DELTA UNIVERSITY
FOR SCIENCE AND TECHNOLOGY
FACULTY OF ENGINEERING

Energy Efficiency and Sustainability Report 2025

Delta University for Science and Technology is committed to improving energy efficiency, reducing electricity consumption, and promoting environmental sustainability through its Strategic Plan for Energy Conservation and Efficiency Improvement (2023–2025).

The university implements sustainable practices, including LED lighting upgrades, natural daylight utilization, rooftop solar photovoltaic systems, water-saving facilities, and waste segregation. The Faculty of Engineering demonstrates these efforts through energy-efficient lighting, sustainable facility renovations, and environmentally conscious architectural design.

This report highlights the university's energy conservation initiatives, sustainable infrastructure improvements, renewable energy integration, and energy consumption performance, reflecting its continued commitment to sustainability and carbon emissions reduction.

2. Institutional Strategic Framework for Energy Conservation and Efficiency Improvement

Delta University's energy conservation strategy is guided by its institutional plan for 2023–2025, developed under the Office of the Vice President for Community Service and Environmental Development.

The strategic plan establishes priorities for improving energy efficiency, reducing unnecessary consumption, encouraging renewable energy utilization, and promoting sustainable resource management.

2.1 Strategic Objectives

The university's strategic energy objectives include:

1. Improving energy efficiency throughout university facilities.
2. Reducing electricity consumption by upgrading inefficient lighting and electrical equipment.
3. Increasing the integration of solar energy into campus electricity supply.
4. Promoting energy conservation awareness among students, faculty members, and administrative staff.
5. Reducing the environmental impacts associated with conventional energy consumption.
6. Applying energy-efficient design standards to new buildings and gradually upgrading existing facilities.
7. Strengthening energy monitoring and management practices.
8. Supporting scientific research and technological development in sustainable energy.

9. Encouraging environmentally responsible behavior throughout the university community.
10. Maintaining alignment with applicable national energy efficiency requirements and recognized international sustainability frameworks.

The plan provides the institutional foundation for the university's energy conservation and sustainable infrastructure initiatives.

2.2 Short-Term Energy Conservation Measures

The university's short-term strategic measures include:

- Organizing awareness campaigns on energy conservation.
- Reviewing existing electrical equipment.
- Identifying devices with high electricity consumption.
- Encouraging responsible electricity use in academic and administrative areas.
- Reducing unnecessary operation of lighting and electrical equipment.
- Promoting energy conservation through faculty councils and institutional communication.

A key priority is the identification of equipment with relatively high electricity demand and the evaluation of opportunities for replacement with more efficient alternatives.

2.3 Medium-Term Energy Efficiency Measures

The medium-term strategic plan focuses on:

- Installing rooftop solar photovoltaic systems.
- Replacing inefficient electrical devices.
- Improving the performance of lighting and air-conditioning systems.
- Strengthening energy management arrangements.
- Introducing monitoring procedures to support informed operational decisions.
- Establishing institutional responsibilities for implementing energy conservation measures.

The strategic plan also addresses the formation of a permanent committee to monitor progress in energy efficiency improvement.

2.4 Long-Term Sustainable Energy Measures

The university's long-term priorities include:

- Applying energy efficiency requirements in new university buildings.
- Gradually upgrading existing buildings.
- Expanding renewable energy installations.
- Supporting the integration of energy conservation principles into relevant academic programs.
- Encouraging research and innovation in sustainable energy.
- Improving the environmental performance of university facilities.

3. Energy Management and Conservation Procedures

Delta University's strategic approach recognizes that improving energy efficiency requires the implementation of operational measures alongside physical infrastructure upgrades.

Energy conservation therefore involves reviewing electricity consumption, identifying inefficient equipment, improving operating practices, and maintaining efficient building systems.

3.1 Energy Consumption Monitoring

The university's strategic plan emphasizes the adoption of energy consumption monitoring and analysis systems to improve decision-making regarding electricity use.

