# Advancing Energy Efficiency and Sustainability
# A Commitment to SDG7

The University of Balamand (UOB) demonstrates a strong commitment to SDG7 through various initiatives aimed at enhancing energy efficiency and promoting low-carbon energy use.

The **Communication on Engagement SDG7** report summarizes many of the events and research in the year 2023 and 2024. Additionally, the **Carbon Footprint** is also available online.

All campus renovations and new constructions follow comprehensive sustainability guidelines, emphasizing recyclable materials and energy-efficient design, as outlined in section 4.4 of the university's Sasaki Detailed Implementation Plan. UOB has adopted an energy efficiency strategy to reduce overall consumption and is actively working to upgrade buildings to higher energy performance standards while lowering carbon emissions. This includes diversifying renewable energy sources and implementing solar energy systems, which have significantly reduced reliance on diesel generators. Although formal policies on divesting from carbon-intensive industries are not explicitly stated, the university's operational choices reflect a shift toward sustainable energy practices.

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# Energy-efficient Renovation and Building

All renovation and construction activities follow the campus-wide guidelines, which take into account sustainability and the use of recyclable materials, as outlined on the first page of the Sasaki Implementation Plan.

### 4.3 Assumptions

The illustrations in this document relative to building footprints, massing and special features are developed directly from the master plan assumptions. They are intended to be examples of the implementation of the principles articulated in both documents. Some of the guideline recommendations may be subject to confirmation upon elaboration of the final building programs, at the time of implementation. Changes in the scope of buildings may result in different interpretations of the guidelines.

### 4.4 Guidelines for Campus-wide Application

#### 4.4.1 Material Selection Criteria

Careful selection of materials ensure a sense of visual continuity and unity throughout the main spaces of the campus. A sustainable model for architecture on the campus will favor the use of local materials and craft. The selection of materials for the building should follow the present criteria:

- Locality: preferred materials are those that are produced locally or regionally or that are locally available.
- Suitability: selected materials must be appropriate for the intended application in the context of the campus location and the material palette characteristic of Balamand.
- Sustainability: building materials are expected to perform relative to conditions of solar radiation, energy transmission and acoustic value, and to contribute to the enhancement of the overall campus environment.
- Durability: material choices should reflect the designer's awareness of the low maintenance standard for the campus. Life cycles should be considered in comparing material alternatives.
- Recyclable content: the ability to recuperate the material post-use would be favored.

#### 4.4.2 Exterior Wall Materials

- The primary cladding material for the walls shall be stone masonry. Local limestone would be preferred as a base material while other locally available stone veneers (sandstone, etc) would be designated as accent materials. An exterior stone skin would reinforce the image of the redevelopment of the campus core and would portray a unified material character for the campus extending from the Monastery up to the hillside.
- Pre-cast concrete or cementicious panels, terracota, laminated wood panels and/or painted plaster/stucco can be used as cladding materials for wall surfaces other than primary building facades.
- Colonnades shall typically be clad in stone masonry.
- Sloping roof surfaces shall be clad in terracota tile (typical of the recent campus buildings).



# Assistance to Low-carbon Innovation and Energy Efficiency Services for Industry

UOB supports Lebanon's transition to a low-carbon economy by providing services that improve energy efficiency and reduce environmental impact. These efforts combine research, technical expertise, and practical solutions to help businesses adopt cleaner practices. A notable example is the Smart Nursery in Lebanon, which benefits students and the community through technology and eco-friendly practices.

The **Life Cycle Assessment (LCA)** Center plays a central role, offering energy efficiency assessments, workshops, and renewable energy research under contractual agreements. By promoting life cycle thinking, it helps industries cut energy use and create environmentally responsible, competitive products.

The **Environmental & Energy Economics (EEE) Program** under the Institute of the Environment complements this work through applied research and capacity building. It develops feasibility studies and business plans for renewable energy and efficiency projects, using advanced tools for decision-making. A key achievement is the SABIOP bioenergy initiative, which converts forest residues into bio-briquettes, reducing waste and providing sustainable energy.

