2019 which witnessed the highest emissions rate since 2018. (Note that 2020 was the Covid year, that's why emissions were the lowest). These reductions demonstrate AASTMT's commitment to its long-term goal of achieving 50% carbon reduction by 2040.