AASTMT 2025 Insights:
Insights into Energy Consumption and Carbon Emissions

To assess AASTMT's progress in energy efficiency and carbon emissions reductions, it is essential to establish a baseline using data from 2019 to 2023. This serves as a foundation for future energy consumption and emissions and allows for a clear comparison with data from 2024 and 2025.

1. Energy Consumption

AASTMT Energy Research Unit and Energy Management Committee put forward several strategies and measures towards regular online monitoring of energy consumption in all AASTMT campuses, rationalization in energy usage and enhancing energy efficiency besides supporting renewable energy employment and cutting off carbon emissions. Insights of energy consumption and carbon footprint were prepared by AASTMT Energy Sustainability Team and AASTMT Energy Management Committee based on the activities of the Maintenance and Electrical Facilities Department and Project Management in Abu Qir. This mechanism is maintained annually for regular follow-up and assessment of the outcomes of AASTMT 2025 Energy Plan which will be concluded in AASTMT 2024/2025 Energy Progress Report.

AASTMT 2024/2025 Plan towards Clean Sustainable Energy

➢ Electrical Energy consumption in all Alexandria campuses

First, **energy consumption in all campuses of AASTMT Alexandria branch** is first analyzed since this branch experiences the highest consumption due to its multiple campuses and largest number of staff and students. **Figure 1** illustrates the total electrical energy consumption across all AASTMT Alexandria campuses over the period 2019–2025. Within the period 2019-2021, AASTMT wasn't working at full capacity due to Covid19. However, after Covid19, AASTMT capacity gradually increased until all the branches returned to their full load in **2022** with a total value of **11,257,258 kWh**. Following the yearly renovation and modernization plan implemented across all Alexandria branch buildings of the Academy, notable energy savings are achieved in electricity consumption in **2023** and **2024**. Proceeding with the annual energy-saving procedures, **2025** witnessed electricity consumption of **10,235,637 kWh**, representing a further decrease of **2.5%** (**262,460 kWh**) compared with **2024**.

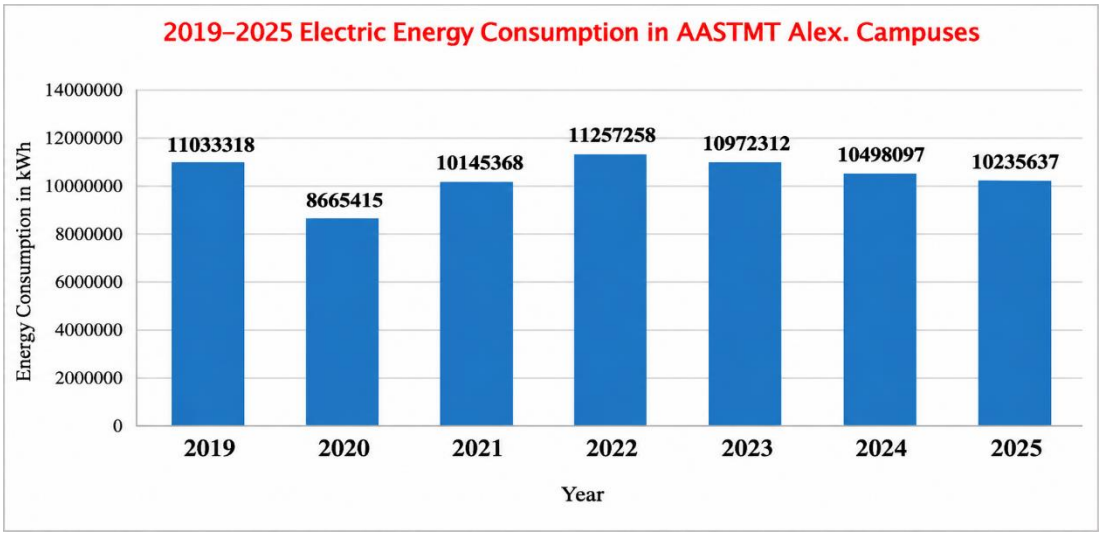


Figure 1. Total Electrical Energy consumption in AASTMT Alexandria campuses (2019-2025)

The continuous progress in energy savings reflects efforts of AASTMT Energy Management Team who is responsible for monitoring and analyzing energy consumption, identifying opportunities for energy savings, and developing plans to upgrade existing electrical systems and appliances using energy-efficient technologies. The main energy-efficiency measures implemented across Alexandria AASTMT branch are detailed in AASTMT **2024/2025 Renovation and Upgrading Report** of AASTMT Alexandria campuses, given in the link below, along with examples of reduction in recorded energy consumption as shown in **Table 1**.

