AASTMT Energy Progress Report – 2024/2025

- 2025 Plan Towards Green Sustainable Energy
- Energy Consumption and Carbon Emissions' 2025 Insights

Powering Green Sustainability, Cleaning the Future

"We pledge to advance clean energy, enhance efficiency, foster innovation, and reduce carbon footprint for a sustainable, greener future"



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AASTMT Energy Sustainability Team

Nahla zakzouk

1. Report Overview

This report highlights AASTMT's continued progress in its transition towards cleaner, more efficient, and sustainable energy during 2025. Building on its previous achievements, the report presents the university's efforts across its different branches and campuses in improving energy efficiency and conservation, increasing renewable energy utilization, reducing carbon emissions, and advancing sustainable energy practices. It reviews electricity consumption trends, energy-saving and renovation measures, renewable energy contributions, and carbon footprint indicators to assess the effectiveness of AASTMT's energy rationalization plans. Furthermore, it highlights the university's commitment to smart energy monitoring, innovative programs and laboratory facilities, research and funded projects, and strategic agreements and initiatives. These efforts are organized around seven interconnected pillars that translate AASTMT's SDG 7 commitment into measurable actions, institutional developments, and collaborative initiatives towards a greener and more sustainable future.

2. Executive Summary

In 2025, AASTMT continued to advance its commitment towards Higher Energy Efficiency and Conservation, Increased Renewable Energy Deployment, and Reduced Carbon Emissions, reinforcing its dedication to Sustainable, Affordable and Clean Energy. Guided by its institutional pledge, *"Powering Green Sustainability, Cleaning the Future,"* the university adopted an integrated approach combining smart monitoring, energy conservation, renewable energy utilization, carbon reduction, innovative programs and laboratory facilities, research and funded projects, and strategic agreements and initiatives.

During 2025, AASTMT recorded notable progress in energy management and sustainable energy development, as demonstrated by the following key achievements:

- **Higher Energy Efficiency and Conservation:** Total electricity consumption across AASTMT branches decreased by approximately **2.47%** compared with 2024, representing an annual saving of approximately 470,218 kWh. Alexandria campuses also recorded a reduction of approximately 2.5%, reaching 10,235,637 kWh. Furthermore, energy intensity decreased by approximately 2.43%, reflecting improved energy utilization.
- **Increased Renewable Energy Deployment:** Electricity generated through AASTMT's on-site solar installations increased from 75,989 kWh in 2024 to 79,632 kWh in 2025, achieving a **4.78% increase**. In parallel, the renewable energy share in the national electricity grid increased from approximately 25.1% to 26%.
- **Greater Contribution from Low-Carbon Energy Sources:** Total energy usage from low-carbon sources, combining national-grid electricity and on-site solar installations, increased from 17,494 GJ in 2024 to 17,682.84 GJ in 2025, representing an increase of almost **1.08%**. Solar energy contributed 273.6 GJ in 2024 and 286.7 GJ in 2025.
- **Smart Monitoring and Energy Management:** Continued monitoring and analysis of electricity consumption across AASTMT campuses supported the identification of energy-saving opportunities and the evaluation of rationalization and renovation measures.
- **Carbon Reduction and Environmental Responsibility:** AASTMT continued its carbon-reduction efforts through energy conservation, renewable energy integration, improved building systems, and institutional sustainability initiatives. Its previous assessment recorded a 32.8% reduction in carbon emissions against the 2019 baseline for Alexandria campuses by 2024, providing an important benchmark for its ongoing decarbonization efforts.
- **Innovative Programs and Laboratory Facilities:** The university continued to promote practical learning, technical training, and applied research through its renewable energy laboratories, solar PV installations, solar thermal demonstrations, and other innovative educational activities.
- **Research and Funded Projects:** AASTMT strengthened its contribution to clean-energy research and innovation through international projects, particularly GREENOLIVE and RESt4GREEN, addressing industrial decarbonization, thermal energy storage, Power-to-Heat technologies, energy efficiency, and renewable energy integration.

- **Agreements and Strategic Initiatives:** International and industrial cooperation, including the PHAETHON partnership and collaborations with energy-sector organizations, supported knowledge exchange, research development, capacity building, and the advancement of sustainable energy technologies.
- **Awareness and Community Engagement:** Workshops, conferences, technical visits, solar energy training, school visits, and institutional campaigns promoted responsible energy consumption and strengthened awareness of renewable energy and environmental sustainability among students and the wider community.

These achievements reinforce AASTMT's contribution to Egypt's clean-energy transition and its long-term 2040 ambitions of 50% carbon emissions reduction and 40% renewable energy share, translating its SDG 7 pledge into measurable institutional progress.

3. Objective

The scope of this report focuses on evaluating AASTMT's continuous efforts towards improving energy efficiency and conservation, increasing renewable energy utilization, reducing its carbon footprint, and advancing sustainable energy practices across its different branches and campuses during **2025**, based on the related energy performance indicators and institutional insights. Accordingly, the report reviews the university's implemented measures, ongoing initiatives, and strategic plans towards realizing the interim targets established in the updated **AASTMT Green Energy and Energy Management Policy (2023–2026)**. Furthermore, it provides detailed insights into AASTMT's electricity consumption, energy use density, renewable and low-carbon energy utilization, and carbon emissions performance to evaluate the effectiveness of its energy-related efforts, monitor progress towards clean energy sustainability, and assess its advancement towards its long-term energy transition and decarbonization objectives. The report also highlights seven interconnected strategic pillars: **Smart Monitoring; Energy Conservation and Efficiency; Renewable Energy Employment; Carbon Reduction; Innovative Programs and Lab Facilities; Research and Funded Projects; and Agreements and Initiatives**, reflecting AASTMT's integrated approach to powering green sustainability and cleaning the future.

4. Measures and Insights

AASTMT's 2025 Energy Plan focuses on seven strategic pillars:

- Smart Monitoring
- Energy Conservation and Efficiency
- Renewable Energy Employment
- Carbon Reduction
- Innovative Programs and Lab Facilities
- Research and Funded Projects
- Agreements and Initiatives

To evaluate progress, the report reviews the measures and achievements under each pillar, supported by key performance indicators covering electricity consumption, energy efficiency, renewable energy utilization, and carbon emissions. It also highlights AASTMT's research projects, partnerships, and awareness initiatives, assessing their contribution to sustainable energy development and the university's long-term 2040 goals.