# Upgrade Buildings to Higher Energy Efficiency and Reduce Carbon Emissions

As part of the **UOB-CAP33 Climate Action Plan**, the University is actively upgrading its infrastructure to meet two key sustainability goals:

1. **Improving energy efficiency**, and 2.**Diversifying renewable energy sources.**

To enhance building energy efficiency, UOB has implemented the following measures:

- **Roof Insulation:** All buildings are already equipped with roof insulation to reduce heat loss and improve thermal performance (Sasaki recommendations).
- **LED Lighting:** A campus-wide transition to LED lighting is nearly complete, replacing outdated lighting systems with energy-efficient alternatives.
- **Solar Street Lighting:** Outdoor lighting has been upgraded to solar-powered streetlights, reducing grid dependency and operational costs.
- **Energy-Efficient Appliances:** All air conditioning units are either inverter-based or in the process of being upgraded. The same applies to refrigerators and other electronic appliances across campus.
- **Boiler Replacement:** Old boilers have been replaced with newer models that consume significantly less energy.
- **Energy Monitoring:** Energy usage is being systematically recorded to track performance and identify further opportunities for efficiency improvements.
- **Solar Energy Systems:** Solar panels have been installed across the campus, contributing to both energy efficiency and renewable energy goals.

Moreover and under the UOB-Cap33, the university is working of establishing a uob sustainalibe transportation program to reducte commiuting emissions, including UOB Connect, bus shuttle, and taxis carpooling.

# Integration of Local Biodiversity in Planning and Development

The University of Balamand integrates local biodiversity considerations into all planning and development processes to ensure ecological sustainability. Before any construction or major development, environmental impact assessments are conducted to minimize disruption to natural habitats. The university promotes sustainable design principles, preserves green spaces, and collaborates with its Institute of the Environment to safeguard biodiversity.

Key initiatives include habitat restoration projects, native species protection, and research programs on land and marine ecosystems, aligning with SDG15 (Life on Land) and **university's Environmental sustainability policy**. In addition, the university follows the Sasaki Landscape Design Guidelines, particularly the Planting Strategy (Section 3.3), which emphasizes water-conscious planting and the use of native, drought-tolerant species. Green roofs—both extensive and intensive—are implemented with specific planting and material lists to enhance biodiversity and reduce heat island effects. This integrated approach ensures sustainable land use, minimizes irrigation needs, and promotes a healthy ecosystem across campus.

Picture for Nahyan Green Roof



# University of Balamand Unveils Solar Energy Project, Paving the Way for a Greener Future

The University of Balamand is proud to announce the successful completion and operation of an extensive solar energy project on its Koura campus. In partnership with NovaEnergia SAL, a leader in the energy sector, the university has embarked on a journey towards environmental stewardship and energy independence.

This ambitious project encompasses 2,772 state-of-the-art Longi Himo X6 solar modules, each boasting a capacity of 580 W, connected across 13 Sungrow on-grid inverters of 125 KVA each. Spread over approximately 13 buildings, these installations are a testament to the university's commitment to adopting the highest technical standards in renewable energy.



Projected to produce around 2,600,000 KWh of clean, renewable energy annually, this solar initiative is expected to fulfill approximately 70% of the university's daytime energy needs and 60% of its overall energy consumption. This significant shift towards solar energy underscores the University of Balamand's dedication to reducing its carbon footprint and promoting environmental sustainability.
The impact of this project extends far beyond energy savings. It is estimated to reduce carbon emissions by a remarkable 1,040 metric tons annually, an achievement equivalent to the CO2 absorption capacity of approximately 47,273 mature trees each year. This substantial reduction in greenhouse gas emissions is a clear demonstration of the university's active role in combating climate change and fostering a sustainable future for generations to come.

Dr. Elias Warrak, President of the University of Balamand, expressed enthusiasm about the project's completion: "This solar energy project is not just an investment in renewable resources; it is a testament to our responsibility towards the planet and our commitment to lead by example in the transition to sustainable energy solutions. We are immensely proud to be at the forefront of this significant environmental milestone."