AASTMT 2024/2025 Renovation and Upgrading Plan

Table 1. Examples of reduction in recorded energy consumption in Alexandria branch in 2025 vs. 2024

System	2024 Energy (kWh)	2025 Energy (kWh)	Change (kWh)
LED Lighting	124,816	150,640 (consumption increased as there were many replacements to conventional bulbs to LEDs to reach 97% LED lighting in 2025	+25,824
Irrigation	124,816	0 (Irrigation relied on solar irrigation unit implemented in 2024)	−124,816
Air-Conditioning Units	144,420	86,652	−57,768
Motors and Equipment	80,237	60,525	−19,712

Accordingly focusing on energy consumption in AASTMT Alexandria different campuses from 2023-2025, **Figure 2** confirms energy saving across different Alexandria campuses in **2025** compared to **2024** and **2023**. **From 2024 to 2025**, all AASTMT Alexandria campuses achieved a reduction in electrical energy consumption with overall reduction of **2.50%,** reflecting AASTMT's continued commitment to energy conservation.

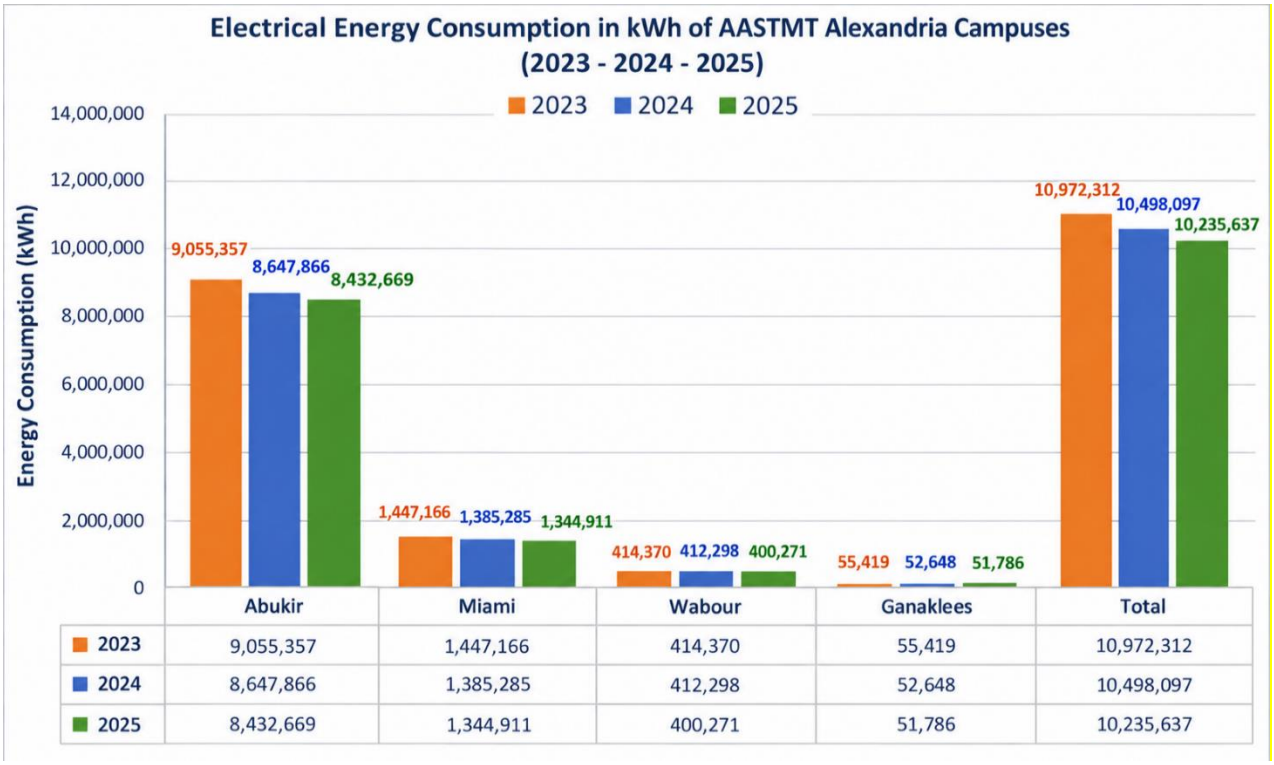


Figure 2. Electrical Energy consumption in each AASTMT Alexandria campus (2023-2025)

➢ Energy consumption in all AAST branches all over Egypt

Regarding Energy consumption in all AAST branches all over Egypt (Alexandria, Aswan, Port-Said, Alamin, Sheraton, Smart village and Dokki), **Figure 3** demonstrates **2025 electrical energy consumption % in all AAST branches** with a total of **18,585,647 kWh**. It is clear that more than half of AASTMT electrical consumption is concentrated in AASTMT Alexandria branch campuses.

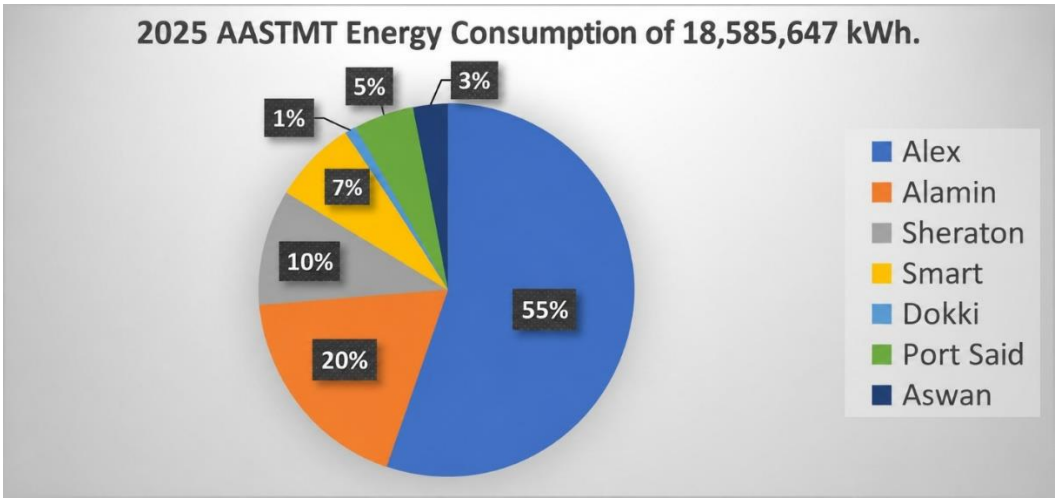
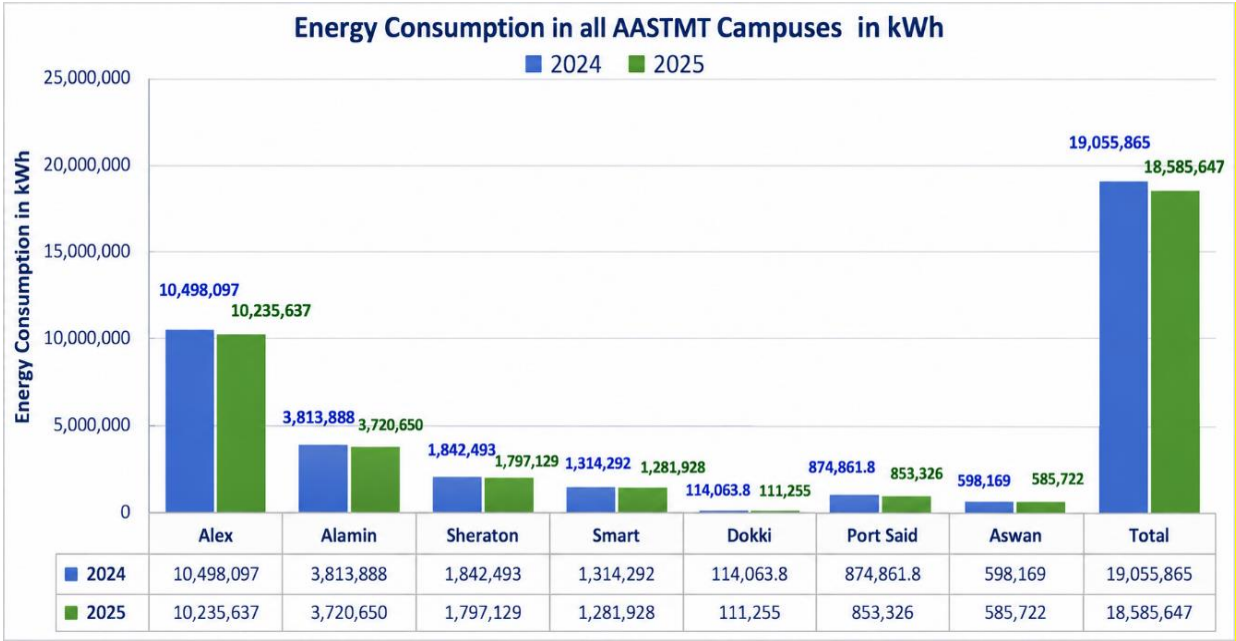