AASTMT 2024/2025 Plan towards Clean Sustainable Energy
AASTMT 2024/2025 Insights

4.1. Smart Monitoring

AASTMT establish effective energy smart monitoring and data-driven plans (ranking of loads guides lighting, HVAC and utility actions) as well as assessment mechanisms to track electricity consumption, perform energy audits and analyze performance indicators. This supports informed decisions, rationalizing energy consumption and realizing optimized energy management across AASTMT campuses.

Example on smart metering in AASTMT Alexandria - Abukir Campus is shown in Figure 1

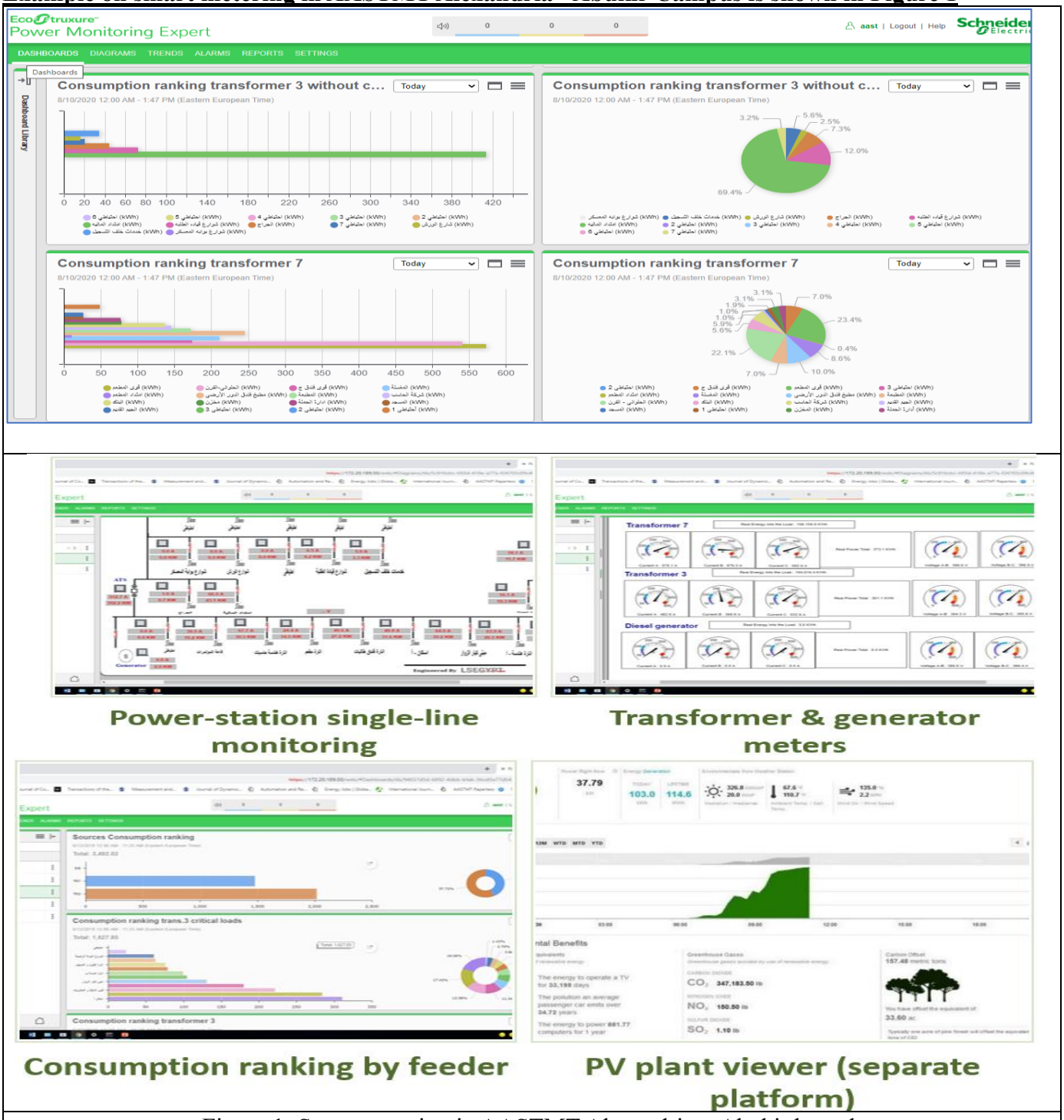


Figure 1: Smart metering in AASTMT Alexandria – Abukir branch

4.2. Energy Conservation & Efficiency

To support continuous electric energy conservation and enhance energy efficiency within its campuses, AASTMT takes consistent measures that are continuously carried out, besides infrastructure upgrading and renovation plans that are updated yearly. This is reflected in reduction in the energy consumption among all its branches.

4.2.1. AASTMT 2025 Measures

AASTMT has established an Energy Management Team 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. These measures support AASTMT's commitment to improving energy efficiency and reducing electricity consumption across its campuses. They include regular measures and 2025 measures for renovation and upgrading as detailed in **AASTMT 2025 Energy Plan** and **AASTMT 2024/2025 Renovation and Upgrading Report which includes all renovation photos.**

AASTMT 2024/2025 Plan towards Clean Sustainable Energy

AASTMT 2024/2025 Renovation and Upgrading Plan

These measures can be summarized as:

