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meetMED
Mitigation Enabling Energy Transition in the MEDiterranean region
Together We Switch to Clean Energy

Identification of Ten Potential Projects for Business Model

WP5 (A 5.1.1) - Financing EE in Building and Appliances Business Models

MED ENER

RCREEE
Regional Center for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

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About the project

The Mitigation Enabling Energy Transition in the Mediterranean region "meetMED" is an EU-funded project developed by the Mediterranean Association of the National Agencies for Energy Management (MEDENER) and the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE).

With the objective of contributing to energy and climate transition Southern Mediterranean Neighbourhood through a multi-scale, multi-partner inclusive approach, meetMED II activities aim at developing a more stable, efficient, competitive, and climate-resilient socioeconomic environment in Southern Mediterranean countries, by fostering regional cooperation for Energy Efficiency measures and implementing demo actions.

The meetMED project recognizes that access to finance and the establishment of a conducive business environment are significant challenges that impede investments in the South Mediterranean countries. To address this, the project aims to create knowledge and raise awareness among stakeholders while establishing accessible business models. By doing so, it seeks to improve the accessibility to financial resources and promote the adoption of energy efficiency (EE) applications, particularly in the building and appliances sectors. The meetMED project's primary objectives include enhancing the finance environment in the targeted countries, facilitating dialogue between banks, financial partners, institutions, and public and private operators. It also aims to improve the availability, conditions, and procedures for accessing and promoting the visibility of existing funds. Additionally, the project strives to create innovative mechanisms for funding projects in the buildings and appliances fields. Furthermore, it aims to build a core of expertise and knowledge specifically related to financing EE programs, with a focus on banks and financial institutions.

By achieving these objectives, the meetMED project aims to enhance the development of EE programs in buildings and appliances, and consequently, contribute to the creation of an EE market at the regional level. This would enable greater accessibility to financial resources and promote sustainable energy practices in the South Mediterranean countries.

The innovative business models for energy efficiency in buildings and appliances often incorporate several key elements. While the specific design may vary depending on the context and stakeholders involved, here are some common elements found in such models:

1 Energy Performance Contracting (EPC):

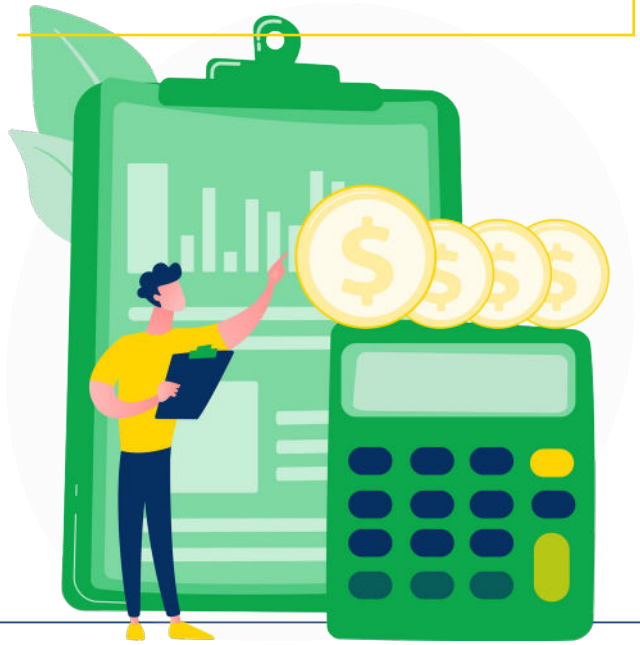
EPC is a popular business model where an energy service company (ESCO) enters into a contractual agreement with the building owner or appliance user to provide energy efficiency upgrades or services. The ESCO guarantees energy savings, and the project costs are typically financed through a portion of the achieved savings.

2 Pay-for-Performance:

This model involves financing energy efficiency projects based on the actual energy savings achieved. The financing is repaid through a portion of the energy cost savings realized over a defined period. It aligns the incentives of the project implementation organization and the investor, as the repayment is directly tied to the project's performance.

3 On-Bill Financing:

This model enables building owners or appliance users to finance energy efficiency improvements through their utility bills. The upfront costs are repaid over time as an additional charge on the utility bill, with the savings from reduced energy consumption offsetting the repayment amount.



4 The Design-Build-Finance-Operate-Own/Transfer (DBFOO/DBFOT) model:

is a comprehensive approach that encompasses the entire lifecycle of energy efficiency projects in both buildings and appliances. It involves multiple stages and stakeholders working together to deliver and sustain energy-efficient solutions. With the below key elements:

Design: The first stage involves the design of energy-efficient systems and solutions for buildings and appliances. This includes identifying energy-saving opportunities, specifying equipment and technology requirements, and developing a comprehensive project plan.