Figure 3. 2025 Energy Consumption in all AAST branches in %

Measures, supporting AASTMT's commitment to improving energy efficiency and reducing electricity consumption, are also implemented across its other branches. The is reflected in the reduction in electricity consumption of each branch, as shown in **Figure 4**. It is noted that there is reduction in total energy consumption by around **2.47%,** from **19,055,865 kWh** in **2024** to **18,585,647 kWh** in **2025,** reflecting AASTMT's continued progress towards energy conservation and improved energy efficiency across all its branches.



	Alex	Alamin	Sheraton	Smart	Dokki	Port Said	Aswan	Total
2024	10,498,097	3,813,888	1,842,493	1,314,292	114,063.8	874,861.8	598,169	19,055,865
2025	10,235,637	3,720,650	1,797,129	1,281,928	111,255	853,326	585,722	18,585,647

Figure 4. Comparison between 2024 and 2025 energy consumption in all AASTMT branches

➢ Renewable Energy Employment

According to the New and Renewable Energy Authority (NREA), Egypt's total installed renewable energy capacity reached approximately **8.6 GW** by the end of **2024/2025**, compared with approximately **6.8 GW** in **2023/2024**, reflecting an increase of around **26%** as shown in **Figure 5** [NREA 2025].
https://nrea.gov.eg/test/en/Media/New/2999