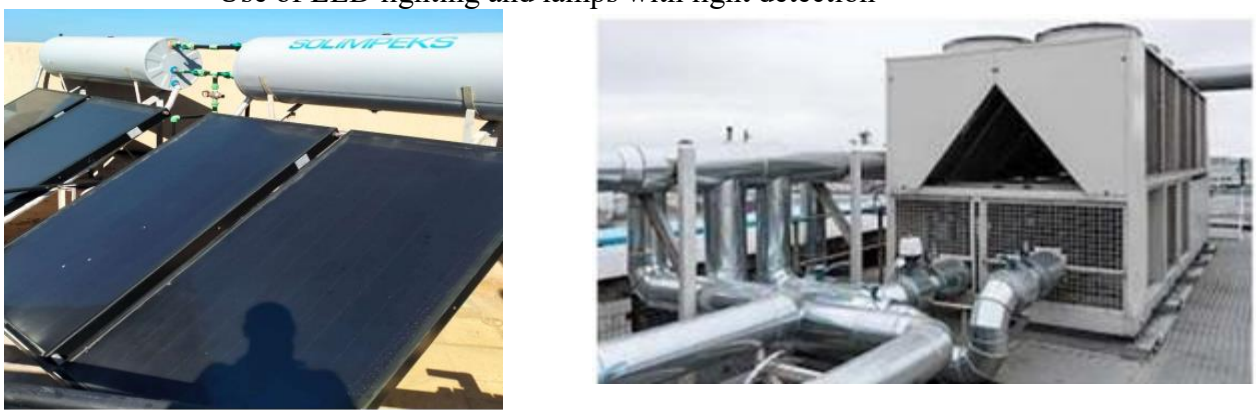
- **LED Lighting Technology:** AASTMT has replaced conventional lighting with energy-efficient LED lamps. Approximately 97% of the lighting installations have been converted to LED technology, with the objective of achieving full conversion to LED lighting.
- **Energy-Efficient Air-Conditioning Systems:** AASTMT has introduced and upgraded air-conditioning systems to improve cooling efficiency and reduce electricity consumption. These measures include the use of Variable Refrigerant Flow (VRF) technology and Variable Speed Drives (VSDs), which allow equipment operation to be adjusted according to cooling demand.
- **Upgrading Central Air-Conditioning Systems:** Improvements to central air-conditioning infrastructure have included the adoption of more energy-efficient equipment and control strategies to reduce unnecessary operation and improve overall system performance.
- **Energy Monitoring and Consumption Analysis:** The Energy Management Team monitors electricity consumption across the different campuses to identify consumption patterns, assess energy-saving opportunities, and evaluate the effectiveness of implemented conservation measures.
- **Continuous Energy Conservation Planning:** AASTMT continues to assess existing electrical installations and appliances to identify opportunities for upgrading equipment, improving operational control, and reducing energy waste.
- **Regular Instructions and Directions:** These are addressed from AASTMT president to all AASTMT campuses towards energy saving and conservation as per the letter given below.
- Letter addressed to all AASTMT institutes from AASTMT president regarding energy saving
- **Increasing awareness regarding energy rationalization and conservation plans:** This addresses AAST staff, students, administrators and technicians via energy-related campaigns, initiatives and seminars as shown in the Events Section found in the following link:
  Energy-related Events

Examples of Energy Efficient Appliances Usage in Alexandria - Abukir Campus in 2025 are shown in Figure 2

- Using LED technology and lamps with light detection
- Use central are conditioning employing VRF and Variable Speed Drive VSD.
- Use Solar water heaters



Use of LED lighting and lamps with light detection



Solar Heater and VRF air conditioning

Figure 2: Example of Energy Efficient Appliances Usage in 2025 in AASTMT Abukir Campus

4.2.2 AASTMT 2025 Energy Consumption Insights

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.

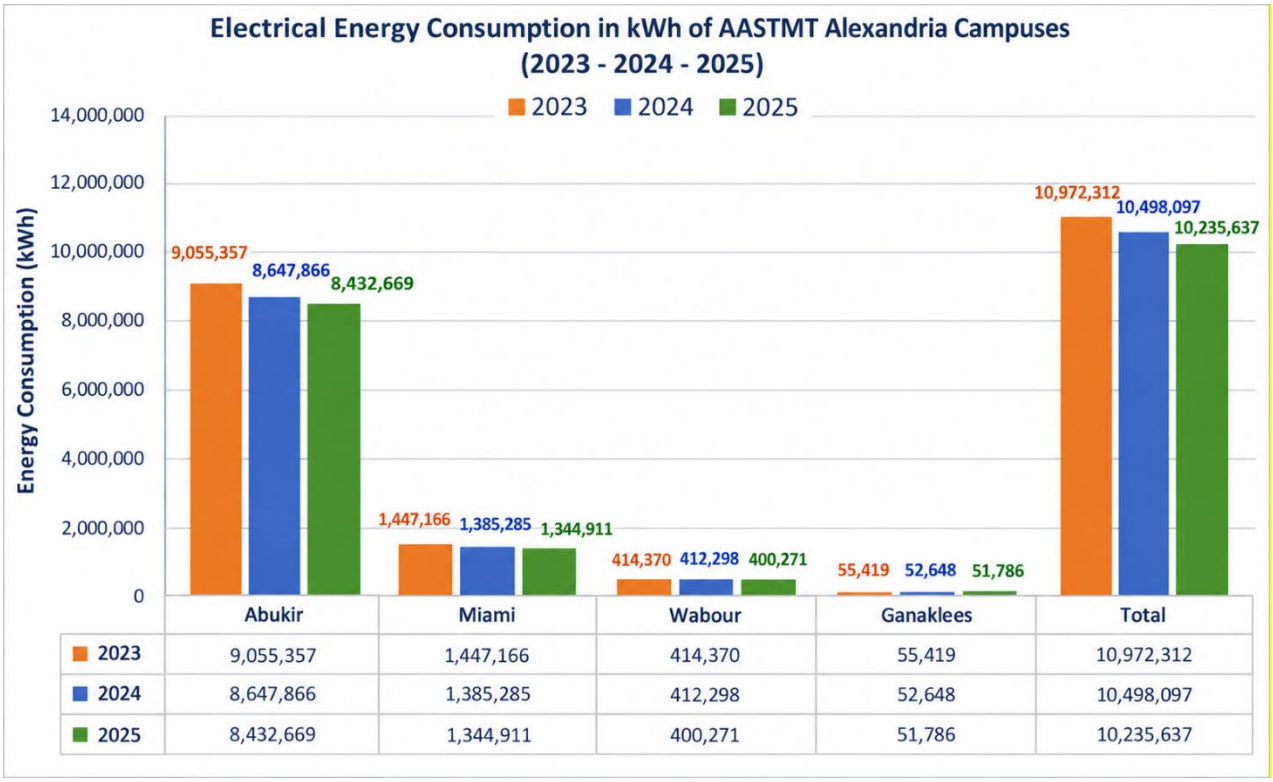
- **Energy consumption in AASTMT Alexandria branch campuses**

The main energy-efficiency measures implemented across Alexandria AASTMT branch are detailed in AASTMT **2024/2025 Renovation and Upgrading Report** of AASTMT Alexandria campuses, along with examples of reduction in recorded energy consumption as shown in **Table 1**.

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 3** 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 by **2.50%,** reflecting AASTMT's continued commitment to energy conservation.



	Abukir	Miami	Wabour	Ganaklees	Total
2023	9,055,357	1,447,166	414,370	55,419	10,972,312
2024	8,647,866	1,385,285	412,298	52,648	10,498,097
2025	8,432,669	1,344,911	400,271	51,786	10,235,637

Figure 3. 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 4** 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.

