



**Boosting Nexus Framework
Implementation in the Mediterranean**



This project is part of the
PRIMA programme supported
by the European Union.

FACTSHEET | DEMOSTRATION PILOT LEBANON



Beqaa Valley (Lebanon)

Context of the demonstration project



The solar-powered hydroponics Demonstration Project (DP) at AUB was developed under the BONEX project to address pressing environmental and agricultural challenges in Lebanon, particularly the Beqaa Valley. This region is considered as Lebanon's agricultural heartland, is facing extreme water scarcity, groundwater depletion, energy shortages, and land degradation. Agricultural practices have become unsustainable due to chemical overuse, water pollution, and outdated infrastructure. Environmental corruption rooted in poor regulation and fragmented governance has worsened these challenges. Originally planned for the Beqaa, the unit was relocated to AUB's Beirut campus due to conflict-related mobility issues, without affecting its core goals.

The AUB unit serves as a controlled environment innovation hub that demonstrates how solar powered hydroponics can optimize water and energy use, improve food security, and reduce pollution. It engages multiple stakeholders from ministries to local producers to build a replicable, sustainable model aligned with Lebanon's National Agriculture Strategy.

Description of the technology demonstrated in the DP

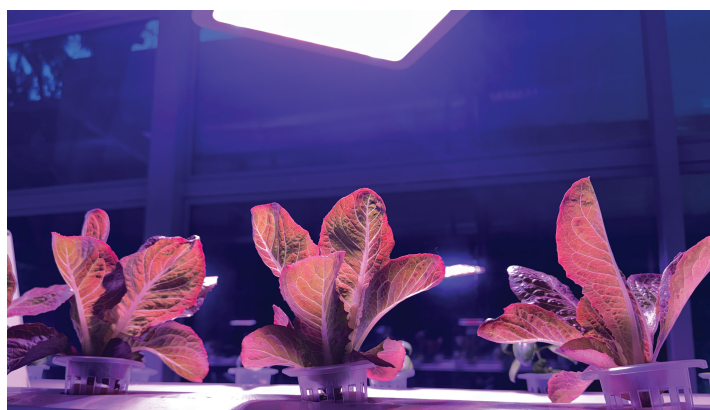


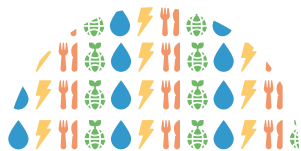
The intervention is a solar-powered greenhouse at AUB equipped with three hydroponic systems: vertical rotating towers, Nutrient Film Technique (NFT), and gutter systems.

The system supports year-round soilless cultivation of leafy greens and fruiting vegetables like tomatoes and strawberries. Solar panels on the rooftop generate 3,627 kWh per cycle, powering automated water and nutrient delivery systems.

It operates on a closed-loop water system, reducing water use to just 40.6 mm/year down from 150–200 mm in traditional systems. Romaine lettuce yields reached 28 units/m², surpassing traditional greenhouse productivity.

The unit also functions as a training and demonstration site for researchers, students, and farmers, integrating academic research with market-driven innovation.





BONEX

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WEFE Nexus dimensions

WEFE dimension is addressed in many ways:

- **Water:** The closed-loop system recycles water, achieving 70–80% savings.
- **Energy:** Powered by rooftop solar panels, reducing reliance on diesel or grid electricity.
- **Food:** Soilless cultivation boosts yields, quality, and year-round production.
- **Ecosystems:** Eliminates agrochemical runoff and minimizes land use, protecting local ecosystems.

Main policy recommendations

- **Incentivize** solar-powered agri-tech via tax relief, grants, and local manufacturing support.
- **Include hydroponics** in national strategy, formally recognizing it as a sustainable farming method.
- **Facilitate public-private-academic** partnerships to bridge research and field application.
- **Train municipal and rural actors** through vocational curricula and community outreach on solar hydroponics.
- **Reduce import duties** on solar and hydroponic components and promote locally made alternatives.
- **Encourage inclusive financing models** (low-interest loans, microfinance) to overcome adoption barriers.



Gender dimension

Gender inclusion was actively integrated in all phases of the AUB hydroponic DP. Women made up over 60% of workshop and training participants, many with no prior agri-tech experience. Through hands-on activities in system assembly, nutrient management, and data monitoring, participants gained confidence and skills.

The project collaborated with AUB's Gender Studies Program to ensure intersectional representation and collected gender-disaggregated data to track engagement and outcomes. Some women trainees have since launched rooftop hydroponic units or community outreach initiatives. These efforts underscore the project's success in portraying women not just as beneficiaries, but as decision-makers and innovators in climate-resilient agriculture.

The greenhouse continues to serve as an inclusive space for cross-disciplinary learning and leadership, especially for women students in engineering, agriculture, and environmental studies.

CONTACT

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