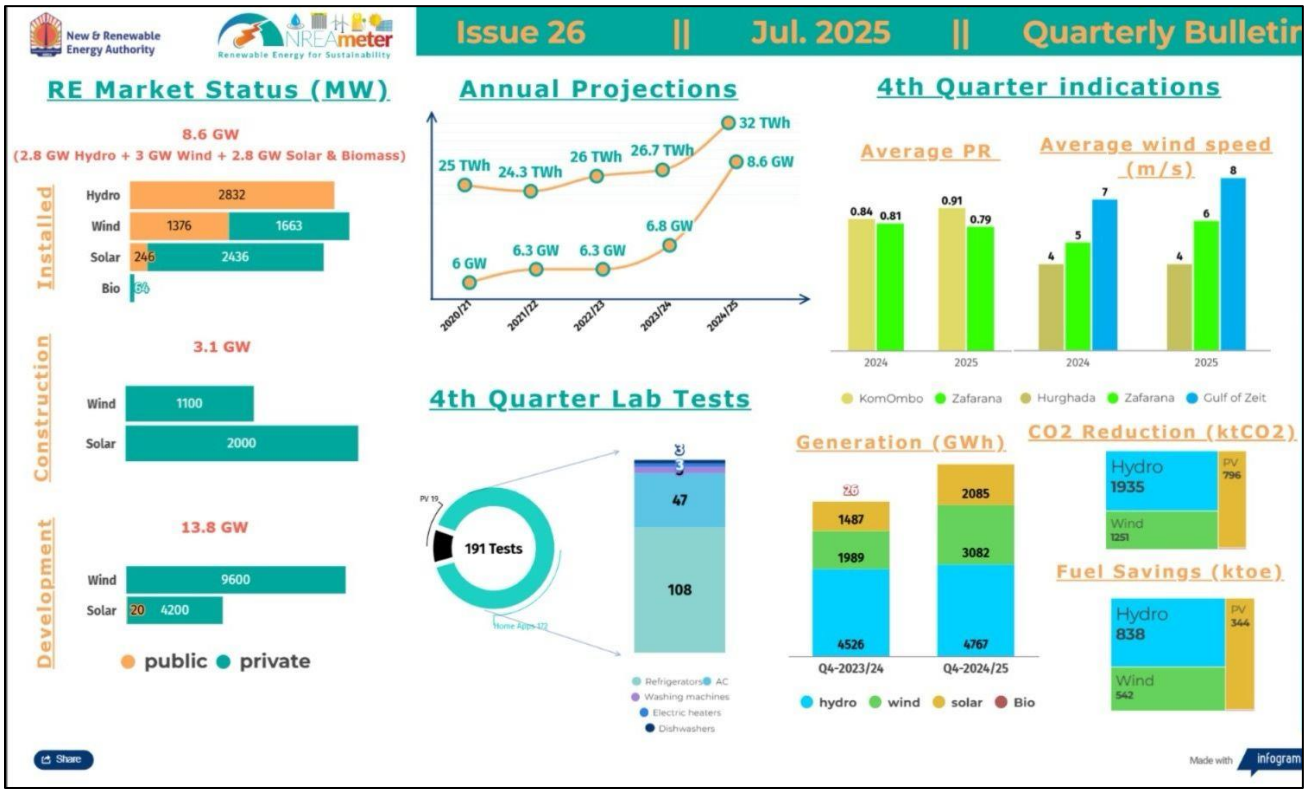


Figure 5. Renewable energy share in national grid [NREA Report 2025]

Since AASTMT's electricity consumption is supplied mainly by the Egyptian national grid, this growth is reflected on AASTMT energy usage from low carbon sources, as shown in **Table 2,** where the **average renewable energy share** in supplying AASTMT total energy demand from **national grid** reached almost **26 %** in **2025** which is more than the **25.1%** in **2024**. Besides renewable energy contributed in AASTMT from national grid, energy from **solar energy installations** across different AASTMT campuses buildings, has increased from **273.6GJ (75989kWh)** in **2024** to **286.7GJ (79632kWh)** in **2025** i.e. an increase of almost **4.78%** from **2024** to **2025.** This results in an increase of almost **1.08%** in AASTMT total energy usage from low carbon energy sources (from national grid and solar installations) in **2025** compared to that in **2024** as shown in **Figure 6.**

Table 2. AASTMT Energy usage from low carbon sources in 2024 and 2025

Energy usage from low carbon sources (2024-2025)	
From national grid only	2024: 17220.4 GJ 2025: 17396.14 GJ
From solar installations only	2024: 273.6 GJ 2025: 286.7 GJ
From national grid and solar installations	2024: 17494 GJ 2025: 17682.84 GJ

