



MAIA-TAQA



FINAL REPORT

Results and lessons learned from the MAIA-TAQA Project

2019 | 2023



Wastewater Treatment



Building-Integrated Photovoltaics



Solar Thermal Facility



Microgrids



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Mobilizing new Areas of Investments And Together Aiming to increase Quality of life for All.

The **MAIA-TAQA** Project represents a monumental endeavor aimed at addressing critical energy challenges and advancing sustainable solutions within our community.

This comprehensive final report is a culmination of extensive research, diligent work, and unwavering commitment to the project's core objectives.

The **MAIA-TAQA** Project, initiated with a vision of promoting sustainable energy practices, renewable resources, and environmental stewardship, has spanned 48 months of dedicated efforts. It has harnessed the collective expertise and passion of our 8 partners from 7 different countries to bring about transformative change in the energy landscape of our southern Mediterranean Countries.

Disclaimer:

This final report publication has been produced with the financial assistance of the European Union under the **ENI CBC Mediterranean Sea Basin Programme**.

The contents of this document are the sole responsibility of **MAIA-TAQA project** and can under no circumstances be regarded as reflecting the position of the European Union or the Programme management structures.

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PROJECT PARTNERS



**Empowering SMEs
in the Renewable Energy
Sector for Innovation,
One Barrier at a Time!**





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EXECUTIVE SUMMARY

MAIA-TAQA project aims at the promotion of innovative Resources Efficiency Services (RES) in the MED countries through the creation of an enabling environment based on EU-MED networks.

Through the creation of tangible demonstration cases, raising awareness, establishing Innovation One Stop-Shop services, and fostering collaboration among SMEs to address regulatory and trade-related challenges.

The outcomes from the implementation of MAIA-TAQA project activities are as follows:



CAPACITY BUILDING PROGRAM: 12 training programs developed to enhance the technical and management capacities of local SMEs in the RE sector. These programs aim to enhance the capabilities of SMEs, particularly those operating in the environment, utility, and building sectors.



PILOT PROJECTS: 6 Innovative Resource Efficiency services piloted in Lebanon, Jordan and Egypt demonstrating the advantages of Resource-Efficient Technologies for Enhanced Sustainability and Cost-Efficiency in the Region.



INNOVATION ONE STOP-SHOP: 3 Innovation One-stop-shops established in Egypt, Lebanon and Jordan provides targeted support and resources to businesses and organizations looking to adopt sustainable practices, reduce resource consumption and transition to renewable energy sources.



GUIDELINES: To overcome regulatory barriers, the MAIA-TAQA project developed guidelines that outline the necessary requirements and procedures for RE projects. These guidelines provide clarity and support for stakeholders navigating the complex regulatory landscape.



VOUCHER SYSTEM: Recognizing the financial constraints faced by SMEs, a voucher system is implemented to provide financial assistance for RE projects. This mechanism aims to alleviate the financial burden and support local innovative companies in achieving their needs.



B2B MATCHMAKING EVENTS: Organization of 3 B2B events and 9 company missions to promote technological cooperation among Mediterranean SMEs to facilitate collaboration and partnership opportunities. These events enable stakeholders to engage in specific matchmaking activities, fostering synergies and promoting the uptake of RE solutions.



INTRODUCTION

1.1 Project Background

The **MAIA-TAQA** project, (Mobilizing new Areas of Investment And Together Aiming to increase the Quality of life for All) is implemented under the ENI CBC Med programme.

The project focuses on developing and defining a range of innovative services in the areas of micro-grids and energy storage, building integrated photovoltaics (BIPV), solar thermal technologies, and Wastewater Treatment and Reuse for small and medium-sized enterprises (SMEs) in the SMediterranean (MED) countries.

These services are designed to have a strong innovative character and are envisioned to be developed through establishing 3 Mediterranean demonstrators pilot projects in **Lebanon, Egypt, and Jordan**.

Additionally, the project aims to reinforce the technical and management capacities of the labor force involved in SMEs in the South MED countries, with a focus on accessing innovative services.

1.2 Objectives and Scope

During the course of the MAIA-TAQA project, several activities are accomplished to fulfill the project's objectives.

The project's objectives include:

1) Development of New Services: Extensive research and collaboration were conducted to develop innovative services in the sustainability sector, specifically targeting energy, water, and resources for the SMEs from the MED countries.

2) Capacity Building: Efforts were made to reinforce the technical and management capacities of the labor force involved in SMEs..

3) Regulatory and Commercial Framework Improvement: The project actively worked towards improving national and standard regulatory frameworks. Additionally, the project facilitated commercial technological transfer, fostering partnerships between SMEs and technology providers to enhance the capacity of SMEs to identify and meet innovation needs.

FINANCIAL DATA

€
3.1 million
Total budget

€
2.8 million
EU contribution

%
10%
Project co-financing

PROJECT IN NUMBERS

8
Partners

6
Countries

13
Technical outputs

PROJECT DURATION

Start date
01 September 2019

End date
31 August 2023

PILOT IMPLEMENTATION ANALYSIS




2.1 Introduction of the pilot objectives

Over the past decades, demand on water and energy in the Southern Mediterranean countries has witnessed a dramatic increase due to a variety of factor including population growth, urbanization surge, improved living standards and industrial development. Energy efficiency is the most cost-effective means of reducing the energy impact on the economy and in promoting a low-carbon future for the South Mediterranean countries.