Energy monitoring can support the identification of:

- Buildings with comparatively high electricity demand.
- Electrical equipment operates inefficiently.
- Unnecessary energy consumption during periods of low occupancy.
- Opportunities for optimizing lighting and air-conditioning operations.
- Changes in consumption patterns across different reporting periods.

Monitoring results can also support the evaluation of energy conservation initiatives.

3.2 Operational Energy Conservation Measures

The strategic plan identifies a number of operational procedures, including:

- Setting air-conditioning systems to an operating temperature of 26°C.
- Reducing the operation of selected air-conditioning units during peak demand periods.
- Replacing conventional lighting with LED technology.

- Introducing lighting controls and sensors in circulation areas.
- Applying energy efficiency considerations when purchasing new equipment.
- Reviewing electrical systems to identify opportunities for reducing consumption.

These measures form part of the university's planned approach to improving the efficiency of campus operations.

3.3 Preventive Maintenance and Equipment Efficiency

Preventive maintenance and equipment reviews are important components of effective energy management.

The university's strategic approach includes assessing existing electrical equipment and identifying devices that may require upgrading or replacement.

Regular assessment of equipment performance can help identify energy losses associated with inefficient operation, outdated technologies, and unnecessary electricity consumption.

The results of such assessments can inform maintenance priorities and future investment decisions.

3.4 Energy Management Responsibilities

The university's strategic plan identifies institutional monitoring and governance as priorities for successful implementation.

A structured management approach can include:

- Assigning responsibilities for energy monitoring.
- Reviewing electricity consumption data.
- Identifying improvement opportunities.
- Prioritizing equipment replacement and maintenance.
- Documenting completed energy conservation activities.
- Evaluating annual energy performance.

The implementation status of individual governance arrangements should be supported by the university's corresponding administrative records.

4. Energy-Efficient Lighting Upgrades at the Faculty of Engineering

As part of its efforts to improve energy efficiency and reduce electricity consumption, Delta University has undertaken lighting system improvements within the Faculty of Engineering.

A total of **160 conventional lighting units have been replaced with energy-efficient LED lamps**.

This improvement represents a practical application of the university's strategic commitment to replacing conventional lighting systems with more efficient alternatives.

4.1 Objectives of the LED Lighting Upgrade

The replacement of conventional lighting with LED technology is intended to:

- Reduce electricity consumption associated with artificial lighting.
- Improve the efficiency of lighting systems in academic and administrative spaces.
- Reduce unnecessary operational energy demand.
- Lower maintenance requirements associated with conventional lighting.
- Support the university's broader carbon emissions reduction objectives.
- Improve the long-term sustainability of university facilities.









4.2 Implementation Details

Table 1. LED Lighting Upgrades at the Faculty of Engineering

Item	Description
Building	Faculty of Engineering
Improvement	Replacement of conventional lighting with LED technology
Number of LED lamps installed	**160**
Primary objective	Improved lighting efficiency
Expected environmental benefit	Reduced electricity demand

The replacement of 160 lighting units demonstrates the transition from energy conservation planning toward practical infrastructure improvements.

4.3 Technical Benefits of LED Lighting

LED lighting generally offers improved energy efficiency compared with conventional incandescent lighting and many older lighting technologies.

Its use can contribute to reduced electricity demand, improved lighting performance, and lower maintenance requirements.

5. Sustainable Renovation of Sanitary Facilities at the Faculty of Engineering

In addition to improving lighting efficiency, Delta University has undertaken infrastructure renovation works to promote responsible water consumption and sustainable resource management.

The Faculty of Engineering has renovated **16 restrooms**, incorporating sensor-operated faucets and water-efficient toilet systems.

These improvements support the university's integrated approach to sustainable campus operations.

5.1 Installation of Sensor-Operated Water Faucets

Conventional faucets were replaced with sensor-operated faucets designed to control water flow automatically.