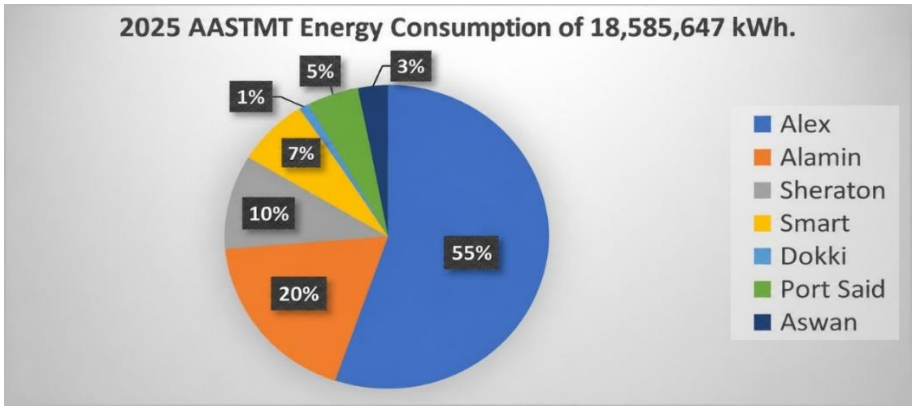
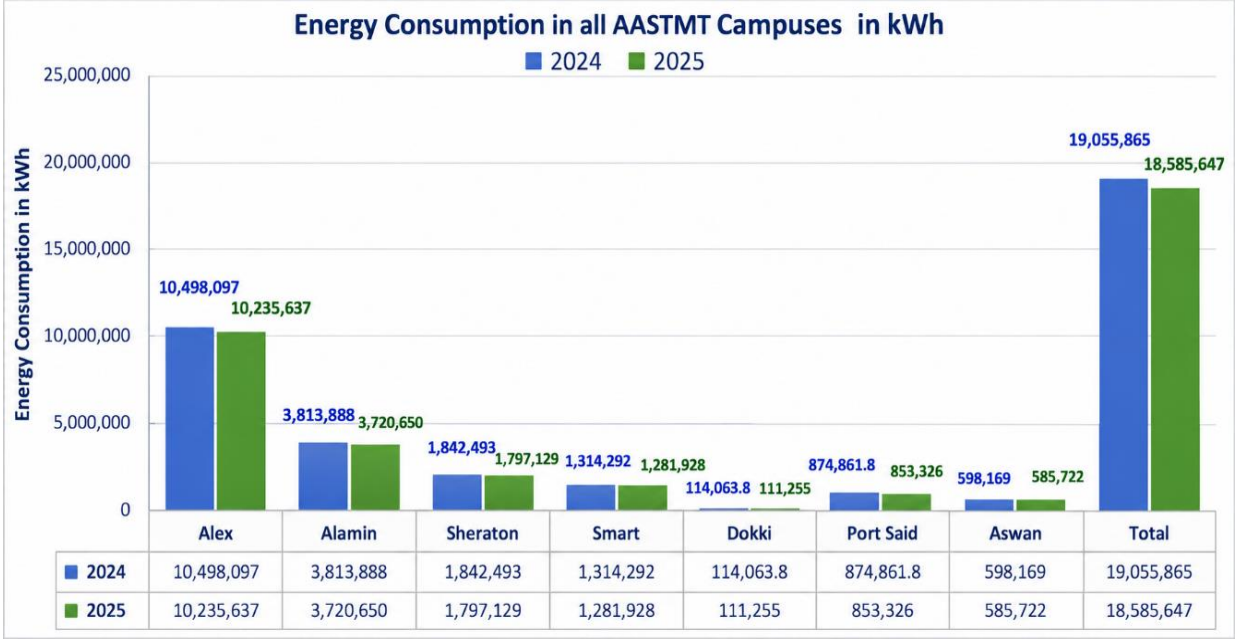


Figure 4. 2025 Energy Consumption in all AAST branches in %

Measures supporting AASTMT's commitment to improving energy efficiency and reducing electricity consumption is also implemented across its other branches. The is reflected in the reduction in electricity consumption of each branch, as shown in **Figure 5**. It is noted that there is reduction in energy consumption in each branch with total consumption reduction 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 5. Comparison between 2024 and 2025 energy consumption in all AASTMT branches

4.3. Renewable Energy Employment

To support expansion in renewables employment within its campuses, AASTMT takes consistent measures that are continuously carried out, besides yearly updated ones. This is reflected in the increase of low-carbon sources' share in AASTMT total energy supply.

4.3.1. AASTMT Measures

- **Continuous maintenance, routine cleaning and improvements** in the existing solar installations, shown in **Figure 6**, to maintain and even improve their output power, thus enhancing its energy share in AASTMT consumption. This includes regular annual measures as follows,
  - **Operate on-site PV:** maintain the existing grid-connected stations, including those at the Abu Qir and Aswan campuses, restore output wherever it falls.
  - **Metered reporting:** publish two figures every year — on-site solar generation as a share of total electricity), and the total renewable share including the renewable share of the national grid — with availability, downtime and performance notes.
  - **O&M:** standardize panel cleaning, inverter checks and fault response to maximize output and keep savings.
  - **Hybrid readiness:** evaluate battery storage and other clean options to improve self-consumption and peak management, through small pilots with clear KPIs.
  - **Connection and safety compliance:** keep grid interconnection, protection and permits current for all sites, with single-line diagrams and inspection logs.
  - **Procurement and design standards:** use lifecycle costing, minimum performance ratios, warranty requirements and end-of-life recycling provisions in all new renewable procurement.