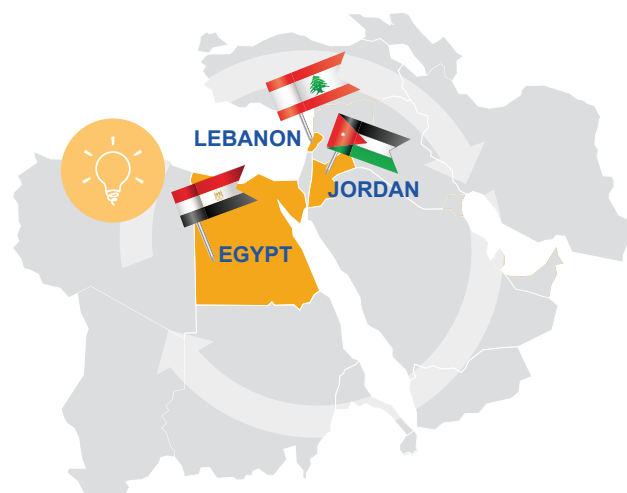
Energy efficiency further helps South Mediterranean countries meet their SDGs goals particularly SDG13, dedicated to combating climate change and its impacts. By reducing GHG emissions resulting from excessive and inefficient consumption of energy, energy efficiency improvements can help governments, companies, and citizens save billions of dollars in the Southern Mediterranean region from reduced energy bills. On another front, it can quickly reduce carbon footprints presenting a win-win solution for all the parties involved Many countries in the region are now moving ahead with new laws, policies, and regulations to improve energy consumption; however, further efforts need be done to accelerate the results.

MAIA-TAQA pilot projects aim to implement resource efficiency solutions in various locations across Egypt, Jordan, and Lebanon.

Through these initiatives, innovative services are made available in:

-  **Micro-grids and energy storage,**
-  **Building-integrated photovoltaics (BIPV),**
-  **Solar thermal technologies,**
-  **and wastewater treatment and reuse.**

These pilot projects serve as tangible examples of resource efficiency solutions in action. By showcasing their effectiveness, we aim to inspire wider adoption among SMEs..



Benefits of the Pilot Projects

MAIA-TAQA project PV systems and energy storage pilot main achievements in Egypt:

The pilot in Egypt is expected to reduce primary energy consumption derived from oil or gas. This initiative is expected to yield environmental benefits, alleviate congestion on distribution networks, and result in lower electricity costs.



The project is developed by CEEBA (Egypt) and consists of the implementation of the following:

- A 100 kWp Photovoltaic system on the Al America Whole Sale Market, capable of generating about 150,000 kWh per year. The purpose of the installation is to demonstrate the energy consumption, environmental and economic benefits by a small-medium size PV system that can be easily replicated throughout the country,
- A backup battery of the Photovoltaic system was designed to provide electricity supply to the Market management building in the event of a main electricity supply interruption.



MAIA-TAQA project solar cooling systems and BIPV pilot main achievements in Jordan:

In Jordan, the introduction of solar cooling systems and BIPV aims to reduce primary energy consumption and to spread awareness and information about these technologies.

The installed Solar Thermal Cooling (STC) system, located in the Chamber of Commerce building in Aqaba, consists of the following main components:

- Solar flat plate collectors (~150m²)
- Thermal energy storage tanks (2x1500 lt)
- STchiller (~35 kW)
- Secondary hydraulic equipment (cooling tower, pumps, heat exchangers, piping, valves and connection with the auxiliary heating source, etc.)
- Control system.

The ST cooling system will have the first priority to cover the building cooling loads, during summer and throughout all season. The solar collectors of the system, will be installed on the roof of the building and they will be grouped into solar collector fields.



Main achievements of MAIA-TAQA's Wastewater treatment plant

In Lebanon, wastewater treatment and reuse of treated water are crucial, due to water scarcity and untreated wastewater that causes significant challenges including pollution and health concerns.

The installed wastewater plant is located in the Industrial Research Institute (IRI) building in Hadat, and is characterized by the following:

- It operates with an advanced MBBR technology,
- All the electrical equipment (pumps, fans, mixers, blowers ...) are solar powered by a 30 kWp PV system that is installed on the roof of the IRI building,
- The water is treated in compliance with the Lebanese Ministry of Environment standards, and is reused for irrigation of non-edible plants surrounding the IRI building.

2.2 Technical Specifications



The pilot project in Egypt is located at the El-America Wholesale Market in Alexandria, aiming to introduce PV systems and storage.



The project in Jordan focuses on solar cooling systems and building-integrated photovoltaic (BIPV) installations at the Aqaba Chamber of Commerce building.

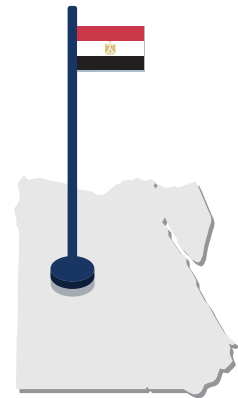


The Lebanese pilot project involves wastewater treatment and reuse at the Industrial Research Institute in Hadat, Lebanon.





THE PILOT PROJECT IN EGYPT



The pilot is managed by the **Alexandria Chamber of Commerce** and implemented at the El Ameria market. The area is populated by about 65.000 inhabitants. The market originally consists of 176 shops on the inner side and 29 additional shops along the external side of the eastern fence. Additional shade roofs have been built to accommodate a larger number of merchants. However, these structures are not divided into shops, but form large open areas.

The ceilings' shops are made of corrugated metal roofing sheets in a semicircular shape, supported by steel brackets. Since the roof structure was not suitable to support extra weight, the PV plant was installed on a dedicated metallic structure.

The 100 kWp PV system covers an area of about 1000 m². The assessment of the power generation capacity, understood as output electricity at 400/220 Vac from the inverter, was carried out referring to the PVGIS-SARAH data base.

The selected BISOL Solar Module BXU-330Wp PV modules, have a maximum peak power of 330 Wp and an efficiency of 16.9%.

24 FIAMM Sealed Batteries, type SMG/S 1150, 2V, 1150Ah@C120, were selected for the Battery backup system. These batteries are particularly suitable for regular, long and deep discharge regimes given their capability to provide power to the market management building, when the main supply is interrupted.

The 100 kWp PV plant is connected to the utility grid and the Ameria Wholesale Market loads can be supplied primarily by the PV plant and by the public network, distribution utility, when the locally generated power is insufficient. A bidirectional meter allows to monitor electricity exchanges, in input and output with the utility network. The existing 125 KW diesel system remains connected in the same current configuration.

The PV system annual generation is similar to the Market reference yearly consumption. However, some consumption takes place during night hours (the Market is operating 24 hours a day) when the photovoltaic generation is not producing electricity. Consequently, during the night hours and some hours of the day the Market will be supplied by the utility network.



