# 2024 AASTMT Plan towards Clean Sustainable Energy

AASTMT Plan and measures towards clean and affordable energy, within the end of 2023 and throughout 2024, in accordance with the university updated **AASTMT Green Energy and Energy Management Policy (2023-2026)**, cover three main aspects; **Towards: Higher Energy Efficiency and Conservation**, **More Renewable Energy Employment** and **Less Carbon Emissions.**

## 1. Higher Energy Efficiency and Conservation

To support continuous electric energy conservation and enhance its efficiency within its campuses, AASTMT takes regular and consistent measures that are continuously carried out, besides infrastructure upgrading and renovation plans that are updated yearly.

### *i. AASTMT Regular Measures*

- Smart building management systems and online real-time regular monitoring to energy consumption for efficient energy management (load priorities determination and energy use optimization in major campus buildings, thus reducing electricity waste and improving operational efficiency).

- Data from local energy meters in each building are used to track building energy use during different times (day/night, weekdays/weekends, and seasonal variations) to identify periods of high and low demand. Differences between peak energy consumption and off-peak consumption are compared to identify potential overuse or unnecessary use. Hence, buildings of high energy wastage will be selected for internal audits to identify reasons of energy inefficiencies and take suitable measures to rationalize energy consumption in such places.

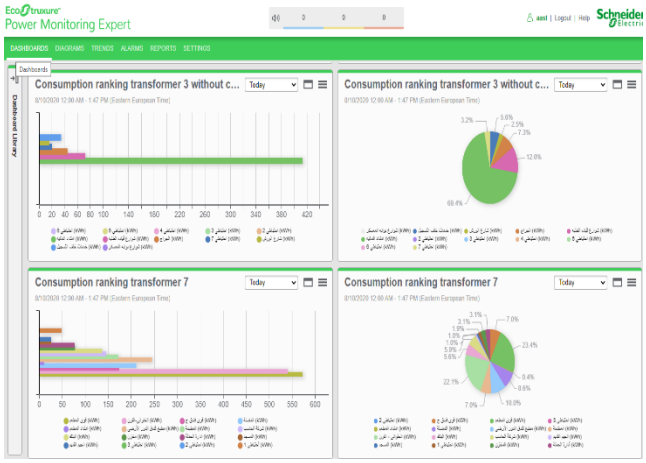

Fig. 1: Schneider Electric-based online metering in AASTMT

- Continuous checking for unnecessary use of energy in high energy wastage buildings where lighting, air conditioners or computers are left on even if the place is unoccupied.

- Spreading instructions and directions towards energy saving and conservation as per the letter addressed to all AASTMT campuses from AASTMT president.
  Letter addressed to all AASTMT institutes from AASTMT president regarding energy saving

- Increasing awareness regarding energy rationalization and conservation plans among AAST staff, students, administrators and technicians through energy-related campaigns, initiatives and seminars as shown in the Events Section found in the following link:
  Energy-related Events

### *ii. AASTMT 2024 Upgrading and Renovation Plan*

Besides, the pre-discussed regular energy saving procedures, AASTMT sets buildings' renovation and upgrading plan all over its campus annually. In each campus, data from local meters at each building is collected to analyze energy use of this building during different times and identify its subjection to energy wastage or energy inefficiencies. Buildings with highest wastage are to be selected for internal audits and measures are to be taken towards these buildings.

## ➢ Alexandria Branch Campuses

The measures discussed in this subsection are to be taken in 2024 for each campus of **Alexandria branch** (This branch renovations are discussed in details since it features multiple campuses, oldest infrastructure and largest number of staff and students i.e. highest energy consumption and energy wastage);
2024 Energy Conservation Report