These systems are designed to activate water flow when required and stop it when use ends.

The main intended benefits include:

- Reducing unnecessary water consumption.
- Preventing water wastage caused by faucets being left running.
- Improving the efficiency of sanitary facilities.
- Supporting responsible resource management.
- Encouraging sustainable practices in university buildings.

5.2 Installation of Water-Efficient Toilets

Water-efficient toilet systems were introduced as part of the renovation works.

These systems are designed to use water more efficiently during flushing, helping reduce consumption associated with daily restroom use.

5.3 Renovation Implementation Summary

Table 2. Sustainable Sanitary Facility Improvements

Item	Description
Building	Faculty of Engineering
Number of renovated restrooms	**16**
Water-saving technology	Sensor-operated faucets
Additional improvement	Water-efficient toilet systems
Main sustainability objective	Reducing unnecessary water consumption

5.4 Contribution to Sustainable Building Operations

Although these improvements primarily contribute to water conservation rather than direct electricity reduction, they demonstrate the university's broader commitment to sustainable building management.

The modernization of sanitary facilities complements the university's initiatives in energy conservation, efficient lighting, sustainable architecture, and responsible resource use.

The water-saving technologies are especially relevant to SDG 6, while also supporting the university's integrated approach to sustainable infrastructure.



6. Natural Daylight Utilization at the Faculty of Engineering

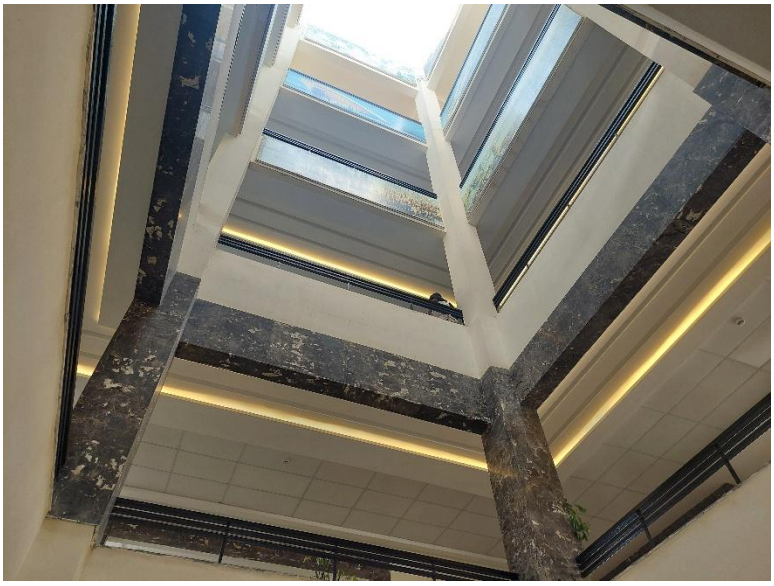
Delta University promotes sustainable architectural design to improve energy efficiency and reduce reliance on artificial lighting. The Faculty of Engineering features spacious areas and openings that maximize natural daylight, particularly during morning hours, reducing the need for electric lighting.

6.1 Architectural Features Supporting Daylight

The Faculty of Engineering includes spacious interior areas designed to allow natural light to enter occupied spaces.

These architectural characteristics help increase the availability of daylight in educational and circulation areas.

The use of natural lighting is an important consideration in sustainable building design because artificial illumination represents a component of building electricity consumption.





6.2 Reflective Glazing in Laboratories

Laboratories within the Faculty of Engineering incorporate glazing features reported to support natural lighting conditions.

These features form part of the building's approach to daylight utilization.

The actual performance of glazing depends on characteristics such as visible light transmission, reflectance, and solar heat gain.