THE PILOT PROJECT IN JORDAN



The solar thermal cooling system installed in the Aqaba Chamber of Commerce office building is coupled with the existing electrical chiller.

The installed STC system in Aqaba Chamber of Commerce is expected to supply the cooling demand of 79,525 KWh per year equal to 52,8% of the building cooling demand amounting to 150,000 KWh per year of the site for Aqaba pilot was selected based on weather conditions, the infrastructure availability and the local regulations and policies.

The methodology followed for the definition of the pilot project includes the following phases:

- A-** Pre-evaluation of the Solar Thermal technologies
- B-** On-site technical visit
- C-** Technical description of the pilot project
- D-** Simulation of the proposed pilot system
- E-** Supply and installation.

The existing main energy system for covering the cooling needs of the building is a central cooled water system. Two air cooled water chillers with reciprocating compressors, are installed on the roof of the building. The cooling capacity of each chiller is 49 RT2 for a total cooling capacity of 98 RT. The chillers are connected to a central piping network system (with estimated flow rate 5.5 m³/h) distributing cooled water to the floors. The terminal units of the network system are 46 fan coil units (RAC system), installed in the ceiling of the floors. There is also one Air Handling Unit (AHU) in the building, used for providing fresh air in the auditorium.

The outcomes of the pre-evaluation phase and the on-site technical visit were used for the selection of the system for the pilot project. CRES examined several system configurations and made the energy simulations for each of them, using with the simulation software "Polysun – Designer", version 11.2.

The Solar Thermal systems cooling system consists of the following main components:

- Solar flat plate collectors (~ 150 m²)
- Thermal energy storage tanks (2 x 1500 lt)
- ST chiller (~ 35 kW)
- Secondary hydraulic equipment (cooling tower, pumps, heat exchangers, piping, valves and connection with the auxiliary heating source, etc.)
- Control system.

The Solar Thermal Cooling system is designed to address the building's cooling requirements throughout all seasons and more particularly in summer. . The solar collectors of the system are installed on the roof of the building and grouped into solar collector fields.

In the primary circuit, the solar energy retrieved by the collectors is transferred to an external heat exchanger through a heat transfer fluid of water-glycol mixture. The captured heat at the external heat exchanger is conveyed to the thermal storage tanks of the system. Due to limited available room space, the system is configured with two energy storage tanks (buffers).

The connection of the two storage tanks in the proposed configuration ensures that the required stratification is achieved. The water flow direction to each storage tank is defined by proper control of two 3-way valves "on-off" type. The first storage tank (Buffer 1) stores water at high temperatures and it is connected to the solar chiller.

The second storage tank (Buffer 2) stores water at medium temperatures. An important component of the ST system is the control system, which plays a pivotal role in ensuring the proper and efficient operation of the ST systems, with various components including temperature sensors, flow meters, flow controllers, on-site and remotely controlled Programmable Logic Controller-PLC and various automation systems, which adjust inputs and outputs and optimize the system functions.



THE PILOT PROJECT IN LEBANON



The pilot developed as part of MAIA -TAQA project features a wastewater treatment plant able to process the wastewater generated from the Industrial Research Institute premises in the Lebanese University Campus in Hadat. The treated water is then allocated for irrigation.

Moreover, considering the electricity shortages in the country and the high costs of electricity generated by diesel generators, the plant is equipped with a photovoltaic system, capable of meeting a significant portion of the electricity consumption requirements related to the wastewater treatment processes.

Therefore, the pilot is demonstrating three innovative RE services:

- **Wastewater treatment:** An effective wastewater treatment able to reduce the effluent quality of the treated water in compliance with the Ministry of Environment Decree No. 52/1 and therefore suitable for irrigation uses,
- **Reuse of treated water:** using a drip system for irrigation;
- **Solar energy:** A PV system installed on the wastewater treatment plant and able to make the plant almost self-sufficient in energy terms.

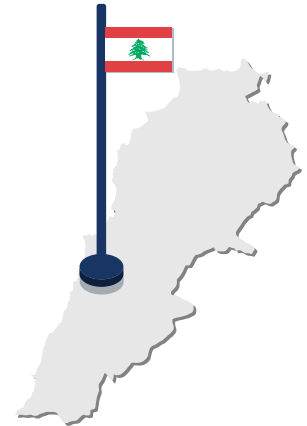
**The implementation of the pilot project is divided into two main parts:
The design phase and the construction phase.**

The design phase includes the selection of the technologies used for treatment, and the conception of a detailed design that encompasses mechanical and civil plans, as well as flow diagrams. The construction phase involves equipment procurement and installation, the associated civil works execution, and the operation and monitoring of the plant.

Based on the expected volume of wastewater from the Industrial Research Institute premises, the total considered capacity of the wastewater treatment is around 20 m³/day.

Considering that the wastewater contains chemicals used in IRI laboratories, the chosen solution for the treatment process includes:

- Settlement tank and screening for solid separation
- Neutralization system
- Dissolved Air Flotation (DAF) unit for oil and grease removal
- Moving Bed Biofilm Reactor (MBBR) unit for biological treatment
- Tertiary treatment



The wastewater is collected after an initial screening in a settlement tank, allowing solids to settle at its bottom. Firstly, the wastewater is neutralized by dosing the PH by a regular reagent, then the wastewater is treated by a coagulant and a flocculent to conglomerate the particles into bigger clusters.

The treated water is then transferred to the DAF unit in order to remove the suspended matter such as oil, grease and solids. The removal is achieved by dissolving air into the wastewater under pressure and then releasing the air at atmospheric pressure in a flotation tank basin.

The released air forms tiny bubbles which adhere to the suspended matter that consequently floats the surface of the water where it may be removed by a skimming device. The water is then transferred to MBBR unit including a combination of extended aeration and Floating Biological Reactor technology. The treated water enters through the anoxic compartment that works as a mixing tank to the return sludge and raw sewage. In this compartment, under anoxic condition a partial denitrification occurs.

