



2024 AASTMT 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 2018 to 2022. This period serves as a foundation for future energy consumption and emissions and allows for a clear comparison with data from 2023 and 2024.

1. Energy Consumption

AASTMT Energy Research Unit and Energy Management Committee put forward several strategies for regular online monitoring of energy consumption in all AASTMT campuses. Insights of energy consumption 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 and the mechanism for follow-up and measurement of performance indicators (KPIs) as well as 2024 rationalization and renovation plans.

➤ 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** shows the **total energy consumption in the entire Alexandria Campuses** within the period **(2018-2024)**. It is clear that comparing the latest consumption in **2024 (10498097 kWh)** by the baseline in **2018 (12698059 kWh)** results in a total of **17.33% reduction in energy consumption**.

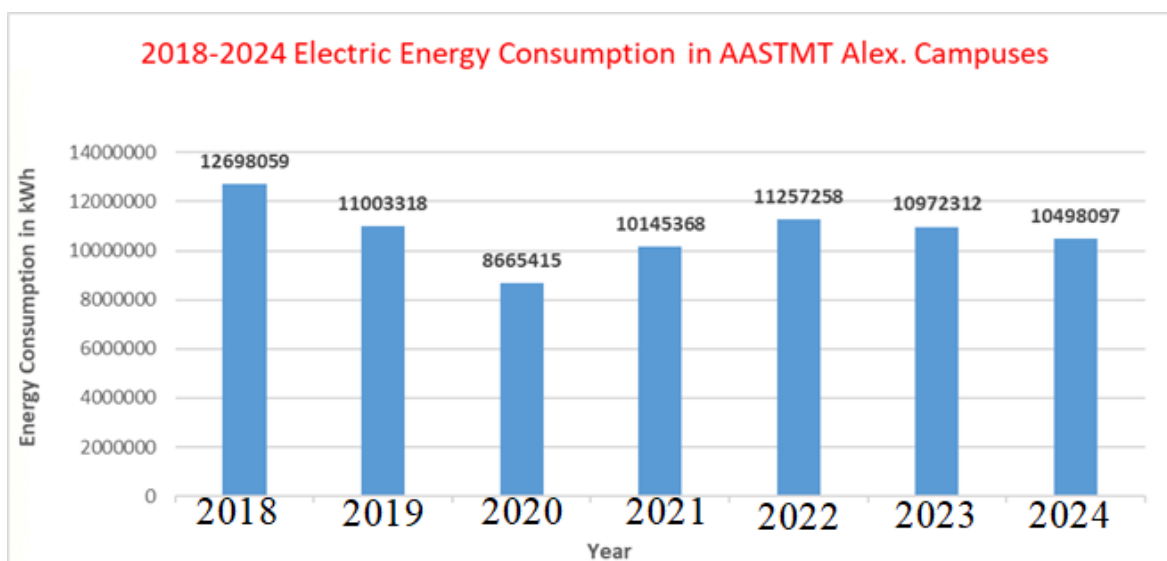


Figure 1. Total Electrical Energy consumption in kWh of AASTMT Alexandria campuses (2018-2024)

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** by **2.5% resulting in energy consumption of 10,972,312 kWh** as shown in **Fig. 2**. **Proceeding in the energy saving yearly procedures, 2024 witnessed energy consumption of 10,498,097 kWh with a further decrease of 4.32% from 2023.**

These savings resulted from the renewal, upgrading, and control of the electrical systems in different campuses of AASTMT Alexandria branch as discussed in details in **2024 Energy conservation report**, resulting in total electricity savings in **2024 of 474,289 kWh** from 2023 as shown in **Table 1**. This verifies the effectiveness of AASTMT plan and measures towards energy efficiency and saving in AASTMT entire Alexandria campuses in 2024.