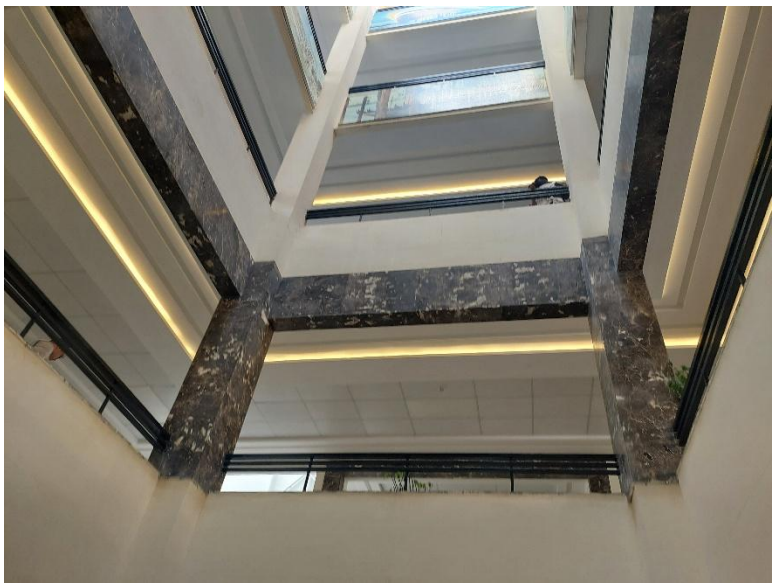
6.3 Environmental and Operational Benefits

The utilization of natural daylight can support:

- Reduced dependence on artificial lighting during daytime hours.
- Lower potential electricity demand for lighting.
- Improved indoor lighting conditions.
- Greater integration of passive design strategies.
- More efficient use of naturally available light.

- Sustainable architectural development.





7. Energy-Efficient Design of Newly Constructed Faculty Buildings

The integration of natural daylight is not limited to the Faculty of Engineering.

Delta University incorporates daylight-oriented architectural design considerations into its newly constructed faculty buildings, aiming to maximize the availability of natural lighting within academic and administrative spaces.

This approach reflects the university's commitment to incorporating energy efficiency considerations into the planning and design of new facilities.

7.1 Sustainable Architectural Planning

The design of newly constructed buildings considers the effective use of natural daylight. Architectural features that support daylight utilization may reduce the need for artificial lighting

when sufficient sunlight is available. The university's stated approach includes the provision of naturally illuminated spaces within academic buildings.

7.2 Energy Efficiency in New Construction

The university's strategic plan calls for the application of Egyptian energy efficiency standards in new buildings. It also identifies the gradual modernization of older buildings as a long-term priority. This approach is intended to improve building efficiency through both new construction and existing building upgrades.

7.3 Sustainable Building Design Principles

The university's sustainable building approach incorporates:

- Maximizing natural daylight within occupied spaces.
- Improving energy efficiency through architectural planning.
- Reducing dependence on artificial lighting where possible.
- Incorporating efficient lighting technologies into building operations.
- Supporting sustainable construction and infrastructure development.
- Considering the long-term energy requirements of university buildings.

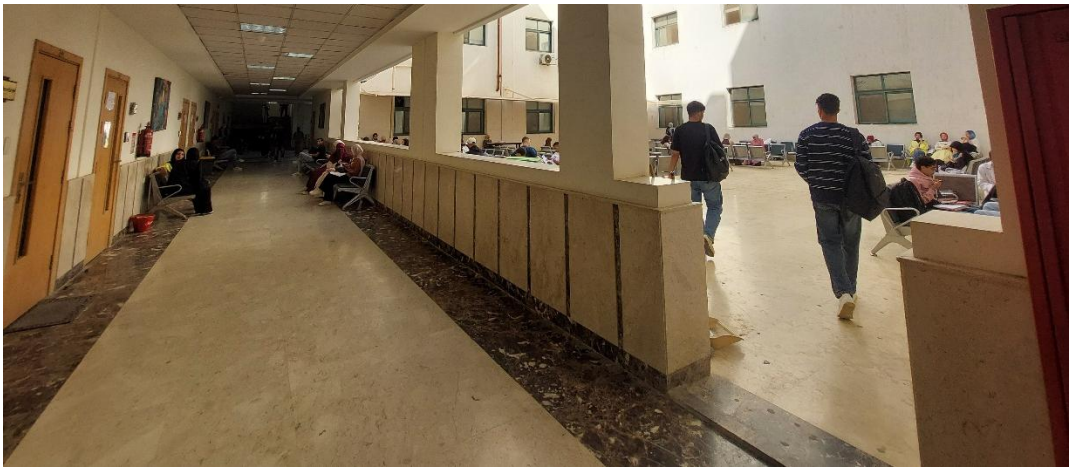
7.4 Existing Building Upgrades and New Building Standards