Then, the waste pretreated by the Free-Floating Bio-media is introduced into a compartment where an aerobic bacterial culture is maintained in suspension. Bacterial culture, in presence of oxygen, carries out the conversion of organic matter into carbon dioxide, ammonia and other end products. The mixed liquor is displaced from the aeration tank and flows by gravity to the settling tank having the function to allow the separation of the suspended solids by means of tilted plates. The separated liquid is then discharged from the tank over the weir for disposal as final effluent. The activated sludge from the settling tank is returned to the aeration tank via a submersible pump. Dead sludge from the settling tank is periodically discharged into a sludge holding tank. Treated water is pumped through a sand filter for tertiary treatment, making it suitable for non-edible uses.

The whole plant is installed in a Containerized Package unit monitored with flow controls and quality control devices. The wastewater treatment plant runs on renewable electricity source through its connection to a 30 kWp solar energy supply PV system.

Based on simulation, this PV plant is able to generate around 45 MWh of electricity per year. The high energy generation during summer is very convenient since the electrical demand of the irrigation system is expected to be higher during this period.

The PV system allows to avoid about 4500 liters of diesel per year (estimated consumption of a diesel generator to supply the wastewater treatment plant and the irrigation pump). The associated reduced CO₂ emissions is estimated to be around 12 tons, taking into account that the carbon emission is 2.6 kg/ 1 liter of diesel per year. Other reduced pollutants are NO_x and SO_x.





INVOLVEMENT OF SMEs



The implementation of the pilots was done in association of various SMEs involved in the design, construction of the infrastructures and provision of pilot services. A total of 9 selected SMS were monitored at the level of the three implementing countries. They specifically contributed to the installation / short term maintenance, monitoring, design, measuring instruments supply, and miscellaneous activities.

Their participation fosters valuable collaboration among the various companies in different countries.



THE PILOT RESULTS ASSESSMENT



A diverse range of measures on both the demand and supply sides has been identified to enhance energy efficiency and address water needs in the pilot countries.

This involves the promotion of rigorous environmental energy-saving policies aimed at combating climate change. By integrating formal energy efficiency programs with voluntary measures, the Southern Mediterranean region can sustain its economic strength. Energy conservation programs in residential, commercial and industrial sectors can significantly reduce carbon emissions and increase energy supply in the Southern Mediterranean region.

A solid regulatory and institutionalized framework helps achieve a reduction in GHG emissions through a bundle of non- market based and market-based instruments.

Developing and enforcing more effective energy efficiency policies, while providing stable funding for initiatives that improve energy efficiency, and taking decisive measures to remove energy subsidies, can significantly improve South Mediterranean countries' energy efficiency, and reduce their energy intensities.

Implementing such measures can result in substantial savings, contributing significantly to the countries' GDP while simultaneously reducing energy bills. Moreover, these initiatives align with the region's commitment to combat climate change and fulfill the objectives outlined in the United Nations' Sustainable Development Goals (SDGs) and their Nationally Determined Contributions (NDCs).



For example, the energy and environmental benefits achieved in Egypt can contribute in energy conservation to 20% as compared to the current levels of use, according to the relevant applications. The following results can be achieved in Egypt; a reduction of 500 grams of CO₂ per one kilo Watt hour of saved electricity or produced from renewables (based on the current fuel mix for electricity generation); while for each 10% reduction in the supply currents a 19% reduction in the value of electric losses would be realized within the supply networks.

Another non-negligible beneficial effect of the spread of small-scale PV systems and the consequent need for their management, is the improved awareness of the consumers on energy issues in general and thus on the optimal use of energy resources, which is no less important than the increasing of renewable generation in the electricity mix.

In Jordan, the Solar Thermal Cooling system has the potential to save up to 30,050 kWh/year of generated electricity for cooling the Aqaba Chamber of Commerce. In other words, STC enables a savings of 84% compared to the electricity consumption of a conventional cooling system with an EER of 25.

In connection with the avoided electricity generation, STC allows to reduce the carbon emission in a quantity of 13.78 tons/year, having considered an emission factor in Jordan of 0.4585 kg CO₂ /kWh.

The electricity consumption for cooling purpose can reach up to 53% of total electricity use in the Jordanian commercial sector (including hotels, supermarkets, shops and service provider offices) that consumes 15% of the total generated electricity in the country the equivalent of 22134 GWh in 2021.



This implies that the electricity generated for powering the cooling systems installed in the Jordanian commercial sector constitutes 8% of the total generated electricity, totaling 1,770 GWh. Moreover, Thermal Cooling system can create a comfortable work environment even when installed for housing/hotels purposes.

This comfort is linked to better productivity and proper health conditions. Compared to traditional cooling systems, the Solar cooling system allows to significantly reduce energy consumption, particularly in Jordan – a country that imports a large part of its primary energy needs. In addition to that, the reduced electricity consumption not only reduces operating costs but also benefits the power grids through lower losses in transmission and distribution networks.

In Lebanon, even if technical and economic feasibility of wastewater treatment and reuse projects are essential for implementation, issues related to social benefits and cultural values are very important and should not be marginalized. The efforts to overcome payback challenges in the wastewater sector need to be balanced with public policies aimed at the public good.

In conclusion, a very significant benefit, which cannot be overlooked, for all three countries involved, is also the possibility of introducing new jobs.



IMPACT ON INNOVATIVE RESOURCE EFFICIENCY SOLUTIONS

3.1 Capacity building

Training to support the introduction of innovative sustainable services

The MAIA-TAQA project is dedicated to fostering innovation and sustainability in local businesses within the regions of Egypt, Jordan, and Lebanon.

One of the key strategies employed to achieve this ambitious goal is the provision of intensive 3-month training programs.

These training programs are designed to empower SMEs with the necessary skills and knowledge to incorporate innovative and sustainable services into their operations.

Within the framework of the MAIA-TAQA project, the training program's specific objectives are as follows:



Capacity Building: To strengthen the technical and management capacities of SMEs in Egypt, Jordan, and Lebanon. This includes improving their understanding of sustainable practices and innovative strategies.



Knowledge Transfer: To facilitate knowledge transfer of expertise in order to bridge the gap between international best practices and local business operations.