(a)



(b)



(c)



(d)

Figure 6: Solar installation in AASTMT campuses (a) 50kW grid tied PV station - Abukir Campus, (b) 10kW Solar PV system for Irrigation Pumping and water Treatment- Abukir Campus, (c) 100kW PV plant on-grid side plant-Aswan campus, (d) 50kW PV plant roof mounted on-grid -Aswan campus,

- The Renewable Energy Unit is planning to further expand AASTMT's renewable energy infrastructure through the installation of a **2kW Vertical Axis Wind Turbine (VAWT)**, funded by an internal AASTMT research grant. The wind turbine is integrated with the existing PV Plant, as shown in **Figure 7**, establishing a hybrid wind–solar energy system that supports sustainable electricity generation, innovative academic research, and hands-on student training. This initiative reinforces AASTMT's commitment to renewable energy innovation, environmental sustainability, and the development of integrated clean energy technologies.
  Energy Research Unit

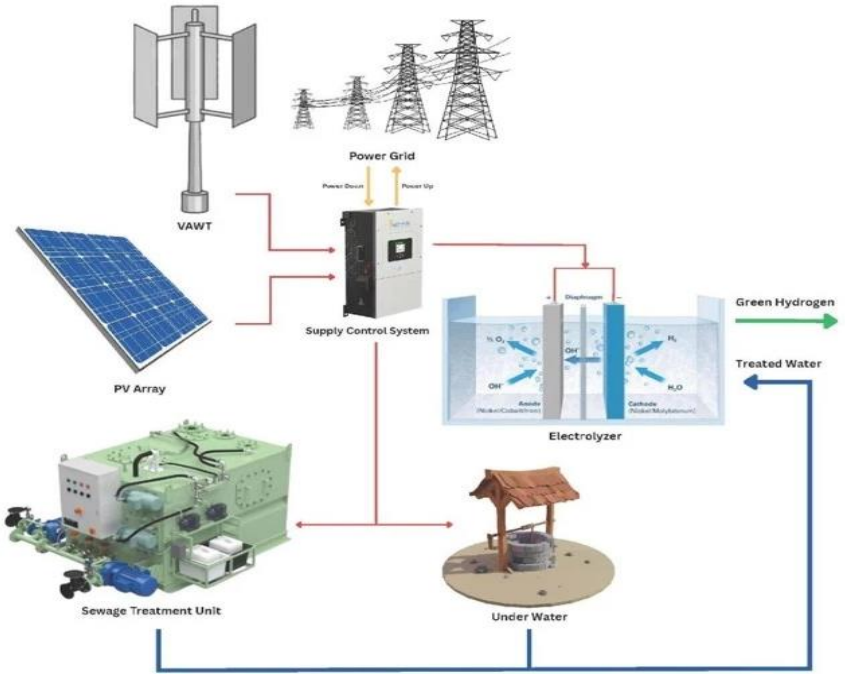


Figure 7. 2kW Vertical Axis Wind Turbine (VAWT) to be implemented

- Study the potential of **expanding renewable infrastructure** among different AASTMT campuses by installing new solar stations and other renewable solutions. See **2024/2025** proposal to establish a solar power plant and **two electric vehicle charging units** at the **College of Eng. and Technology building – Alamein** 2024/2025 Study and Proposal for establishing PV station and EV charging units in Alamein Branch

4.3.2. 2025 AASTMT Renewables Insights

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%** [NREA 2025].
https://nrea.gov.eg/test/en/Media/New/2999

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 7.**

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

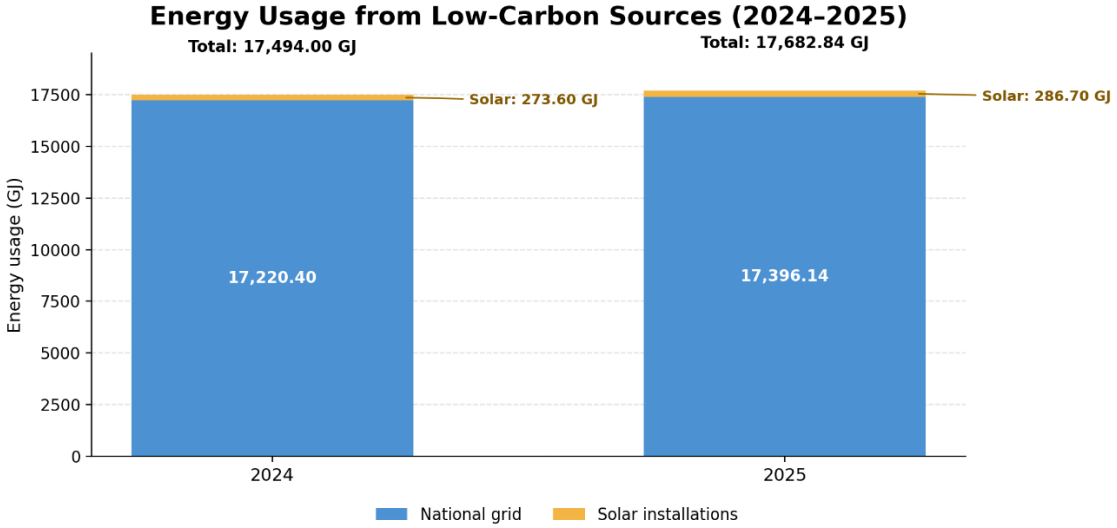


Figure 8. AASTMT Energy usage from low carbon sources in 2024 and 2025

Finally, **Table 3** summarizes **entire AAST energy supply** from national grid and from AASTMT total solar installations, in kWh/m^2 and GJ/m^2 from **2024-2025** and **the relative energy density** in **GJ/m^2**. The latter reached about **0.09135GJ/m^2 in 2025** which is less than the **0.09363GJ/m^2 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 3. Energy Density in GJ/m^2 for the entire AAST in 2024 - 2025

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) (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

4.4. Carbon Reduction

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 the year 2024/2025**, following the **GHG Protocol and ISO 140641** as given by **AASTMT Carbon Footprint Report 2024/2025.** 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.

4.4.1. AASTMT 2025-2030 Climate Action Plan

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. The measures are detailed in **AASTMT 2025-2030 Climate Action Plan**, found in the link below

AASTMT Climate Action Plans

These measures can be summarized as;

For Scope 1 emissions reduction: Refrigerant management and Optimize fuel use

For Scope 2 emissions reduction: Operate and expand on-site PV, Metered reporting, LED persistence, BMS optimization, HVAC O&M, Operational guidelines

For Scope 3 emissions reduction: Standardized sorting, Organics program, Paper-use controls, Sustainable procurement, E-waste stewardship, Water efficiency, Data and logistics, Green commuting, Fleet, cooling and refrigerants assessment Sustainable food and wider Scope 3

4.4.2. AASTMT 2025 Carbon Footprint

AASTMT 2024/2025 Carbon Footprint is given by

AASTMT Carbon Footprint Report 2024/2025

https://aast.edu/en/about/co2-footprint.php

Compared to 2019–2024 figures which covered only 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 4** and **Figure 9.**