[2024 Energy Conservation Report](#)

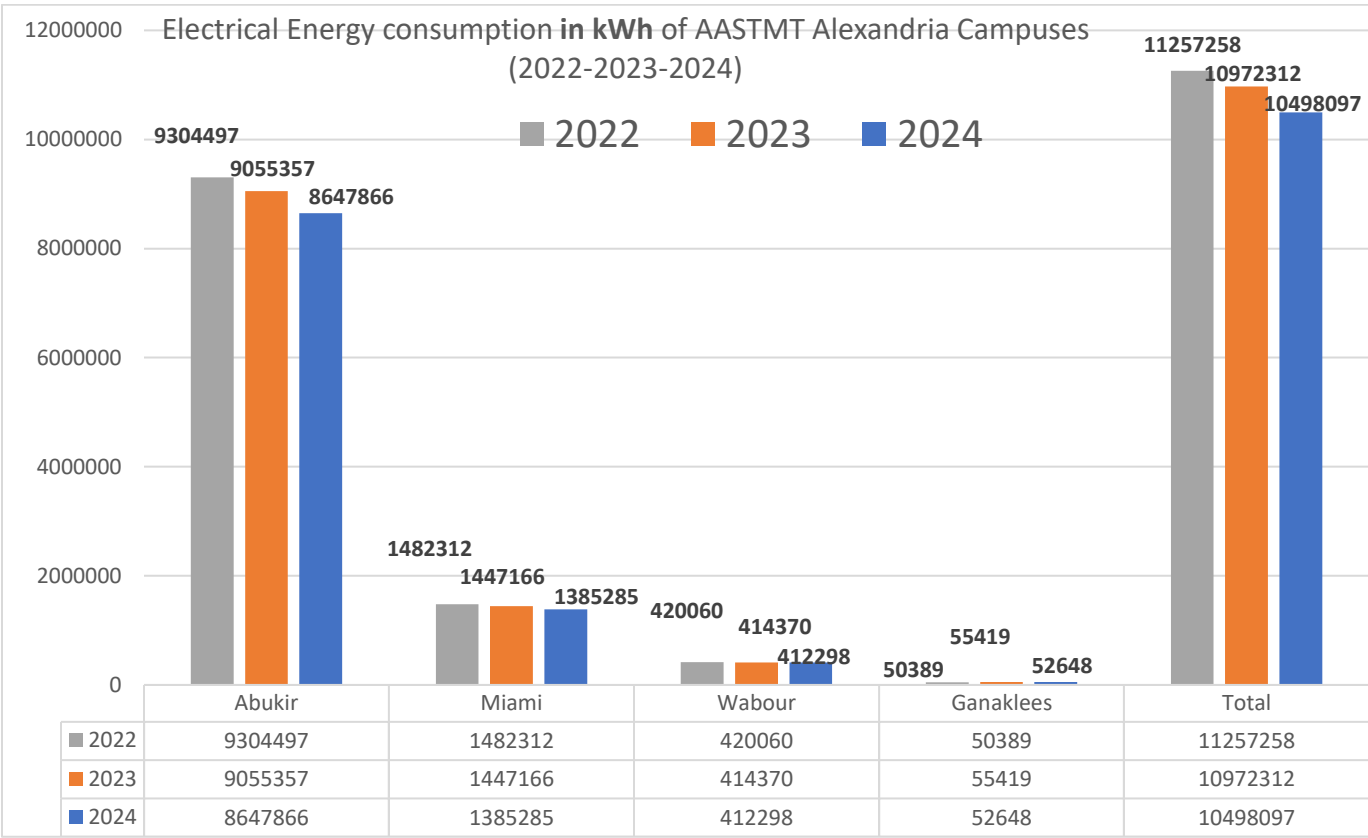


Figure 2. Electrical Energy consumption in kWh of AASTMT Alexandria campus (2022-2024)

Table1: Electrical Energy Savings in 2024 in AASTMT Alexandria Campuses

Year	Lighting (LED) Savings	Irrigation Savings	Air Conditioning Savings	Motors and Equipment Savings	Total Savings
2024	124,816 kWh	124,816 kWh	144,420 kWh	80,237 kWh	474,289 kWh