Innovation Integration: To encourage the integration of innovative solutions and practices within the participating SMEs.



Sustainability Promotion: To introduce a culture of sustainability within these businesses, emphasizing environmentally responsible practices and social responsibility.



MAIA-TAQA

TRAINING COURSE
ON RESOURCE-EFFICIENCY SOLUTIONS
ON WATER AND WASTEWATER TREATMENT

REVIEWS & FEEDBACK



MAIA TAQA training was very informative, and the lecturers were keen to reply to all raised questions.

The moderator, and the persons in charge for the training were very cooperative!



Ramzi Ramadan
Road Engineer at the Ministry of Public Works



MAIA-TAQA training was really enjoyable and informative with great instructors and presentation style with lots of opportunities to ask questions and talk about real projects/case studies on Resource Efficiency solutions.

This has more than met my expectations. Thank you for this great course!



Rania Mohamed Abdelhamid
Environmental Engineer



MAIA TAQA training is filled with useful information about the water issues, electricity issues that we face in Lebanon and how to deal with them. The course had great presentations with even more great lecturers, I enjoyed it and learnt a lot.

Thanks for all who the people who helped in this course!



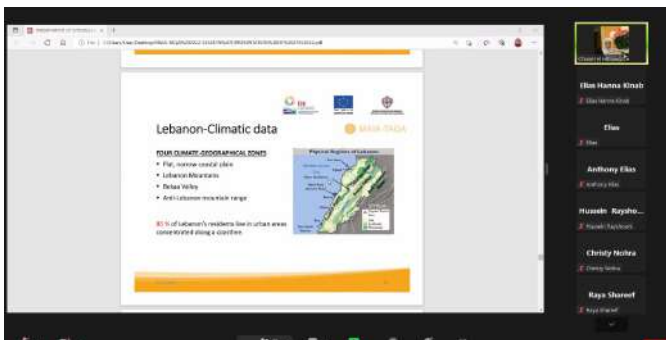
Raya Al Shareif
Environmental Health Student

THE TRAININGS RESULTS AND ACHIEVEMENTS



The MAIA-TAQA project developed a Three Courses program on Sustainable Technologies:

- **Wastewater Management in Lebanon:** This course is designed to educate participants on innovative wastewater treatment and management techniques, promoting environmental sustainability and resource conservation.
- **Building-Integrated Photovoltaics (BIPV) in Egypt:** Participants in this course gained expertise in the integration of photovoltaic systems within building structures, harnessing solar energy for sustainable power generation and architectural solutions.
- **Solar Cooling in Jordan:** Focusing on the use of solar energy for cooling applications, this course empowered participants to explore efficient and eco-friendly cooling solutions in a region with high energy demands.



Train the Trainers:

A pivotal aspect of the training process was the "Train the Trainers" program, which ensured that knowledge and expertise were cascaded down to local instructors. This approach fosters sustainability by building a cadre of skilled trainers capable of delivering future training initiatives.

Participants from Target Countries:

In total, 57 participants from the three target countries—Jordan, Egypt, and Lebanon—engaged in these training programs. Their participation implies a commitment to advancing sustainable technologies and practices within their respective countries.

Selection of Top Performers:

Following the completion of these training courses, a thorough evaluation process identified the top performers from each of the three countries.

Six outstanding individuals were selected from Jordan, Egypt, and Lebanon. These individuals demonstrated exceptional dedication, understanding, and potential to lead the next phase of the MAIA TAQA project.

The results and achievements of these training programs mark a significant milestone in the MAIA-TAQA project's mission to enhance the technical capabilities of local SMEs and to promote sustainable practices. By equipping 443 participants with knowledge and skills related to innovative technologies, the project is positioned to make a lasting impact on the participating countries' economies and environments.

THE INNOVATION ONE STOP SHOP INITIATIVE

4.1 Why the IOSS

The three pilot partners AAST and CEEBA in Egypt; IRI in Lebanon and the Jordan Chamber of Commerce in Jordan launched a sustainable Innovation One Stop Shop (IOSS) with the objective to meet national innovation needs and resources.

The IOSS is intended to serve as a front office to deal with innovative Resource efficiency services in the three partner countries. It will also manage the voucher system projected within the MAIA-TAQA activities.

IOSS specific objectives

They are summarized as follows:

- **Capitalization:** Results and lessons learned beyond the project.
- **Increase of R&D activity:** Acting as a “focal point” for SMEs and entrepreneurs interested in implementing innovative resource efficiency services and sustainable innovation in general.
- **Boosting agreements:** Technology transfer (funded research, consulting, etc.) between academic institutions and enterprises.
- **Exploitation of results at national and cross border level:** Use the results of the studies/surveys/projects, multiplying their impact on the regional level (among the created IOSS as well as other MED countries interested in innovation and sustainable development).
- **Promotion of innovation culture:** Promoting the “continuous innovation” culture on sustainable issues and economic growth in line with the SDG goals and the EU “Green Deal”.
- **Act as “a cross border cooperation window”** for EU projects and programmes to promote innovation based on green renewable energies and sustainable growth.
- **Creation of a “cluster network”** of innovative sustainable resource efficiency services at cross-border level.

The three developed IOSS in Egypt, Lebanon, and Jordan represent the initial phase in forming a network of entities interested in sustainable development. This network holds the potential for a positive “multiplier effect,” attracting investments and fostering private sector cooperation among companies across the Mediterranean region. Such collabora-



THE LAUNCH OF THE IOSS IN THE THREE PARTNER COUNTRIES

The Arab Academy for Science, Technology and Maritime Transport (AASTMT) in cooperation with CEEBA organized the event for the launch of the "Innovation one-stop-shop (IOSS)" on 25th of September 2022, at Arab Academy for Science, Technology and Maritime Transport Abu-Qir, main campus, Alexandria.

The event was attended by SMEs, students, the representative of the Syndicate of Engineers, and keynote speakers including university professors, consultants, and businessmen.

The Euro-Lebanese Centre for Industrial Modernization (ELCIM) at The Industrial Research Institute (IRI) organized the IOSS launch event "Innovation one-stop-shop (IOSS)" on the 28th of September at the Energy Strategies Summit 2022: It takes a village! In the MEA Training & Conferences center in Beirut, Lebanon.