**First: Abou Qir Branch**

- Upgrading lighting at the new gym entrance with **20 spotlights (5 W)**.
- Upgrading electrical outlets, data points, and lighting on the **entire 4th floor of Housing Hotel C**.
- Upgrading electrical outlets and accessories on the **entire 2nd floor of Housing Hotel E**.
- Upgrading lighting in **4 classrooms on the 4th floor of the Architecture Engineering Building** with **50 LED fixtures**.
- Upgrading lighting in all **corridors of Engineering Buildings C and D** to LED with **100 fixtures**.
- Upgrading lighting in **8 classrooms of Building D (Marine)** with **40 LED fixtures**.
- Installing **2 power factor correction panels** for **2 UPS units** in the Financial Affairs Building.
- Installing **2 control panels** for **water pumps** in **Housing A and Housing B**.
- Upgrading lighting in classrooms on the **3rd and 4th floors of Engineering Building D** with **100 LED fixtures**.
- Upgrading lighting in classrooms on the **3rd and 4th floors of Engineering Building C** with **100 LED fixtures**.
- Upgrading all lighting in the **main restaurant of Housing Hotel E** with **50 LED fixtures**.
- Upgrading lighting in **4 classrooms of the Preparatory Studies Building** with **60 LED fixtures**.
- Upgrading **lighting, outlets, and accessories** on the **3rd and 4th floors of Housing Hotel C**.
- Upgrading **lighting, outlets, and accessories** on the **1st floor of Housing Hotel D**.
- Installing **7 control panels** for **7 irrigation system stations**.
- Installing **1 power factor correction panel** for the **Civil Machinery Lab in Engineering Building D**.
- Installing **1 power factor correction panel** for the **paper-cutting machine** in the Printing Building.
- Upgrading **outdoor lighting** at **Smart Cafeteria** with **6 façade LED lights (100 W)**.
- Upgrading lighting in the **ground-floor classroom of Engineering Building G** with **30 LED fixtures**.
- Upgrading **lighting, outlets, and accessories** on the **2nd and 3rd floors of the Industrial Modernization Building**.
- Upgrading **lighting, outlets, and accessories** in **Hall 02 of the Preparatory Studies Building**.
- Installing **1 power factor correction panel** for a **UPS device** in ground floor of Financial Affairs Building.
- Upgrading **outdoor rooftop lighting** of **Eng. Faculty Buildings** with **6 façade LED lights (200 W)**.
- Upgrading **outdoor rooftop lighting** of the **Maintenance Building** with **6 façade LED lights (200 W)**.
- Upgrading **18 sub-distribution panels (power + lighting)** in the **Engineering Faculty Buildings**.
- Upgrading **6 sub-panels (power + lighting)** in **Housing Building D**.

- Upgrading the **main power and lighting panel** feeding the **restaurant of Housing Hotel D**.
- Upgrading **2 panels (power + lighting)** feeding the **Marine Safety Building vestibule**.
- Upgrading the **hangar power and lighting panel** of the **Technicians' Building**.
- Upgrading the **Maintenance Building's power and lighting panel**.
- Upgrading **all 2nd floor offices** of **Engineering Building A** (lighting + outlets + accessories).
- Upgrading **4 classrooms** on the **2nd, 3rd, and 4th floors** of the **Computers Faculty** (lighting + outlets + accessories).
- Upgrading **corridor lighting** throughout **Engineering Building G** with **300 LED fixtures**.
- Upgrading lighting in **4 classrooms of Engineering Building G** with **60 LED fixtures**.
- Upgrading lighting in **6 classrooms of the IMO Building** with **80 LED fixtures**.
- Installing **2 control panels** for **irrigation pumps** of the **main field and restaurant**, each **3 HP**.
- Upgrading **pool lighting** in the **Marine Safety Building** with **4 façade LED lights (200 W)**.
- Upgrading **the second phase of low-voltage panels** at the **main distribution station**.
- Upgrading **room lighting** in **Housing A and Housing B** with **180 LED fixtures**.
- Upgrading **bathroom lighting** in **Housing A and B** with **60 LED spotlights**.
- Installing a **service panel** at the **Engineering Faculty field** for temporary electrical connections during events.
- Upgrading **2 control panels** for the **water desalination plant** at the main restaurant.
- Upgrading the **fire alarm panel** in the **Admissions and Registration Building**.
- Installing a **power factor correction panel** for a **UPS** in the **ground floor of the Financial Affairs Building**.
- Installing an **alternating control panel** for **water pumps** in **Engineering Building G**.