Thus; summarizing insights of Alexandria campuses in 2023/2024

- Total energy used (2023) = 10972312 kWh=39500.32 GJ
- Total energy used (2024) = 10,498,097 kWh=37793.1492 GJ
- % reduction (2023/2024) = 4.32% reduction

➤ 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 2** demonstrates **2024 electrical energy consumption % in all AAST campuses** with a total of **19,055,865 kWh**. It is clear that more than half of AASTMT electrical consumption is concentrated in AASTMT Alexandria campuses.

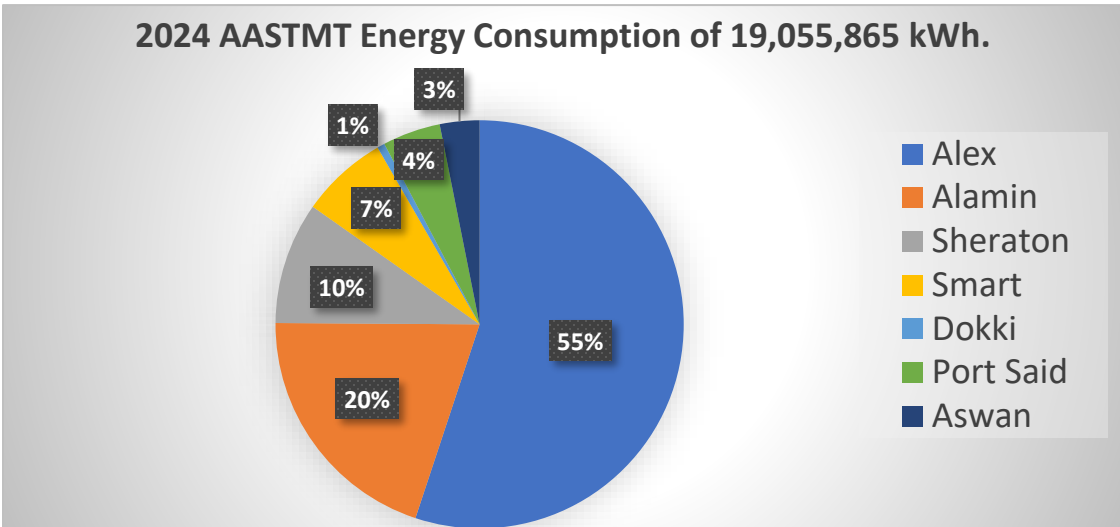


Figure 2. 2024 Energy Consumption in all AAST campuses in %

Comparing the energy consumption of all AAST campuses for the years 2023 and 2024, as illustrated in **Figure 3**, it is noted that the **average reduction in all campuses is about 4-5% with a reduction in the total consumption by around 4.3%, from 19,917,470 kWh in 2023 to 19,055,865 kWh in 2024, reflecting AASTMT progress towards energy saving in all its branches.**