Table 4. 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

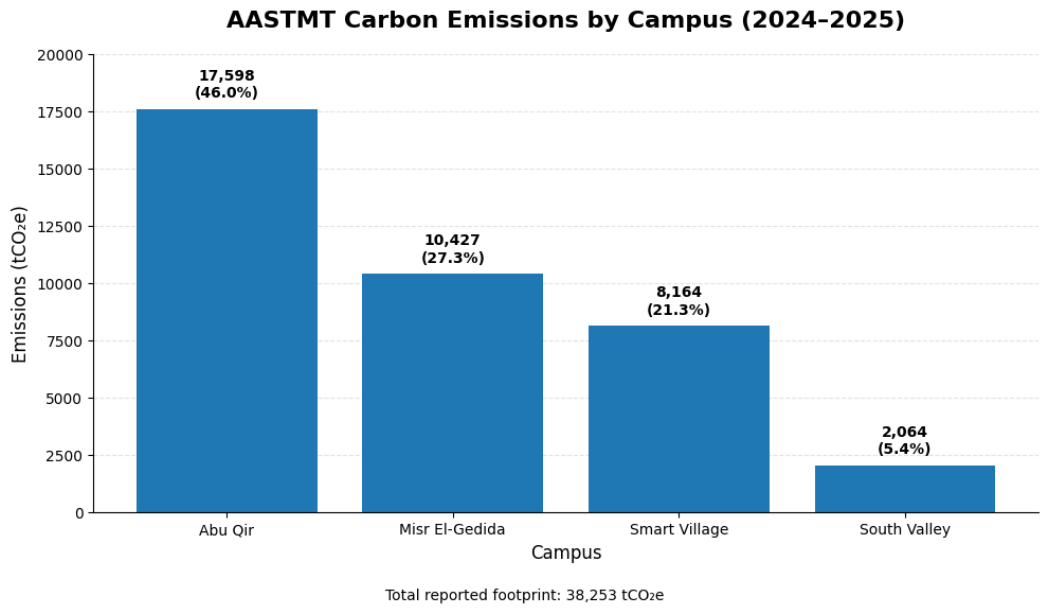


Figure 9. Breakdown of Carbon Footprint Report 2024/2025 by campus

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.

4.5. Innovative Programs & Lab Facilities

AASTMT is committed to strengthen practical education, technical training, and students' projects involving innovative clean-energy programs and laboratory facilities. In this regard, the following is achieved in 2025.

- Continuous improvement to related programs and trainings offered by AASTMT different entities to students and industry as detailed in the link below
  Energy-related Innovative Programs and Trainings by AASTMT

- Investments in Energy-related LABs intalled in AASTMT different campuses to guarantee continuous maintenance and improvements, thus assisting in consultancy, research and trainings. These Labs include;

- **Energy Research Unit LAB in 7th Engineerring Building - Alexandria Headquarter**
  Energy Research Unit LAB
- **Energy LAB in Eletrical Energy Engineering Department - Smart Village Campus**
  Eletrical Energy Engineering LAB
- **Environmental Monitoring and Climate Change Laboratory - Scientific Research & Innovation Centre**
  Environmental Monitoring and Climate Change Laboratory
- **Renewable Energy Educational Lab in the Electrical and Control Eng. Dept- room G142 at AASTMT Alexandria - Abukir campus**
  Renewable Energy Lab in EE Dept-AAST Abukir

- Encourage **renewable energy and decarbonization-related educational events and activities** (seminars, workshops, visits and trainings) in **2024/2025.**
  Energy-related Events
  Energy-related Activities

- Prioritizing fields of decarbonization and clean energy in **graduation projects**,
  Energy-related Graduation Projects

As per this measure, examples of **2024/2025** graduation projects that serve decarbonization are shown below,

Table 5: 2024/2025 Energy-related Graduation Projects in Electrical and Control Eng. Dept. – Abukir branch

Department	Project
Electrical and Control Eng. - AASTMT Alex.	Facility Management Energy Consumption Monitoring and Control Implementation of a Cardless Smart Meter Smart Greenhouse Electrical Installations of a Sustainable Social Hub Integrating PV and EV Charging Station

- Prioritize **renewable energy and decarbonization** in **AASTMT Industry Service Complex** to serve the industry and community effectively and resourcefully.
  AAST ISC 2024/2025 projects

Renewable Energy-related 2024/2025 Projects in **AASTMT Industry Service Complex include,**

- **Smart Solar Waste Compactor**

  "Smart Solar Waste Compactor," aims to develop an intelligent device for compacting plastic waste in various institutions such as schools, hospitals, and factories, relying primarily only on **solar energy** as its main power source. This project represents a **practical solution** that helps **reduce plastic pollution**, promotes the **concept of a circular economy**, and encourages institutions to **sort their waste** and **gain financial returns** from it.
  Smart Solar Waste Compactor

- **Solar Agricultural Robot**

  This is an integrated agricultural robot powered by **solar energy** and considered the second of its kind in the region. The robot was developed through joint funding from AASTMT and businessman Eng. Ahmed Abu Hashima in the project, named **"LiDAR Navigation IoT Solar Agribot".** This project aims to **support smart clean and sustainable farming** and **reduce reliance on manual labor**, particularly in desert and muddy environments.
  Solar Agricultural Robot

- **Liquid Tree**

  An environmental photobioreactor, powered by **solar energy,** is implemented to purify the air and produce oxygen using marine algae. The project is a **low-cost version** of a model used in the UAE, which costs around **$10,000**, while the students managed to build the unit in **Egypt for less than 15,000 EGP**. The **amount of oxygen** produced by this system is **equivalent to that of ten mature trees**, making it suitable for use in **parks, schools, and crowded urban areas**.
  The Liquid Tree



(a) (b) (c)

Figure 10. 2024/2025 renewable energy-related projects in AASTMT Industry Service Complex
(a) Smart Solar Waste Compactor, (b) Solar Agricultural Robot, (c) Liquid Tree

4.6. Research & Funded Projects

Advance AASTMT's research and innovation capabilities through national and international funded projects addressing clean energy, energy efficiency, and industrial decarbonization.

