7.2.2 University plans to upgrade existing buildings to higher energy efficiency

Alexandria University is upgrading existing buildings through an integrated energy efficiency strategy that enhances solar energy conversion, optimizes battery and energy storage systems, and improves overall performance under varying temperature and operating conditions. Using advanced models, simulation, and analysis, the university evaluates loads, current, and electric potential to reduce carbon dioxide emissions and increase system stability. The plan applies innovative materials, thin films, solar cells, and wind power technologies, combined with smart control systems to ensure efficient energy utilization and long-term sustainable development. This approach supports the modernization of campus infrastructure through improved structure, process optimization, and enhanced renewable energy integration.

Alexandria University has achieved a continuous and substantial reduction in its institutional carbon footprint. Decreasing emissions is a result of systematic decarbonization strategies, including energy efficiency upgrades in campus infrastructure, increased and procurement of renewable electricity. The consistent downward trajectory aligns with the emission reduction pathways recommended by the Intergovernmental Panel on Climate Change for limiting global warming to 1.5 °C. It supports Egypt's updated Nationally Determined Contributions under the Paris Agreement. By embedding these measures into core operational planning, the university demonstrates a replicable model of science-based climate governance within the higher education sector.

Alexandria University is advancing a dual-track sustainability initiative comprising a rooftop photovoltaic installation and a Fab Lab for circular economy innovation. The solar component, targeting approximately 200 m² of suitable roof space (net usable area: 196 m² after accounting for 3% service access), will deploy a 1.5-ton system generating an estimated 37,700 kWh annually under Alexandria's mean global horizontal irradiance of 5.2 kWh/m²/day, factoring in 20% panel efficiency and a 0.75 performance ratio to account for system losses.

Alexandria University significantly advanced its digital transformation as a core pillar of its sustainability and operational efficiency strategy, by deploying smart digital infrastructure, including IoT-based irrigation systems, building Management Systems (BMS) with real-time energy dashboards, and motion-sensor lighting, digital tools, such as the Green Cycle carpooling app and e-learning platforms for renewable energy courses, as well as centralized digital monitoring for utilities, further reinforced resource efficiency. This comprehensive digitization effort not only supports the university's goal of reducing its carbon footprint but also aligns with Egypt's Vision 2030 and global sustainability commitments by enhancing educational quality, institutional resilience, and environmental stewardship.

Energy Efficient Appliances Usage

- Alexandria University intends to realize further energy savings by paying close attention to energy management. All the faculties and institutes of the university realize their own energy-saving potential by means of LED lighting and the deployment of sustainable technology.

- Motion-Activated Lighting with PIR Sensors
  PIR sensors have been installed in select faculties to enable motion-activated lighting by detecting changes in heat signatures. Gradual implementation of PIR sensors across all faculties and institutes of the university, as a future phase.
- Automated Lighting Systems
  Install lighting systems that automatically adjust based on occupancy or time of day to enhance energy efficiency.

Energy Efficient Appliances Usage: Use of LED lighting and lamps (New Abbes Campus, Alexandria University)

Alexandria University Program to reduce Electricity consumption from Air Conditioners and electric devices such as Computers, printers, photocopiers, surveillance cameras.

1. All newly purchased AC are inverter AC to reduce the electricity consumption
2. The new electric devices such as Computers, printers, photocopiers, and surveillance cameras are energy efficient devices.
3. All electronic devises must be shut down at night, when not used.
4. Passive Infrared (PIR) Sensors were implemented in some Faculties for motion-activated lighting to detect changes in heat signatures when someone or something moves within the sensor's range. These sensors will beimplemented in phases in for all faculties and institutes of the university.
5. Regular Maintenance of all devices.
6. The thermostats of the air conditioner are set at 25°C, and direct sunlight is avoided by using sun protection curtains.

Energy Efficiency

- Integrating solar and wind energy sources into building design reduces reliance on non-renewable resources.
- Installing systems that optimize ventilation with minimal energy consumption.
- Automated lighting systems that respond to occupancy or time of day.
- As for energy, all the buildings have solar energy generation cells to provide part of the building's needs, which are estimated at about 45%, in addition to using energy-saving lamps (LED).
- The public site lighting poles are powered by solar energy.