The strategic approach distinguishes between two related priorities:

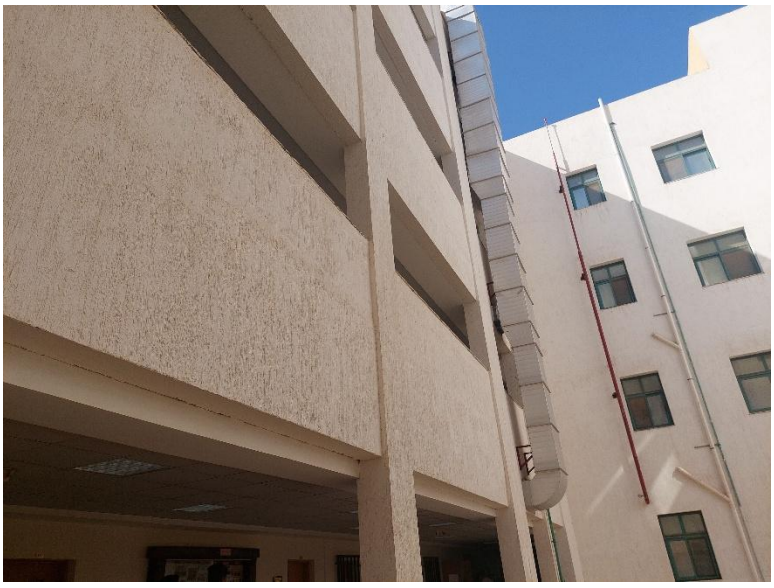
Existing buildings: Identifying opportunities for energy efficiency improvements through renovation and equipment modernization.

New buildings: Incorporating energy efficiency considerations during the design and construction stages.

Together, these priorities support the university's long-term goal of developing more efficient academic facilities.







8. Solar Photovoltaic Systems and Renewable Energy Integration

Delta University integrates rooftop solar photovoltaic systems across faculty buildings to generate clean electricity, reduce reliance on conventional energy sources, and support its sustainability goals.

8.1 Rooftop Solar Photovoltaic Systems

Solar photovoltaic systems convert sunlight into electrical energy. Rooftop installations provide an opportunity to utilize available building surfaces for renewable electricity generation.

8.2 Benefits of Solar Energy Integration

Solar photovoltaic technology supports several strategic objectives:

- Increasing the use of renewable energy within campus facilities.
- Reducing dependence on conventional electricity generation.
- Supporting long-term energy security.
- Contributing to the university's carbon reduction objectives.
- Demonstrating practical renewable energy applications.
- Supporting energy sustainability within educational institutions.

8.3 Renewable Energy Expansion Strategy

Delta University's strategic plan identifies the installation and expansion of rooftop solar photovoltaic systems as an important measure for improving energy sustainability.

The plan includes the progressive use of available rooftop spaces to support renewable electricity generation.

8.4 Monitoring Solar Electricity Production

To evaluate the contribution of solar photovoltaic installations, the university can document:

- The location of each installed system.
- The installed capacity in kilowatts.
- The installation and commissioning date.
- Annual electricity generation in kilowatt-hours.
- Electricity generated and consumed on campus.
- Maintenance and operational performance records.