- Encourage Staff to Prioritize fields of decarbonization and clean energy in research 2024/2025
  Scientific Research & Innovation-Alexandria | AASTMT

- Strengthening AASTMT's **Renewable Energy and Sustainable Development (RESD) journal** by providing a practical research platform for generating innovative findings, scientific publications, and knowledge exchange in renewable energy, thermal energy storage, energy efficiency, and sustainable industrial applications.
  RESD Issues

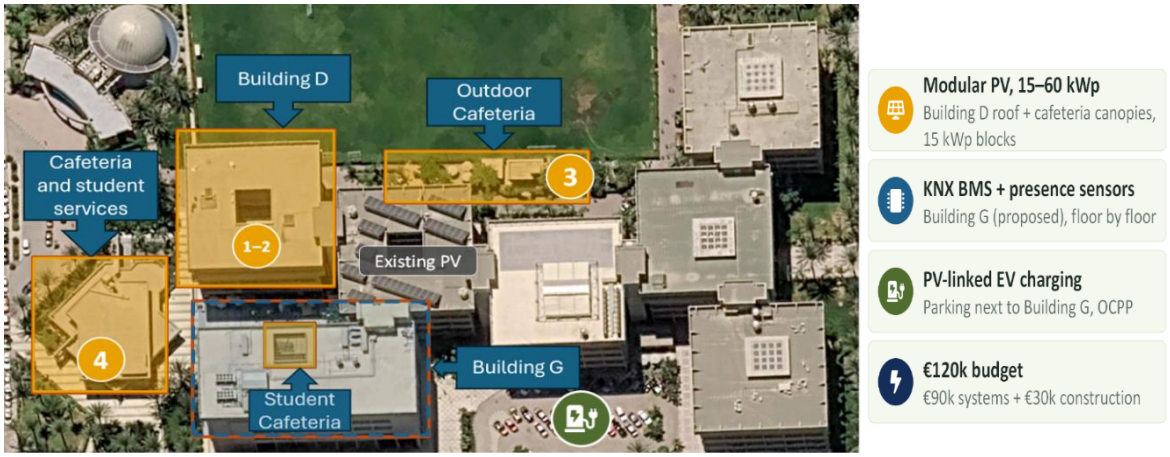
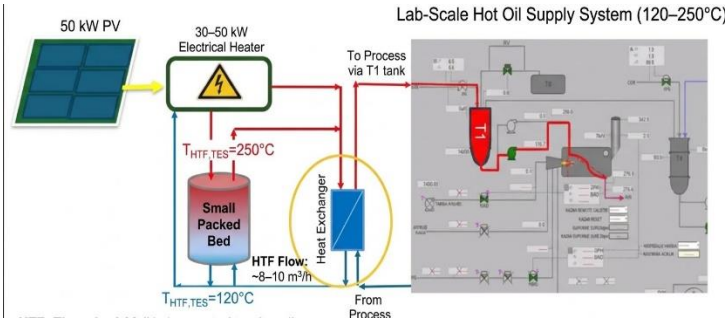
- Prioritize **renewable energy and decarbonization research projects** as shown in **Table 6**
  Renewable Energy Research Projects

Table 6. Energy-related research projects participated by AASTMT

Project Name	Start date	End Date	Link
RESt4GREEN Energy efficiency, Renewable Energy Sources and smarT energy conservation for improved quality of life and a GREENer Mediterranean	16/07/2025	15/7/2028	RESt4GREEN
GREENOLIVE Solar-driven Decarbonization for Mediterranean Industries	01/09/2025	31/08/2028	GREENOLIVE
PRO-Green-LABs Promoting Integrated Green Competences for Sustainable Development in Architectural Education through Experiential Lab-based, Active Learning	April 2024	March 2026	Pro-GREEN-LABs
RURALITIES Climate smart, ecosystem-enhancing and knowledge-based rural expertise and training centres	01/10/ 2023	30/10/2026	RURALITIES
AI-ESI Strengthening education and research in Applied Informatics for Energy System Integration	01/01/2022	31/12/2026	AI-ESI Project
GreenMED Green Shipping Pathways Towards a Clean Energy Transition in the Mediterranean	01/10/2023	31/12/2025	GreenMED Project

- Start preparing for the implementation of 2025 **research projects** outcomes to serve the industry and community effectively and resourcefully**, especially Interreg NEXT MED projects (RESt4GREEN and GREENOLIVE)** whose pilots to be implemented in AASTMT are shown in **Table 7**
  RESt4GREEN and GREENOLIVE

Table 7. Project pilots to be implemented in AASTMT

Project	Description of Project Pilot
REST4GREEN Project	**<u>Proposed AASTMT Pilot as an Outcome of the REST4GREEN Project</u>** A system that integrates renewable energy, smart building technologies, and sustainable mobility within a campus environment. The pilot combines modular solar PV installations with a capacity of 15–60 kWp on Building D and cafeteria canopies, KNX-based building management and occupancy sensors in Building G, and solar-linked electric vehicle (EV) charging infrastructure. These technologies will be integrated into a unified monitoring framework using the campus SCADA system and the REST4GREEN dashboard to monitor PV generation, building electricity consumption, EV charging, and weather conditions. The Energy Research Unit will support simulation, commissioning, performance evaluation, and staff and student training. This pilot will translate the project's objectives into a demonstrable, replicable solution for improving campus energy performance and accelerating the transition towards smart, low-carbon university campuses.  *Amber = PV zones, blue = KNX zone, green = EV charger. Locations indicative*
GREENOLIVE Project	**<u>Lab-Scale Solar-Powered Hot Oil Supply and Thermal Energy Storage Pilot</u>** The proposed pilot consists of a 50kW photovoltaic (PV)-powered hot oil supply system, integrated with a 30–50 kW electrical heater and a small packed-bed thermal energy storage (TES) unit operating at temperatures ranging from 120°C to 250°C. A heat exchanger connects the storage system to an industrial process, demonstrating the potential for supplying renewable heat for industrial applications. Implementing this pilot at AASTMT will directly support clean sustainable energy by providing an advanced educational and research platform for solar energy integration, thermal energy storage, and energy efficiency. It will enable students and researchers to gain hands-on experience, investigate high-temperature heat storage performance, develop innovative renewable heating solutions, and explore alternatives to fossil-fuel-based industrial heating. Furthermore, the pilot will support graduation projects, postgraduate research, professional training, and scientific publications, strengthening AASTMT's contribution to clean energy innovation, technology transfer, and the development of sustainable industrial energy solutions. 