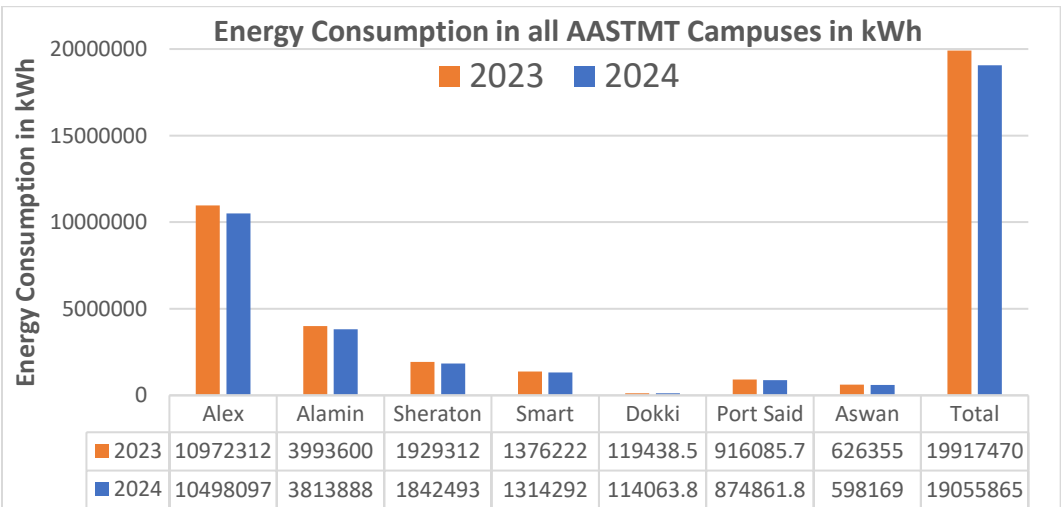


Figure 3. Comparison between 2023 and 2024 energy consumption in all AASTMT branches

➤ Renewable Energy Employment

AAST consumption is supplied mainly from the Egyptian national grid in which the renewable energy (RE) share has increased from **6.3GW in 2022** to **6.7Gw in 2023** till reaching **8.6GW in 2024** as per **NREA Report 2024**, achieving an increase by almost **6.3% from 2022 to 2023 and by 28.4% from 2023 till 2024** as shown in **Fig. 4**. Besides renewable energy contributed in AASTMT from national grid, there is almost **230 kW solar energy installations** on AASTMT campuses buildings, with production reaching almost **75989 kWh in 2024**. The latter shows an increase of almost **1.3% from the 75000 kWh solar installations in 2023** as shown in **Fig. 4**. This reflects AASTMT efforts to divert to clean energy, energy efficiency, reduce emissions and sustain serving the Environment. Conclusively, AASTMT average **renewable energy share in supplying its total energy demand** (including RE share in national grid and its solar installations) reached **above 25% in 2024** which is more than the **24% in 2023**, reflecting AAST continuous efforts and investments to increase its RES installations, meeting its roadmap of achieving 25% RES share by 2025 and progressing towards its long-term goal of 40% RES share by 2040.

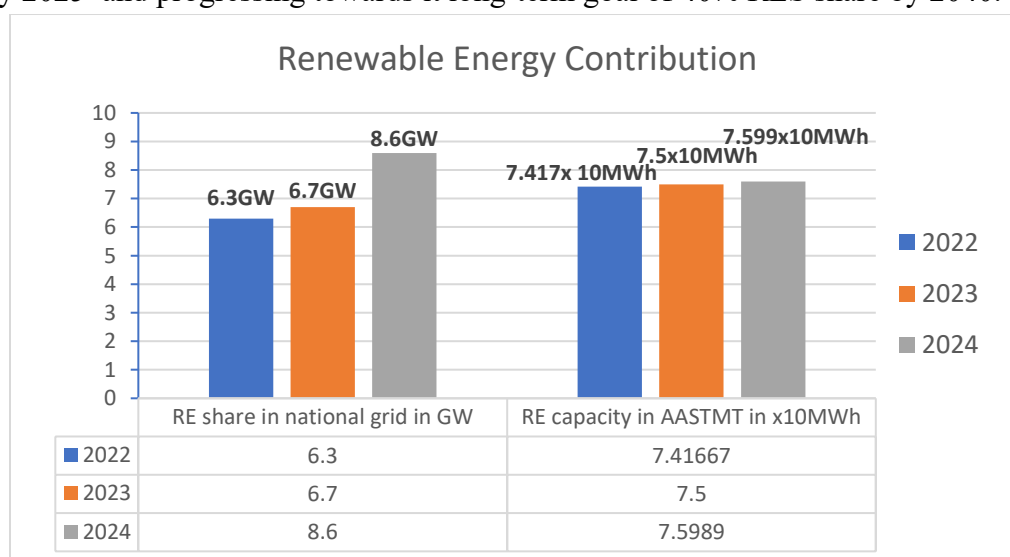


Figure 4. Renewable energy share in national grid [NREA Report 2024] and AAST RE installations

➤ Total Energy Density in GJ/m²

Regarding **AASTMT 2024 energy density**, **Table 2** shows energy consumption analysis for all AAST campuses allover Egypt and gives the energy density in kWh/m².