Such information would allow a more detailed assessment of the contribution of renewable energy to university electricity demand.





9. Waste Segregation and Sustainable Waste Management

Delta University promotes sustainable waste management by providing designated waste bins across its campus to separate different types of waste at source.

This initiative encourages responsible waste disposal among students, faculty, and staff, improves waste collection efficiency, supports recycling and resource recovery, and reduces environmental impacts.

Waste segregation complements the university's broader sustainability efforts, including energy-efficient lighting, renewable energy integration, water conservation, and sustainable building design.



10. Energy Wastage Identification and Energy Review Procedures

Delta University's Strategic Plan for Energy Conservation and Efficiency Improvement emphasizes identifying high-energy-consuming equipment and monitoring electricity usage to improve operational efficiency.

The university's energy review framework covers lighting, air conditioning, laboratory equipment, and electrical appliances, aiming to identify potential energy wastage and opportunities for improvement.

Recommended corrective measures include replacing inefficient equipment, upgrading lighting systems, optimizing operating schedules, and conducting preventive maintenance.

11. Energy Consumption Monitoring and Three-Year Performance Comparison (2023-2025)

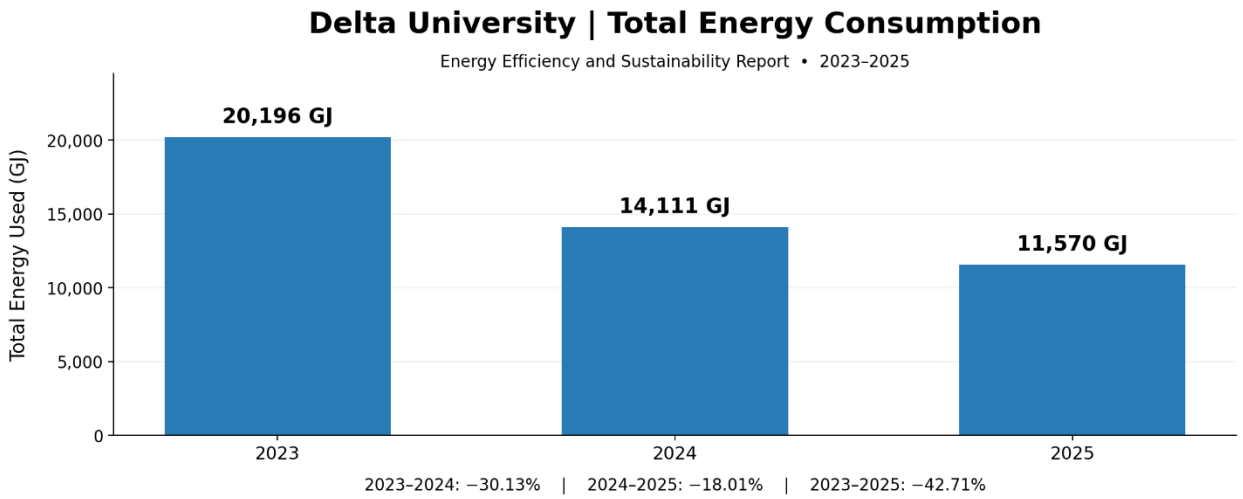
Monitoring total energy consumption is essential for assessing changes in energy demand and evaluating the university's overall energy performance.

Delta University has provided total energy consumption figures for 2023, 2024, and 2025.

These figures allow a comparison of reported energy use over the three-year period.

11.1 Total Energy Consumption Data

Figure 1. Annual Total Energy Consumption at Delta University for Science and Technology



11.2 Analysis of Energy Consumption Trends

The reported figures show a decline in total energy consumption from 2023 to 2024.

The additional 2025 figure is lower than the preceding values.

Changes in total energy consumption can also be influenced by factors such as:

- Building occupancy.
- Academic and operational schedules.
- Changes in campus floor area.
- Weather conditions.
- Equipment utilization.
- Renewable electricity generation and its accounting treatment.
- Changes in the number of students and staff.