- As per **AI-ESI (Applied Informatics for Energy System Integration)** Project outcomes, postgraduate students are engaged to conduct AI studies in the fields of renewable energy and decarbonization, by offering opportunities of Fully funded MSc and PhD degrees and mobility in University of Stavanger.
  Fully funded MSc and Phd degree-NORPART AI-ESI for AASTMT postgraduate students
  Fully funded MSc Mobility- NORPART AI-ESI for AASTMT postgraduate students



Figure 11. NORPART AI-ESI Project outcomes

4.7. Agreements and Initiatives

Expand AASTMT's strategic partnerships and institutional initiatives to accelerate the clean-energy transition via cooperation with industry, academia, governmental institutions, and international organizations.

- Put **Government Partnership** towards renewable energy and climate change measures a priority, especially with Ministries of Environment, Local Development and Finance.
  - AASTMT president with Minister of Local Development and Acting Minister of Environment reviewed future plans in waste management, renewable energy and climate change in October 2025.
    Meetings with ministries of Environment and Local Development
  - In May 2026, AASTMT College of Engineering and Technology - Main Campus welcomed a delegation from Egypt's Ministry of Finance to explore opportunities for strengthening institutional partnerships, exchanging expertise, developing joint research and applied projects, and enhancing collaboration in energy auditing, energy management systems, energy efficiency, and sustainable resource utilization.
    Meetings with ministry of Finance
- Activate partnerships and MOUs signed or renewed with industry, in fields of consultancy, trainings and technical cooperation within **AAST Industry Advisory Council annual sessions** and services offered by **AASTMT Productivity and Quality Institute (PQI)** and **Industry Service Complex (ISC)**
  Industry Advisory Counsil Session 2025
  AASTMT Industrial Service Complex
  AASTMT Power and Quality Institute

Examples

- **AASTMT Industry Service Complex (ISC)**

In June 2025, A solar energy training was organized by AASTMT ISC in collaboration with Caritas Egypt for Refugee trainees from Sudan in the field of solar energy.
Solar Energy Training for Sudanese Students



Figure 12. Solar Energy Training for Sudanese Students`



Figure 13. ISC agreement

A cooperation agreement was signed between the Academy—**Industry Service Complex**—and **Smart Factory for Industrial Projects**. The agreement was signed during the proceedings of the **Academy Advisory Council for Industry** on 19 May, 2025.
The agreement aims to enhance cooperation in the fields of training and professional skills development for trainees and learners, in line with labor market requirements, through the launch of an **integrated professional diploma in Digital Transformation**. The program equips industrial professionals with skills in AI, automation, data management, and smart manufacturing, optimizing energy consumption, reducing operational waste, and enhancing productivity through digital technologies i.e. supporting the transition towards sustainable, energy-efficient industries in line with the principles of Industry 4.0.
ISC Agreement 2025

In April 2025 AASTMT ISC delivered **Electrical Maintenance Training Courses** for factory personnel in cooperation with Caritas Egypt and funded by Caritas Austria for the learning and employment opportunities of refugees, asylum seekers and migrant youth in Egypt. The training provided participants with practical, hands-on experience in electrical maintenance, enhancing their technical competencies, improving industrial equipment reliability, and strengthening their employability. This initiative also supports sustainable industrial development by promoting efficient maintenance practices, reducing equipment failures, and extending the operational life of industrial assets to enhance equipment efficiency.
ISC Electrical Maintenance Training Courses 2025

- **AASTMT Productivity and Quality Institute (PQI) services**

AASTMT Productivity and Quality Institute (PQI) offers **consultancy service** in the form of ISO 50001 Energy management Systems Consultancy Service (EnMS) to enable organizations to establish or re-structured the systems and processes necessary to improve energy performance, including energy efficiency, use, consumption and reduce running cost.
ISO 50001 Energy management Systems Consultancy Service-AASTMT PQI

Also local and international **Energy and Environmental Management Certified Training Courses** are offered by PQI. These courses enhance businesses sustainability and reduces an organization's impact on the environment while improving its operating efficiency by controlling its energy consumption which helps in reducing product manufacturing.
Energy and Environmental Management Training Courses-AASTMT PQI

Also, **collaborative consultancy projects** with other entities took place to optimize the energy and environmental management in different facilities. Check the link below
Collaborative consultancy Project with ABB
Collaborative Consultancy Project with Arcas Egypt



Figure 14. PQI agreements

- Encourage **renewable energy and decarbonization-related campaigns** to promote renewable energy and climate action importance beyond AASTM walls.
College of Engineering and Technology at AASTMT, and the Energy Research Unit at AASTMT, produced and published an awareness video, launching the "Our Energy, Our Responsibility" initiative.
Watch the awareness video of AASTMT initiative campaign "Our Energy, Our Responsibility":
Our Energy, Our Responsibility Video

This video was dedicated to the Ministry of Finance to highlight the importance of strengthening partnerships between academic institutions and government entities in promoting energy conservation, raising public awareness, and fostering a culture of sustainability and social responsibility.
https://www.linkedin.com/posts/ministryoffinance-energyabrconservation-sustainableabrdevelopment-ugcPost-7489617054443048960-tU3M/

- Promote **behavioral change** among staff and students to reduce energy consumption, foster awareness on clean energy and decarbonization importance beyond AASTMT walls, and encourage community to engage with sustainable practices via **initiatives, campaigns** and **workshops**.
Energy-related Events
Energy-related Activities

5. Key Performance Indicators

The following dashboard summarizes the principal quantitative indicators associated with 2025 energy plan compared to that of 2024 to confirm AASTMT progress towards clean and sustainable energy.

Table 8. 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	273.6 GJ	286.7 GJ	+4.78%
Energy from low-carbon sources	17,494 GJ	17,682.84 GJ	+1.08%
Carbon emissions		38,253 t.CO_2e	New Measurement methodology Evaluation will be in 2025/2026

6. Conclusion

AASTMT's Energy Plan 2025 represents an integrated institutional framework for advancing sustainable energy management and supporting the university's contribution to SDG 7. Through its seven strategic pillars, the Academy combines smart monitoring, energy conservation, renewable energy utilization, carbon reduction, innovative laboratory facilities, research and funded projects, and strategic partnerships into a unified approach. The measurable reductions in electricity consumption, improvement in energy intensity, and growth in on-site solar generation demonstrate progress towards more sustainable campus operations. At the same time, international research projects and institutional cooperation provide opportunities to transform scientific innovation into practical clean-energy solutions. Ultimately, the plan reinforces AASTMT's pledge to Power Green Sustainability, Cleaning the Future, while supporting its long-term ambition of achieving a 50% reduction in carbon emissions and a 40% renewable energy share by 2040.

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