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**Second: Miami Branch**

- Upgrading **lighting on the ground floor** of the **main library and Building A classrooms** with **50 LED fixtures (40 W)**.
- Upgrading **rooftop lighting** of **Buildings A and C** to LED with **6 façade fixtures (200 W)**.
- Upgrading **6 administrative offices** on the **ground floor of Building A** (lighting + outlets + accessories).
- Upgrading **3 classrooms** on the **3rd floor of the Administrative Building** (lighting + outlets + accessories).
- Upgrading lighting in **4 classrooms of Building A** with **40 LED fixtures**.
- Upgrading **outdoor lighting** of the **Administrative Building and Building B** with **40 spotlights (6 W)**.
- Upgrading **landscape lighting** with **20 lighting poles**.
- Installing a **service panel** at the **International School playground** for event and occasion power connections.
- Upgrading **interior lighting** of the **new gym**.
- Installing a **separate power panel** for the **new gym**.

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**Third: Wabour El-Maya Branch**

- Upgrading **corridor lighting on the ground floor** to LED with **50 fixtures**.
- Installing **1 power factor correction panel** for a **UPS** in the **Studio**.
- Upgrading **corridor lighting on the ground floor** to LED with **50 fixtures** (duplicate task confirmed).
- Installing **1 control panel** for **2 water pumps (3 HP)**.
- Upgrading lighting in **6 classrooms** with **50 fixtures**.
- Upgrading lighting in **ground-floor corridors and 8 classrooms** with **50 spotlights (24 W)**.
- Upgrading lighting in **classrooms and corridors on the 1st and 2nd floors** with **30 spotlights (24 W)**.

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**Notes:**

- The calculations are approximate and based on **8 working hours per day**.
- **Official holidays are not included** in these estimates.

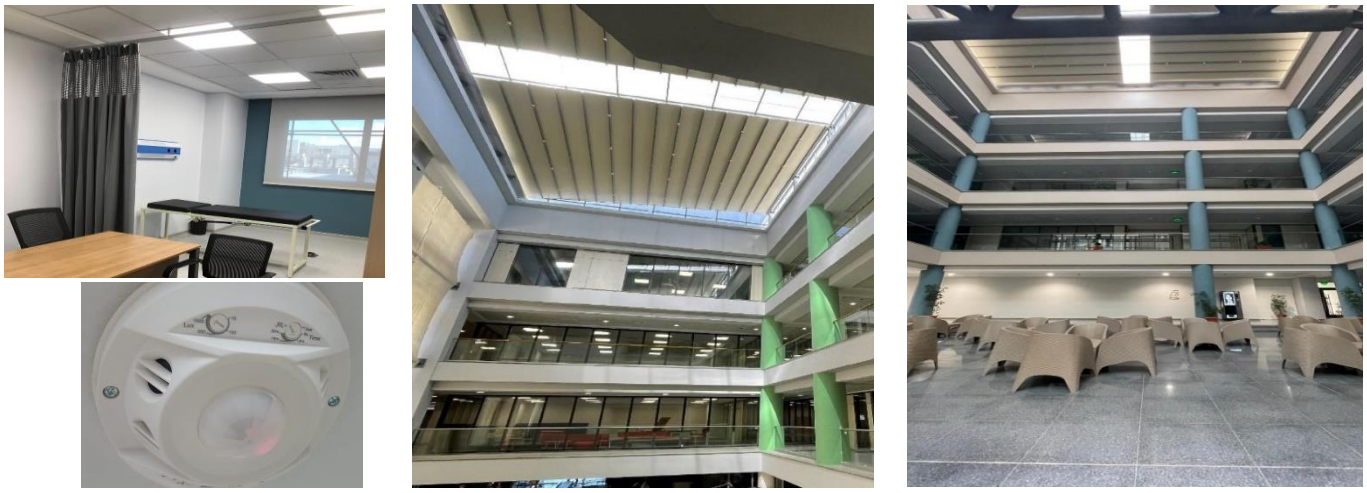
## ➢ Alamein Branch Campus

In **ElAlamein branch**, the installation of College of Medicine are to be finished by the end of 2024. Thermal characteristics of walls, glasses and roofs have a strong impact on the cooling load and chilled water demand of a building. To obtain a properly sized and energy-efficient cooling system, a thermal efficient building shell is utilized in the design with the following specifications:

- Maximize **light colors** for roofing and wall finishes materials.
- Install **high R-value** wall and ceiling **insulations**.
- Use **minimum glass** on **east** and **west** exposures.
- Use windows with **low shading coefficient (SC)** such as double glass windows and roof, however with **shaded curtains**.
- Minimize electrical loads from lighting by using **light sensors** to benefit from natural lighting as much as possible during day-time.
- Implement recommended **lighting intensity as per ASHRAE 90.1-2007** and also **LED luminaries** to minimize heat built up.