11.3 Relationship with Energy Conservation Initiatives

The reported reduction in total energy consumption is consistent with the objectives outlined in the university's strategic plan.

Relevant initiatives include:

- Replacing conventional lighting with LED systems.
- Improving building energy efficiency.
- Increasing the utilization of natural daylight.

- Integrating solar photovoltaic technology.
- Reviewing inefficient equipment.
- Improving energy management and monitoring procedures.

These measures provide context for the university's energy conservation efforts.

11.4 Continuous Energy Performance Evaluation

Continued energy monitoring can support:

1. Identifying buildings and equipment with high energy demand.
2. Evaluating the effectiveness of conservation measures.
3. Detecting unnecessary energy consumption.
4. Prioritizing future building upgrades.
5. Measuring progress toward conservation objectives.
6. Improving institutional energy management decisions.

The university's reported figures provide a basis for further energy performance evaluation.

12. Energy Performance Indicators and Monitoring Framework

Delta University evaluates its energy efficiency performance through key performance indicators (KPIs) that support energy conservation, sustainable building improvements, and renewable energy integration.

The main indicators include:

- **Total Energy Consumption:** Monitoring annual energy use in gigajoules (GJ) for 2023–2025.
- **Energy Consumption Reduction:** A recorded **30.13% decrease** between 2023 and 2024.
- **Energy Use Intensity:** Assessing energy consumption per square meter (kWh/m²), subject to verified building area data.
- **Renewable Energy Contribution:** Evaluating electricity generated by rooftop solar photovoltaic systems.
- **Building Efficiency Improvements:** Tracking upgrades, including the installation of **160 LED lamps** at the Faculty of Engineering.

- **Energy Management Performance:** Monitoring energy reviews, equipment efficiency, maintenance activities, and corrective measures.

These indicators provide a framework for assessing the university's progress in improving energy efficiency and achieving its sustainability objectives.

13. Energy Efficiency Improvements and Environmental Performance

The university's sustainability initiatives address several interconnected aspects of environmental performance.

13.1 Electricity Conservation

LED lighting upgrades, improved building design, and energy management procedures support more efficient electricity consumption.

13.2 Renewable Energy Utilization

Rooftop solar photovoltaic systems contribute to the university's strategy of increasing the use of clean energy.

13.3 Sustainable Building Operations

The renovation of sanitary facilities, efficient lighting, and daylight-oriented architecture support responsible resource management in university buildings.

13.4 Water Conservation

Sensor-operated faucets and water-efficient toilets help reduce unnecessary water consumption.

13.5 Responsible Waste Management

Separate waste collection points encourage waste segregation and support opportunities for recycling.

13.6 Carbon Emissions Reduction

Energy conservation and renewable energy utilization can contribute to lower energy-related greenhouse gas emissions.

13.7 Integrated Sustainability Benefits

Together, these measures demonstrate the university's approach to integrating energy efficiency, renewable energy, water conservation, sustainable architecture, and responsible waste management.

14. Carbon Reduction and Sustainable Energy Transition

Delta University recognizes the relationship between energy consumption, conventional electricity generation, and greenhouse gas emissions.

The university's strategic approach emphasizes improving energy efficiency and increasing renewable energy utilization to support its environmental objectives.

14.1 Reducing Energy-Related Environmental Impacts

The university's measures include:

- Improving the efficiency of lighting systems.
- Integrating renewable energy technologies.
- Promoting efficient building design.
- Reviewing electrical equipment.
- Encouraging responsible energy consumption.

These measures are intended to reduce energy demand and support the university's broader carbon reduction objectives.

14.2 Renewable Energy and Emissions Reduction

Solar photovoltaic systems can replace a portion of electricity that would otherwise be supplied by conventional sources.