The event was attended by numerous SMEs, NGOs, syndicated representative, and keynote speakers from the Middle East and North Africa as well as consultants and experts from the renewable energy sector.

The Jordan Chamber of Commerce launched its "Innovation one-stop-shop (IOSS)" on the 9th of July 2023, in Aqaba, Jordan.

The event was attended by representatives from the Jordan Chamber of Commerce, public and private institutions, from the renewable energy sector in presence of the Coordinator of the Regional Office for Eastern Mediterranean of the ENI CBC MED program.



THE IOSS RESULTS AND ACHIEVEMENTS



The **MAIA-TAQA** project, aligned with its objectives of assisting SMEs in identifying their innovation needs, planned for the following activities:

The selection of 9 SMEs that are awarded “innovation vouchers” through a “Voucher Call” worth of 20.000 EUR per award.

In total, 9 SMEs are selected (3 per country from Egypt, Jordan, and Lebanon) to benefit from the Vouchers system. The total amount of vouchers per partner country is 60.000€ (20.000€ x 3 SMEs)

These vouchers are intended to support the purchase of innovation services by local SMEs in each of the 3 pilot countries and to introduce innovation in the field of resource efficiency solutions and to constitute in-kind contribution from the MAIA-TAQA project in the form of personalized innovation and knowledge services.

The type of services covered through the MAIA-TAQA voucher call are:



Technical Services



Business Consultancy



Technical and Business Training and Capacity Building



Funding Calls Management

Six small and medium-sized enterprises (SMEs) were granted a total of €120,000 through six vouchers: Three SMEs in Egypt (3 x €20,000) and three SMEs in Lebanon (3 x €20,000)


The selection process involved expert panels and field partners in both pilot countries, Egypt and Lebanon, who evaluated various proposals to identify deserving companies.

In the case of Jordan, despite conducting the “Vouchers Call” and successfully selecting three potential beneficiary SMEs, internal decisions stemming from a New Board of Directors at the Jordan Chamber of Commerce hindered the execution of the voucher call and subsequently delayed the launch of the tender for service providers.

IOSS Voucher Beneficiaries Profile in Egypt and Lebanon


 **Sustain Egypt’s Energy program by EJADA for Consultation and Training** focuses on energy and water sectors. The program will motivate the business community to move towards renewable energy and energy rationalization trend by supporting customers to apply international standards and systems to rationalize energy consumption, encouraging them to find alternative and renewable energy sources and helping them to share their experiences, and discuss their sustainable energy applications with each other, to raise knowledge and innovation in sustainable energy track.

The program will help customers calculate their energy consumption and convert it towards a sustainable energy model (solar) and calculate the equivalent economic savings (manually and electronically).


 **Mesalla Engineering Works (MES) project on “Water Desalination/purification using solar thermal technology”** focuses on Solar Energy. To combat water scarcity and the high cost of electricity used in desalination, Mesalla Engineering Works (MES) will use thermal solar technology to heat water until it reaches steam and then condensate it to separate all contamination and produce drinking water.

This technology can be used for irrigation as well as drinking water. It can also generate electricity through steam turbines.


THE IOSS BENEFICIARIES PROFILE


 **"High Power Density Converter Based on GAN MOSFET Devices"** by **AWB-Electronics** targets energy converters. The proposed project is based on GAN devices that can operate at RF switching frequency. It is an upgrade for an earlier developed project based on SIC 10KW -NPC GCI (Grid Connected Inverter) operating 50KHz.

The modular design based on GAN converter aims to be applicable in the parallel converter for high-power applications based on small-footprint 10KW modules.

 **Innergy Solutions** main mission is to develop more energy efficient buildings by working on a sustainable construction material with a main goal of reducing the electricity consumption of a building an enhancing its thermal comfort.

The household residents will benefit from a reduction in the cooling and heating energy loads, and hence a decrease of up to 40% in electricity bills. The people who benefit the most are those who have the mindset of looking out for our future by living in sustainable buildings that save on energy demand.

 **Cubex** is a social enterprise specialized in wastewater management in off-grid applications with the vision to make wastewater treatment economically viable through resource recovery and through the provision of solutions aligned with the local economy and adapted to local contexts.

 **Mruna** is a global network of experts working with clients, communities, and colleagues to develop and implement innovative solutions to the world's urban sustainability and resilience challenges. It specializes in the distribution and sale of services and products contributing to urban resilience.

MRÜNA is currently focused on urban resilience in the Middle Eastern market, with an eye to identify and address unmet needs and demands within the region. It is currently registered in Beirut and in Dubai.





B2B MATCHMAKING EVENTS



One MAIA-TAQA's main goal is to emphasize the promotion of technological collaboration among Small and Medium-sized Enterprises (SMEs) in Lebanon, Egypt, and Jordan. This is achieved through successful Business-to-Business (B2B) events and company missions, that are intended to foster collaboration and partnership opportunities, specifically in the field of Renewable Energy (RE) solutions.

Highlights of the Events: The MAIA-TAQA Project encompasses several key components that significantly contribute to its overall success:



B2B Events: These events provided a platform for more than 200 SMEs, students, public institutions, engineers, trade buyers, technical consultants, and other stakeholders to engage in networking, knowledge exchange, and collaboration. The diverse audience ensured a rich and dynamic environment for fostering business relationships.

● **Company Missions:**

Company missions, consisting of SMEs from the pilot countries, are integrated throughout the project. These missions aim to explore business opportunities, identify potential partners, and promote technological cooperation in Lebanon, Egypt, and Jordan. Additionally, they facilitate collaboration among SMEs from both North and South Mediterranean regions.

In line with this objective, a mission was carried out in Greece attended by the SMEs vouchers beneficiaries from Egypt and Lebanon. This Mission was an opportunity to meet with Greek companies' counterparts including site company visits where Lebanese and Egyptians SMEs learned from the large Greek experience in the RE sector.