Table 2. Analysis of Energy for all AAST campuses in 2024

	Alex	Alamin	Sheraton	Smart	Dokki	Port Said	Aswan	Total
Floor Area (m ²)	392402.5137	208000	45000	32000	1750	42000	14500	735569.7
Consumption (kWh)	10,498,097	3,813,888	1,842,493	1,314,292	114,064	874,862	598,169	19,055,865
Energy Density (kWh/m ²)	26.75	18.336	40.944	41.07	65.179	20.83	41.253	25.91

Table 3 shows the entire AAST energy density, including energy from national grid and from AASTMT total solar installations, in kWh/m² and GJ/m² in 2024 compared to that of 2023. The calculated energy density reached about **0.09363GJ/m² in 2024** which is less than the **0.09785GJ/m² in 2023** by almost **4.3%**, mirroring AASTMT continuous efforts towards electrical energy conservation and energy efficiency improvement.

Also, it is worth noting that AASTMT total energy consumption from low carbon sources (summing up RE sources share in national grid and solar installation in AAST), has reached **17494GJ in 2024** which is more than the **17271GJ in 2023** by almost **1.29%**, reflecting AAST support to transition to clean energy.

Table 3. Energy Density in GJ/m² for the entire AAST in 2024 compared to 2023

Year	Total Floor Area (m ²)	Total energy (kWh) (from Grid + AAST solar infrastructure)	Total energy (GJ) (from Grid + AASTMT solar infrastructure)	Density (GJ/m ²)	Energy from low carbon sources (GJ)
2023	735569.7	19,992,470	71972.892	0.09785	17271
2024	735569.7	19,131,865	68874.714	0.09363	17494

2. Carbon Footprint

As per Carbon Emissions, calculations were made to evaluate **carbon emissions (kg CO²-e) in Alexandria campus** for the years **2018 to 2024** as discussed in details in **2024 AASTMT Carbon Emissions Report. AASTMT Carbon Emissions 2024**

Table 4: AASTMT-Alexandria campus- Carbon Emissions from 2018 to 2024 (kg CO²-e)

Year	Scope 1 (kg CO ² -e)	Scope 2 (kg CO ² -e)	Scope 3 (kg CO ² -e)	Total Emissions (kg CO ² -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

Table 4 presents the emissions across Scope 1, Scope 2, and Scope 3, using the Greenhouse Gas Protocol's framework, providing insights 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 **Table 4**, it is concluded that by **year-end 2024**, AASTMT's total carbon footprint is **103,862,750 kg CO₂e**, a further **-3.0%** from **2023's 107,075,000 kg CO₂e**. Against the **2019** base year (**154,594,380.99 kg CO₂e**), 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**. [AASTMT Carbon Emissions 2024](#)

Conclusion

AASTMT 2023/2024 measures towards energy efficiency and conservation, renewable energy employment, besides decarbonization efforts in Alexandria campus, have effectively resulted in,

- Energy consumption reduction in 2024 by almost 4.3% from 2023 and total 17.33% from 2018
- Total carbon emissions reduction in 2024 by 3% from 2023 and total of 32.8% from 2019.
- Increasing the RES share of AASTMT energy demand to over 25% in 2024.

All this reflects AASTMT progress **Towards Efficient, Clean and Renewable AASTMT**, keeping in track with its short-term goal of 25% renewables share and 30% carbon emissions reduction by 2025 and progressing perfectly with its long-term goal; “By 2040, Increase renewables share in energy supply by 40% and Reduce Emissions by 50%”

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