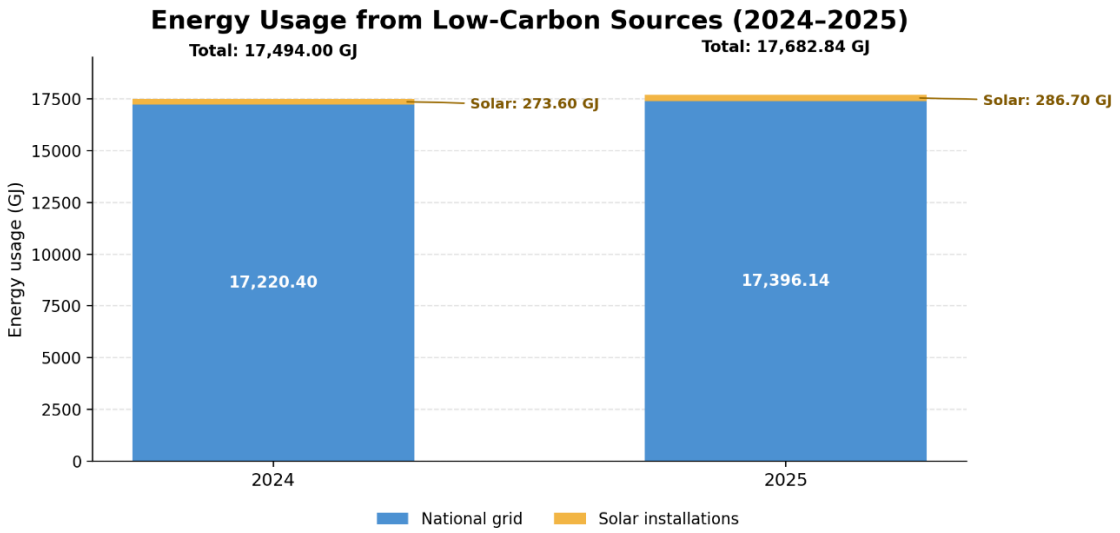


Figure 6. AASTMT Energy usage from low carbon sources in 2024 and 2025

➢ Total Energy Density in GJ/m2

Regarding **AASTMT 2025 energy density**, **Table 3** shows energy consumption analysis for all **AAST campuses allover Egypt** and gives **the energy density in kWh/m²**.

Table 3. Analysis of Energy for all AAST campuses in 2025

	Alex	Alamin	Sheraton	Smart	Dokki	Port Said	Aswan	Total
Floor Area (m²)	392402.5137	208000	45000	32000	1750	42000	14500	**735569.7**
Consumption (kWh)	10,235,637	3,720,650	1,797,129	1,281,928	111,255	853,326	585,722	**18,585,647**
Energy Density (kWh/m²)	26.085	17.888	39.936	40.060	63.574	20.317	40.395	**25.267**

Finally, **Table 4** summarizes **entire AAST energy supply** from national grid and from AASTMT total solar installations, in kWh/m² and GJ/m² from **2024-2025** and **the relative energy density** in **GJ/m²**. The latter reached about **0.09135GJ/m² in 2025** which is **less than** the **0.09363GJ/m² in 2024** by almost **2.43%,** mirroring AASTMT continuous efforts towards electrical energy conservation and energy efficiency improvement, besides the **increase** in **total energy consumption from low carbon** sources by almost **1.08%,** reflecting AASST support to transition to clean energy.

Table 4. Energy Density in GJ/m² for the entire AAST in 2024 - 2025

Year	Total Floor Area (m²)	Total energy (kWh) (from Grid + AAST solar infrastructure)	Total energy (GJ) (from Grid + AASTMT solar infrastructure)	Density (GJ/m²)	Energy from low carbon sources (GJ) (from national grid and solar infrastructure)
2024	735569.7	19,131,865	68874.714	0.09363	17494
2025	735569.7	18,665,279	67195	0.09135	17682.84

2. Carbon Footprint

AASTMT accounts for its emissions under the GHG Protocol Corporate Standard, for the organizational boundary under its operational control, covering all campuses in Egypt as given by **AASTMT Climate Action Plan 2025-2030** found in the link below.
AASTMT Climate Action Plans

➢ Baseline 2019-2024

The previous published **2019–2024** series covers **total emissions (Scope 1, 2 and 3) of AASTMT Alexandria campuses** (Abu Qir, Miami, Wabour El Maya and Gianaclis), given by

• **Scope 1 (direct):** fuel combustion in university-controlled sources and refrigerant emissions from air-conditioning and refrigeration.
• **Scope 2 (indirect, energy):** purchased electricity, reported location-based, with on-site solar generation reported alongside.
• **Scope 3 (selected categories):** waste, paper, water, and transmission and distribution (T&D) losses from purchased electricity — the same categories used in the published series.