Since dependence on natural lighting is a main goal to reduce electrical load, a transparent glass roof is to be used. However, this would increase the indoor temperature and affect the AC conditioner efficiency. Thus, **motorized shading systems -**curtains that can be **opened or closed** based on **sunlight intensity, room temperature, or time of day** – are to be implemented for automatic adjustment for optimal cooling, thus enhancing energy efficiency as follows,

- During hot hours, they are **closed** to block solar radiation preventing rooms from heating up (Up to **30–40% reduction in unwanted heat gain)**. Thus, AC works less while maintaining a comfortable temperature. When less heat enters the room, the AC runs for shorter cycles and at lower power, thus improving its cooling efficiency, extending its lifespan and reducing maintenance needs. This can **reduce AC energy use by 10–25%**.
- On cool days, they **open** to allow **natural light, ventilation** and reduce lighting and energy consumption.



(a) (b)

Fig. 2: Medicine Campus in AASTMT- El Alamein branch, (a) LED lights and lighting sensors, (b) All atriums have motorized shading systems

## 2. More Renewable Energy Employment

Starting from 2022 along to 2024, AASTMT took consistent steps towards renewable energy (RE) sources employment, with a particular focus on solar power, by installing and functioning about **230 kW** solar of photovoltaic (PV) side and mounted stations as well as solar heaters as follows,

- In Aswan branch a **150kW grid tied PV power station** is mounted in the form of a roof mounted station and a side mounted one. Both work with net metering system.
- A grid-tied PV power station with a capacity of **50 kW** is installed in the Seventh Engineering Building in **Alexandria- Abukir campus** with net metering system.
- In 2022, **solar heaters** were installed in the **Pharmacy college- Alex. Abukir campus**, while others were planned to be installed to replace the electric heaters in **students' dorms – Alex. Abukir campus** which was put into action in **2024.**

(a)

(b) (c)

Figure 3: Solar installation in AASTMT campuses (a)150kW grid-tied roof and side mounted PV station in Aswan campus, (b) 50kW – grid tied PV station in Abukir Campus, (c) Solar Heaters in Abukir campus

However, to sustain and expand AASTMT efforts towards renewable energy solutions, regular measures are taken into account, besides initiatives and projects initiated annually to serve this goal.

### *i. Regular Measures*

- **Continuous maintenance, routine cleaning and improvements** in the existing solar installations help to maintain and even improve their output power, thus enhancing its energy share in all AASTMT consumption.
- **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

### *ii. AASTMT 2024 Plan*

Annually, AASTMT participates in renewable energy-related projects and improves the outcomes of already existing ones to serve the industry and community effectively and resourcefully. Besides, campaigns and technical talks are organized to increase the awareness about RE importance and technicality. Moreover, studies are conducted for renewables expansion in AASTMT infrastructure and facilities.

- 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 Engineering and Technology building – AASTMT Alamein** Branch.

  2024/2025 Study and Proposal for establishing PV station and EV charging units in Alamein Branch
- Addition of **Renewable Energy Educational Lab** in the **Electrical and Control Eng. Dept- room G142 at AASTMT Alexandria - Abukir campus.**

  It presents the essential need to prepare students with a comprehensive background in renewable energies via three experimental kits. These lab experiments help the students understand the main concepts regarding renewable energy, energy measurement and energy storage. The three main resources are Solar, Wind and Fuel Cell. The laboratory serves renewable energy courses and summer school camps.