As the University of Balamand continues to innovate and inspire, this solar project marks a significant step forward in UOB’s ongoing journey towards sustainability, environmental responsibility, and academic excellence.

# Progress Toward Divestment

By implementing the solar energy system, the reliance on generators has significantly decreased. In 2024, generator operating hours decreased by 755 hours compared to 2023, despite solar panels becoming fully operational only in July 2025.

- Year 2023: 9,686 hours
- Year 2024: 8,931 hours

Additionally, the waste stream for the period from 2024 up to August 8, 2025 has been tracked and registered with the Ministry of Environment, including detailed records of quantities, dates, and locations.

| BENEFICIARY | INVOICE REF # | COLLECTION DATE | QTY W-UMO BL | WCV # | MOE REF # | DATE |
|---|---|---|---|---|---|---|
| BALAMAND TRIPOLI | REV232400078 | 09/01/2024 | 6.25 | WCV- 01028 | 830/B | 15/4/2024 |
| BALAMAND ALEY | REV242500080 | 15/02/2024 | 1 | WCV- 01160 | 830/B | 15/4/2024 |
| BALAMAND TRIPOLI | REV242500039 | 31/10/2024 | 14.5 | WCV- 2107 | 191/B | 17/1/2025 |
| BALAMAND TRIPOLI | REV242500040 | 01/11/2024 | 7 | WCV-2108 | 191/B | 17/1/2025 |
| BALAMAND ALEY | REV242500081 | 04/12/2024 | 2 | WCV- 2268 | 191/B | 17/1/2025 |
| BALAMAND TRIPOLI | REV242500135 | 09/04/2025 | 8 | WCV-2683 | 2541/B | 3/7/2025 |
| | TOTAL BARRELS COLLECTED | | 38.75 | | | |

**A Pioneering Sustainable Innovation with the E-Shade Solar Bench**

Long before solar equipment became commonplace, the Faculty of Engineering at the University of Balamand (UOB) paved the way for a sustainable future, setting an example for environmental stewardship and technological advancement in the region. In a pioneering initiative, the Faculty of Engineering was the first in Lebanon to recognize the transformative potential of solar energy with its innovative E-Shade solar bench. Manufactured to promote relaxation, connectivity, and environmental awareness, this solar-powered bench redefined outdoor seating experiences well ahead of the widespread adoption of solar equipment in Lebanon.

In December 2019, Electrical Engineering students Alissar Wahab and Tony Klaimy unveiled the E-Shade solar bench as part of their Master's graduation project. The bench was officially inaugurated and put into service at UOB's main campus in 2021, after COVID was under control. This innovation was made possible thanks to the unwavering support and visionary leadership of Dr. Maged Najjar, Full Professor in the Electrical Engineering Department at UOB. The E-Shade bench was designed to convert solar energy into electric power and can charge 4 laptops and 8 cellphones simultaneously without circuit breakage. Additionally, LED lights in the ceiling provide ambient illumination, requiring an output power of 540W. The bench seats up to 5 people with shaded tables and benches, including wheelchair access.

The E-Shade solar bench offers a shaded, eco-friendly space that combines comfort with connectivity. It frees users from indoor power outlets, enabling students to work, study, or relax outdoors while staying productive and sustainable.





# Energy Efficiency Review and Wastage Identification

The University of Balamand conducts regular energy assessments and monitoring as part of its **Climate Action Plan (CAP33)**. These reviews aim to identify areas of high energy consumption and inefficiency across campuses. Systematic energy audits analyze patterns and pinpoint wastage sources such as outdated lighting systems, HVAC inefficiencies, and generator reliance.

To address these, UOB introduced solar energy systems, cutting generator hours and emissions. A solar monitoring platform with a real-time dashboard, live data, and alerts ensures optimal performance and early fault detection.

Audit findings guide upgrades like LED lighting, better insulation, and optimized schedules. Energy performance indicators are tracked and published in **Sustainability Reports and SDG7 documentation**, ensuring transparency and alignment with the United Nations Sustainable Development Goals.