The emissions reduction associated with solar electricity generation depends on the amount of electricity generated, the university's energy accounting boundary, and the applicable emissions factor.

14.3 Carbon Footprint Assessment

A comprehensive carbon footprint assessment may address:

Scope 1 – Direct Emissions

Emissions from sources owned or controlled by the university, such as on-site fuel combustion and refrigerant leakage.

Scope 2 – Purchased Energy

Indirect emissions associated with purchased electricity.

Scope 3 – Other Indirect Emissions

Relevant indirect emissions associated with university activities, such as waste management, procurement, and transportation, according to the selected reporting methodology.

14.4 Long-Term Sustainability Direction

The university's sustainability framework includes a roadmap toward achieving zero carbon emissions by 2050.

The roadmap supports long-term planning for reducing environmental impacts and increasing the use of cleaner energy sources.

15. Implementation Summary and Supporting Evidence

Table 5. Summary of Reported Sustainability Measures

No.	Sustainability Measure	Location / Scope	Reported Implementation
1	Energy-efficient lighting	Faculty of Engineering	Replacement of 160 conventional lamps with LED
2	Sustainable restroom renovation	Faculty of Engineering	Renovation of 16 restrooms
3	Sensor-operated faucets	Faculty of Engineering	Installed within renovated sanitary facilities
4	Water-efficient toilet systems	Faculty of Engineering	Installed within renovated sanitary facilities
5	Natural daylight utilization	Faculty of Engineering	Spacious architectural areas and daylight-supporting glazing
6	Energy-efficient building design	Newly constructed faculty buildings	Architectural design incorporating natural lighting
7	Solar photovoltaic integration	Faculty rooftops	Reported rooftop solar installations
8	Waste segregation	University campus	Separate waste containers for different categories

9	Energy consumption monitoring	University-wide	Energy consumption figures for 2024–2026
10	Energy conservation planning	University-wide	Strategic Plan for Energy Conservation and Efficiency Improvement (2023–2025)
11	Electrical equipment assessment	University-wide	Identified as a measure in the strategic plan
12	Energy-efficient new construction	Newly constructed buildings	Energy efficiency standards included in strategic planning
13	Carbon reduction planning	University-wide	Sustainability and carbon reduction roadmap

15.1 Institutional Strategic Evidence

The university's Strategic Plan for Energy Conservation and Efficiency Improvement provides the main policy foundation for:

- Energy efficiency improvement.
- Equipment modernization.
- Renewable energy expansion.
- Sustainable building standards.
- Energy conservation awareness.
- Energy monitoring and management.

15.2 Infrastructure Implementation Evidence

The following reported improvements can be supported through technical and photographic documentation:

- Installation of 160 LED lamps at the Faculty of Engineering.
- Renovation of 16 restrooms.
- Installation of sensor-operated faucets.
- Installation of water-efficient toilets.

- Natural daylight features and laboratory glazing.
- Rooftop solar photovoltaic installations.
- Separate waste collection points.

15.3 Quantitative Energy Performance Evidence

Year	Total Energy Consumption
2023	20,196 GJ
2024	14,111 GJ
2025	11,570 GJ

16. Student Innovation and Research in Renewable Energy

Delta University promotes student innovation and applied research in renewable energy through projects developed by the Faculty of Energy Engineering.

Student initiatives include solar tracking systems, solar-powered lighting solutions, green hydrogen technologies, and wind energy applications. These projects demonstrate the university's commitment to advancing clean energy technologies, encouraging practical learning, and supporting sustainable innovation.











Summary

Delta University for Science and Technology is committed to advancing energy efficiency, environmental sustainability, and responsible resource management through the implementation of its institutional energy conservation strategy.

This report highlights the university's integrated approach to sustainable campus development, encompassing energy-efficient infrastructure, sustainable building design, renewable energy integration, energy consumption monitoring, and environmental management practices. It also

reflects the university's efforts to promote research, innovation, and awareness in clean energy technologies.

Prepared by:

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