● **Matchmaking Activities:** The events facilitate tailored matchmaking activities that connects SMEs with senior-level decision-makers, investors, partners, mentors, suppliers, and more. This personalized approach enhances the quality of interactions and potential collaborations.

● **Product and Service Showcases:** Beneficiary SMEs have the opportunity to showcase their products and services during the B2B events. This exposure not only elevates their brand presence but also provides a platform to demonstrate their innovative solutions to a receptive audience.

● **Knowledge Sharing:** The project includes live workshops and panel discussions where participants stay updated on the latest trends and topics in the renewable energy sector. This knowledge-sharing component is essential for continuous learning and innovation.

● **Access to Funding Opportunities:** Networking with major regional investors and building lasting partnerships within the sector opens doors to potential funding opportunities for the SMEs. This financial support is crucial for the development and implementation of Renewable Energy projects.

● **Innovative Services Introduction:** The matchmaking of SMEs from both European Union (EU) and Mediterranean Member States (MED MSs) provides a more effective way to introduce Innovative Services within the Mediterranean region, promoting the adoption of sustainable energy solutions.

THE B2B RESULTS AND ACHIEVEMENTS



The MAIA-TAQA Project had a significant impact on the participating SMEs and the broader Mediterranean community.

The key benefits include:

- Increased visibility and exposure for beneficiary SMEs, allowing them to connect with their target audience and senior decision-makers.
- Opportunities to learn from and share best practices with like-minded individuals and organizations in the Renewable Energy sector.
- Tailored matchmaking sessions that meet the specific needs of SMEs, connecting them with partners, investors, mentors, and suppliers. Access to funding opportunities and the establishment of long-lasting partnerships within the sector.
- Participation in live workshops and panel discussions, enabling participants to stay informed about the latest trends and developments in the Renewable Energy industry.
- The introduction of innovative services in the Mediterranean region, resulting from collaborations between EU and MED SMEs.

By facilitating collaboration, providing exposure to innovative solutions, and offering matchmaking opportunities, the project contributes to the growth of sustainable energy practices in the region. The positive impact on SMEs and the broader Renewable Energy community underscores the success and importance of such initiatives in fostering cooperation and driving innovation in the Mediterranean region.

Some Participant Feedback and Testimonials



Dalia Falah
Innergy Solutions

Being part of the MAIA-TAQA project beneficiary has been a game-changer for us. It provided us with invaluable support in the different needs through the IOSS voucher and now again it is giving us exposure with this B2B event, allowing us to demonstrate our expertise in Renewable Efficiency services.



Rayan Bachik
SolaRay

As a provider of portable solar energy to empower people with a safe, connected, and sustainable future, it's inspiring to see the variety of solutions showcased in the MAIA-TAQA B2B event.



Apostolides Christos
Sonne Akiton

At our organization, we believe that collective action is key to driving sustainable change. Coming from Greece, this event allows us to engage with local industry leaders, exchange knowledge, and work together towards a greener future.



Vagelis Lamaris
Sole

Attending this event helped me find new ways to maximize resource usage in my own firm because I knew the MAIA-TAQA project was committed to promoting innovative Resource Efficiency services in Mediterranean SMEs.



CHALLENGES AND LESSONS LEARNED



General Challenges

Several challenges are common to all pilot partners:

- The first challenge was the ability to identify SMEs interested in applying for the "innovation vouchers call." Despite the attractiveness of the €20,000 per voucher, convincing these companies to use the vouchers for introducing innovation aligned with the type of Renewable Energy Sources (RES) implemented in each specific pilot country proved challenging. Consequently, "Voucher Calls" had to be relaunched multiple times in all countries.
- The second challenge was the ability to find "Knowledge providers" able to support the awarded SMEs in implementing the required innovative services. The selected SMEs had diverse needs that couldn't be met by a single service provider. To address this issue, different service providers were selected based on the specific needs of each company. This challenge led to multiple tender relaunches for the selection of knowledge providers in Egypt and Lebanon. Eventually, tenders were structured into "lots" of services, allowing knowledge providers to apply to different lots.
- The third and most significant challenge in the implementation of MAIA-TAQA was the short implementation period. All partners consistently faced delays in the implementation phase. This delay was noticeable during the implementation of both the pilots' and vouchers' activities.

Key takeaways from these general considerations are as follows:

An alternative approach could involve implementing specific work packages at the early stages of the project to address this issue. An alternative approach could involve implementing specific work packages at the early stages of the project to address this issue.

Even if the vouchers implemented through knowledge providers are a smart mechanism to facilitate the introduction of innovation, they are time consuming and complex to implement. It is therefore strongly suggested to replace the subgrants mechanism by a voucher mechanism that would facilitate the activity implementation and its monitoring





SPECIFIC CHALLENGES



The biggest challenge for CEEBA was finding the right service providers for the beneficiaries of the innovation vouchers. As we made a very tailored assessment of the needs and proposals of the beneficiaries, it was hard to find suppliers that match these needs. In addition to that, suppliers in Egypt were not ready to get paid in EGP (regulation by Central bank) for goods that were to be purchased in Euro, which resulted in the inability to cover all the requested services.

Lesson learned: The innovation vouchers call for services need to be more generic, in order to allow service providers to provide with offers.



The major issues faced in the implementation of the Aqaba Pilot Solar cooling system is the unavailability of sufficient local expertise. Consequently, the tender for the system was repeated. Additionally, the operational phase of the system was not realized till later in the project and thus monitoring information was not available for the system at that phase of implementation.

We also faced an issue after the first test run of the system, as a pump needed to be replaced. Unfortunately, we couldn't find a local replacement with the same specification. We ended up importing the pump from Yazaki Co. (Italy). The last issue we faced in Aqaba project was a wiring misconnection, which was solved later in cooperation with Yazaki Co., Sole Co. and Millennium Co. as a local contractor. Also Aqaba Chamber claims that after operating the system for two months the electricity bills reached around 20.000 thousand \$ per month.

In relevant events, JOCC has promoted the Solar cooling system among local institution and RE suppliers, in order to start implementing the system within local institution and promoting such technology with suppliers.