It is clear from **Table 5** that there is **continuous reduction in carbon emissions** across the years **2019-2024.** During this period, reductions were achieved across all three scopes through refrigerant management, about 95% LED lighting, smart building management systems, on-site solar generation, and waste and paper reduction.

Table 5. Total emissions in $t.CO_2e$ in AASTMT Alexandria campus 2019-2024

Year	Total emissions ($t.CO_2e$)	Change against 2019
2019 (base year)	154,594	—
2022	112,250	−27.4%
2023	107,075	−30.7%
2024	103,863	−32.8%

➢ 2024/2025 Carbon Footprint as per GHG Protocol Corporate Standard

Under the direction of the President of AASTMT, a multidisciplinary committee coordinated by the Research and Innovation Center assessed the carbon footprint of **four AASTMT branches** (Abu Qir, Misr El-Gedida, Smart Village and South Valley) **for year 2024/2025**, following the **GHG Protocol and ISO 14064-1.** It covers Scope 1 (stationary and mobile combustion and fugitive emissions), Scope 2 (purchased energy, including outsourced cooling) and a wider set of Scope 3 sources: purchased goods and services, capital goods, water and wastewater, fertilizers, staff and student commuting, waste, business travel and leased assets. This is given by **AASTMT Carbon Footprint Report 2024-2025** given by;

AASTMT 2024/2025 Carbon Footprint Report
https://aast.edu/en/about/co2-footprint.php

Compared to 2019–2024 figures which covered AASTMT Alexandria branch campuses; the **2024–2025** figures cover four AASTMT branches and a wider set of Scope 3 sources, including commuting, business travel, food and other purchased goods and services. The breakdown by campus is given by **Table 6** and **Figure 7.**

Table 6. Breakdown of Carbon Footprint Report 2024/2025 by campus

Campus	Scope 1 (t.CO_2e)	Scope 2 (t.CO_2e)	Scope 3 (t.CO_2e)	Total (t.CO_2e)
Abu Qir	2,470	4,361	10,767	17,598
Misr El-Gedida	177	1,391	8,859	10,427
Smart Village	88.9	4,380	3,695	8,164
South Valley	119.2	307.8	1,637	2,064
Total, four campuses	2,855	10,440	24,958	38,253