  Renewable Energy Lab in EE Dept-AAST Abukir

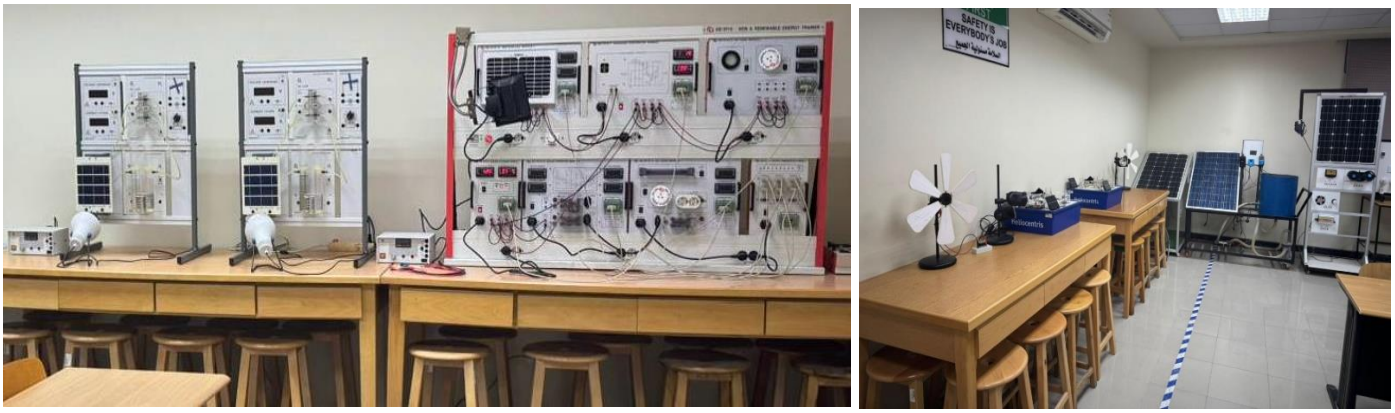


Fig. 4: Installed renewable energy educational lab in electrical and Control Eng. Dept. – Alex. Abukir campus

- Implement the outcomes of already existing **research projects** to serve the industry and community effectively and resourcefully via the implementation and testing of the unit designed in the research project: **Monitoring, Assessment and Innovative Treatment Technology to Enhance Groundwater Quality for Irrigation Purposes toward Climate Change Adaptation (TREATMENT) Funded Project**

  **The Renewable, Innovative and Integrated Water Treatment Unit** designed in **2023** in the TREATMENT Project **is to be implemented, tested and put into action** in **2024**. This unit uses energy harnessed from **7kW photovoltaic system** to be used to lift water from a well, and subsequently, the water is directed through the four-stage nano-filter, where it undergoes a rigorous purification process. The end result is clean, potable water or water suitable for irrigation and cultivation and almost 7kW PV system, serves as the sustainable energy source for the three-phase pump.
  TREATMENT Project

- Encourage **renewable energy-related events and activities** (campaigns, initiatives, seminars, workshops, visits and trainings).
  Energy-related Events
  Energy-related Activities

- Prioritize **renewable energy research projects and graduation projects**.
  Renewable Energy Research Projects
  Renewable Energy Graduation Projects

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

## 3. Less Carbon Emissions

Measures to be 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
AASTMT Carbon Emissions Reduction and Sustainability Progress Report (2024)

These measures are summarized as;

### *i. 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.

### *ii. AASTMT 2024 Plan*

- **Different Scopes of emissions are to be 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 is replaced with **LED** and **smart building management systems (BMS)** is deployed across major buildings. In 2024, teams will prioritize **BMS tuning** (scheduling, set-points, and alarms), targeting **HVAC**, and **light controls** in high-use spaces, besides improvements and maintenance in **on-site solar output** to **lower grid dependence**

**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
  Energy-related Activities

- Engage postgraduate students and faculty in **conducting studies on climate adaptation, carbon footprint and decarbonization in AASTMT campuses**, especially the largest AASTMT Alex. Campus.

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

**Previously discussed AASTMT measures and efforts towards Clean Sustainable Energy keep AASTMT in track with its short-term sustainability goals and support its progress towards its long-term goals**

- By 2025: AASTMT plans to continue achieve 30% carbon emissions reduction and expand its renewable energy capacity, with the goal of sourcing 25% of its energy from renewables.
- By 2040: AASTMT aims to achieve a 50% reduction in carbon emissions, besides expansion in renewable energy infrastructure, where AASTMT aims at increasing energy from renewables to 40% .
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