Despite many challenges in Lebanon, the project implementation was successfully conducted by the project team, and all tasks were completed before the end of the project.

Among the challenges that were faced by the Lebanese partner and managed effectively:

- **Economic volatility:** Lebanon suffered from an unprecedented economic crisis.. The fluctuations in the local currency value, inflation, and economic downturns affected the project cash flow and settlements. Strategies like using a foreign currency (Euros) for most of the project finances and limiting the local currency to only a partial settlement of HR expenses helped in mitigating this risk.
- **Political Instability:** The uncertainty in the political ecosystem of the country, added a challenge to the organization of B2B events, and in securing additional co-funding for the local beneficiaries (SMEs) of the project.
- **Health and Safety:** The COVID-19 pandemic posed a significant challenge to the execution of several tasks of the project. Several meetings were cancelled and replaced by online events. Several planned trainings on wastewater technologies were also conducted online.
- **Supply Chain Disruption:** COVID-19 and economic instability affected the supply chain, which led to some delays in acquiring the equipment and materials for the installation of WWTP and the solar PV system used to power the pumps of the treatment station.

The IRI team successfully managed these challenges through a combination of risk assessment, strategic planning, and fruitful collaboration with local and international partners.

Lessons learned:

The lessons learned from the implementation of the Maia Taqa project in Lebanon include:

Effective communication: One of the keys for the success of the implementation was based on a clear and consistent communication by the Project team with local stakeholders, and team members from partner countries.

● **Engagement of Team Members:** All decisions taken at the local level for the completion of the project tasks involved all team members, taking into consideration all concerns for a better acceptance of choices and success of execution.

● **Adaptability:** the flexibility in adapting to changing circumstances and unforeseen challenges is a key lesson to consider for future projects design. More flexibility with deadlines in future collaboration allows for a better adjustment in response to shifting conditions.

These lessons underscore the importance of careful planning, collaboration, and a proactive approach when working on EU funded projects involving unstable countries like Lebanon. They can be complemented with a risk assessment and mitigation strategies to ensure project success in challenging environments.



COMMUNICATION

The MAIA-TAQA project has achieved substantial strides in its mission to enhance the uptake of Renewable Energy (RE) technologies and solutions throughout the Mediterranean region.

Through a targeted approach to overcome barriers to innovation, the project has played a pivotal role in empowering Small and Medium-sized Enterprises (SMEs), equipping them with the necessary support for success.

As a result, the communication strategy of the MAIA-TAQA projects enables outreach efforts, ensures that local communities are informed about the project's benefits and engages in the sustainable initiatives.





FUTURE OUTLOOK



The future outlook for resource efficiency sources like renewable energy and wastewater treatment and re-use are exceptionally promising in the Mediterranean area. The abundance of solar radiation and wind in this region makes it well-suited for the expansion of renewable energy sources such as solar thermal, solar PV, and wind power. Advancements in technology and decreasing costs make these sources increasingly competitive and accessible. Additionally, there is a growing awareness of the environmental challenges (pollution, CO2 emissions...), coupled with the need to reduce the energy bill which has become very expensive lately due to the International conflicts.

Similarly, waste water treatment and re-use is evolving from a technology to control the pollution to a means of valuable resource recovery process. Latest development in the wastewater treatment technologies can enable the reduction of energy consumption, the recovery of energy and nutrients, and the re-use of treated water for irrigation purposes. The integration of these technologies into the Mediterranean infrastructure can contribute to a sustainable water management. and drive the economic growth.

This should be a driving force for private and public investments and policy initiatives aimed at a wider development of these resource efficiency technologies in the area. Building on the successful results of the Maia Taqa project, continuing it in the Euronext Med can help achieve further development in the Mediterranean countries. This continuation ensures that the momentum and efforts already invested will lead to greater success in implementing our initiatives to a wider range of RES stakeholders.

Conclusion:

In conclusion, the MAIA-TAQA project, operating within the ENI CBC Med programme, has significantly advanced the cause of sustainability and resource efficiency within Small and Medium-Sized Enterprises (SMEs) across the Mediterranean (MED) countries. Focused on innovative services in Micro-Grids, Energy Storage, Building Integrated Photovoltaics (BIPV), Solar Thermal Technologies, and Wastewater Treatment and Reuse, the project has successfully executed demonstrator pilot projects in Lebanon, Egypt, and Jordan.

The achievements of these pilot projects have been showcased through various impactful initiatives. In Egypt, the installation of a 100 kWp Photovoltaic

system at the El Ameria Wholesale Market promises environmental benefits, reduced distribution network congestion, and lower electricity costs. In Jordan, the introduction of a Solar Thermal Cooling (STC) system at the Chamber of Commerce building in Aqaba aims at lowering primary energy consumption and fostering awareness of sustainable technologies. Lebanon's wastewater treatment plant at the Industrial Research Institute in Hadat exemplifies a comprehensive solution, utilizing advanced technologies and solar energy to meet environmental standards and address water scarcity.

The technical specifications reveal meticulous planning and execution, underlining the diverse applications of renewable energy and resource efficiency solutions. The capacity-building initiatives and regulatory framework improvements are crucial, ensuring that SMEs across South MED countries are well-prepared to adopt and benefit from these innovative services.

Despite challenges in the implementation of the voucher system and other hurdles, the project remains committed to supporting SMEs in identifying their innovation needs and promoting resource efficiency solutions. The awarded vouchers represent a step toward realizing these goals, with a focus on fostering innovation and sustainable practices.

Furthermore, the project's emphasis on promoting technological cooperation among SMEs in Lebanon, Egypt, and Jordan through B2B events and company missions has yielded notable successes. The engagement of over 200 stakeholders, tailored matchmaking activities, and the introduction of innovative services underscore the impact on SMEs and the broader Renewable Energy community.

As the MAIA-TAQA project stands as a beacon for scalable and replicable solutions aligned with sustainable development goals, it emphasizes the urgent need for accelerated efforts to address climate change and its impacts in the Southern Mediterranean region. The positive trajectory and lessons learned position the project as a valuable model for continued development and collaboration in the pursuit of resource efficiency and sustainable practices.