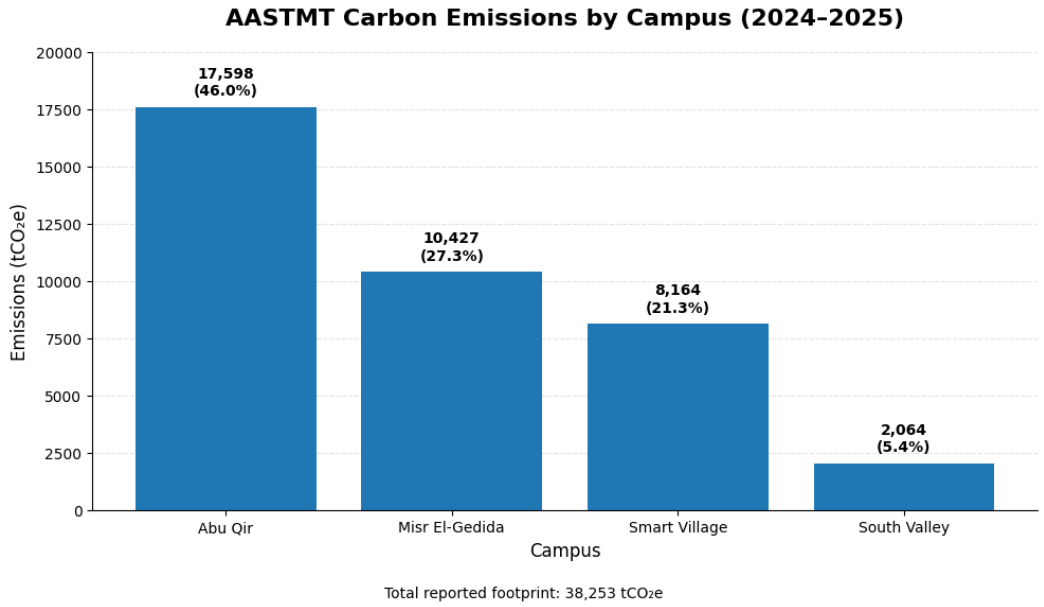


Figure 7. Breakdown of Carbon Footprint Report 2024/2025 by campus

It is worth noting that **Scope 3** makes up **65%** of the footprint of the four campuses, **Scope 2** up to **27%** and **Scope 1** up to **8%**. Emissions are 1.73 t CO_2e per student, below the global average of 2.67 t CO_2e per student cited in the report. The main sources are commuting, the Abu Qir vehicle fleet, outsourced cooling at Smart Village, food at Abu Qir and refrigerant leakage at South Valley. This assessment extends the inventory to a wider range of Scope 3 sources and gives a detailed picture for each campus.

Finally, during period 2025-2030, AASTMT has put a **Climate Action Plan 2025-2030**, intending to extend this wider assessment to all its campuses based on **GHG Protocol and ISO 14064-1.** AASTMT measures towards reducing Scope 1, 2 and 3 emissions will be assessed annually given the baseline measured in 2025, to make sure the 2025-2030 plan is progressing each year.
AASTMT Climate Action Plans

3. Discussion

The assessment of AASTMT's energy consumption, renewable energy utilization, and carbon emissions during 2024–2025 demonstrates continued progress towards improving energy efficiency, promoting clean energy, and achieving institutional decarbonization targets. Across all AASTMT branches in Egypt, total electricity consumption decreased from 19,055,865 kWh in 2024 to 18,585,647 kWh in 2025, representing a reduction of approximately 2.47% (470,218 kWh), reflecting the positive impact of energy conservation measures and annual renovation programs. In Alexandria campuses, electricity consumption declined further by approximately 2.5%, reaching 10,235,637 kWh in 2025. Energy efficiency improvements are also reflected in the reduction of overall energy density from 0.09363 GJ/m² in 2024 to 0.09135 GJ/m² in 2025, equivalent to a 2.43% improvement. Regarding clean energy utilization, the renewable energy contribution from the national grid increased from 25.1% in 2024 to approximately 26% in 2025, while electricity generated through AASTMT's on-site solar installations increased from 75,989 kWh to 79,632 kWh, achieving a 4.78% increase. Consequently, total energy usage from low-carbon sources increased by approximately 1.08%, reaching 17,682.84 GJ in 2025. Furthermore, the historical carbon emissions inventory for Alexandria campuses indicates a substantial reduction of 32.8% between the 2019 baseline and 2024, demonstrating the impact of LED lighting, smart building management systems, refrigerant management, solar energy integration, and waste reduction initiatives. The 2024–2025 carbon footprint assessment further provides a more comprehensive institutional emissions baseline across four branches, identifying Scope 3 emissions as the largest contributor (65%), followed by Scope 2 (27%) and Scope 1 (8%). These findings highlight the importance of extending future efforts beyond electricity conservation to include sustainable transportation, cooling systems, procurement, and waste management.

4. Conclusion

AASTMT 2024/2025 measures towards energy efficiency and conservation, renewable energy employment and climate action, have effectively resulted in **KPIs** given in **Table 7.** This reflects AASTMT progress **Towards Efficient, Clean and Renewable AASTMT**, progressing perfectly with its long-term 2040 vision of increasing the renewable energy share by 40% and reducing carbon emissions by 50%.

Table 7. Key Performance Indicators 2024–2025

KPI	2024	2025	Achievement
Total electricity consumption	19,055,865 kWh	18,585,647 kWh	-2.47%
Alexandria electricity consumption	10,498,097 kWh	10,235,637 kWh	-2.50%
Energy density	0.09363 GJ/m²	0.09135 GJ/m²	-2.43%
Renewable share in national grid	25.1%	26%	+0.9 %
On-site solar electricity generation	75,989 kWh	79,632 kWh	+4.78%
Energy from low-carbon sources	17,494 GJ	17,682.84 GJ	+1.08%
Carbon Footprint		38,253 t.CO_2e	New Measurement methodology Evaluation will be in 2025/2026

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