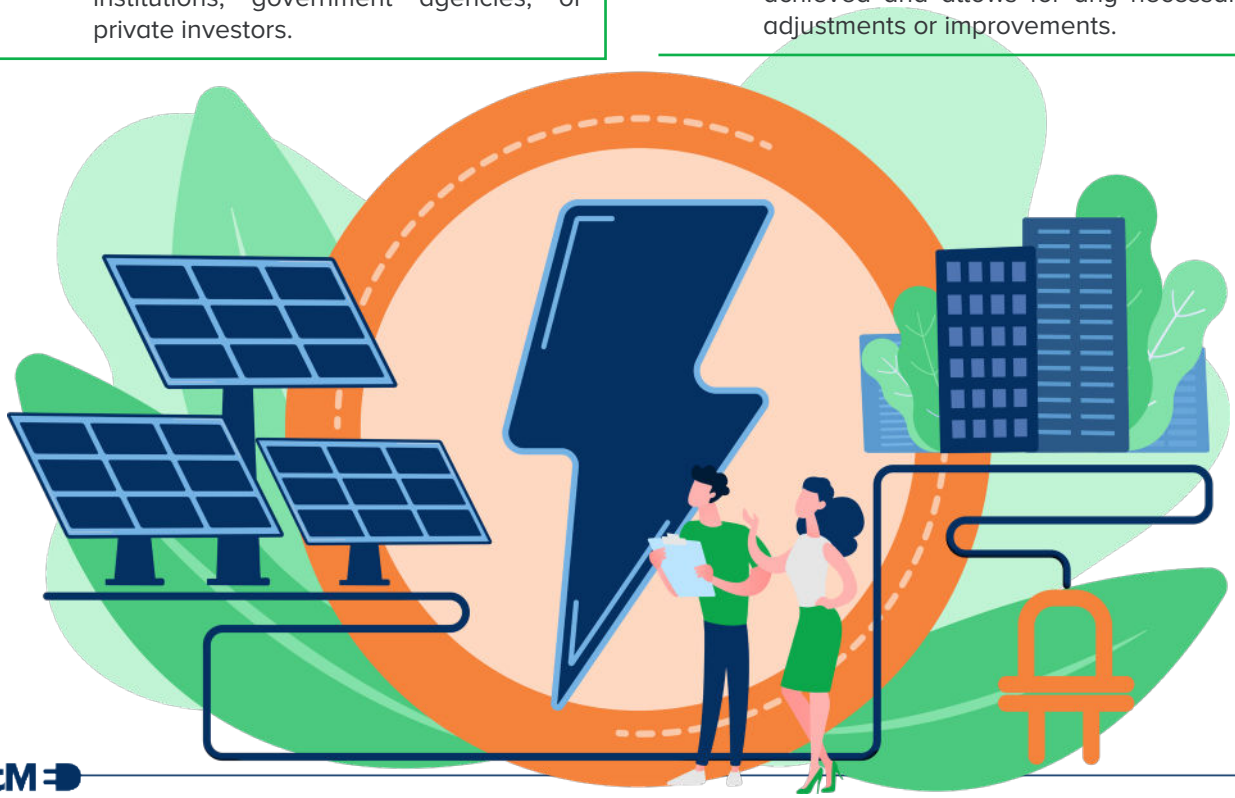
Build: Once the design is finalized, the construction or installation phase begins. Contractors or service providers are responsible for implementing the energy efficiency measures, including retrofitting buildings, installing energy-efficient appliances, and integrating control systems.

Finance: The finance stage involves securing the necessary funding for the project. This can be done through various financing mechanisms, such as loans, grants, public-private partnerships, or energy performance contracts. The financing can be provided by financial institutions, government agencies, or private investors.

Operate: After the construction phase, the energy efficiency systems and appliances start operating. Building owners or operators, or appliance users, are responsible for the day-to-day operation and maintenance of the energy-efficient infrastructure. This includes monitoring energy consumption, optimizing system performance, and conducting regular maintenance and repairs.

Own/Transfer: In the DBFOO/DBFOT model, there are two possible paths regarding ownership. Firstly, the building owner or appliance user may choose to retain ownership of the energy-efficient assets and continue to operate and benefit from the energy savings. Alternatively, ownership of the assets can be transferred to a third party, such as an energy service company (ESCO) or an investor, who assumes responsibility for operation and maintenance while providing financial returns to the original owner.

Performance Monitoring and Verification: Throughout the operational phase, monitoring and verification mechanisms are put in place to assess the actual energy savings and performance of the energy efficiency measures. This helps to ensure that the projected savings and environmental benefits are being achieved and allows for any necessary adjustments or improvements.



5 Green Leasing:

Green leasing involves incorporating energy efficiency and sustainability criteria into lease agreements for buildings. the collaborative parties cooperate together to implement energy-saving measures, and the costs and benefits are shared between both of them. This model encourages energy-efficient practices and investments in leased spaces.

6 Energy Service Agreements (ESA):

ESAs are similar to EPCs but typically apply to ongoing energy services rather than specific projects. In an ESA, an energy services provider undertakes to manage and optimize a building or appliance's energy performance over an extended period. The provider is compensated based on the achieved energy savings or agreed-upon performance targets.

7 Peer-to-Peer (P2P) Financing:

P2P financing platforms connect investors directly with building owners or appliance users seeking funds for energy efficiency projects. This model bypasses traditional financial intermediaries and allows individuals or organizations to invest directly in specific projects, promoting transparency and efficiency in funding.

8 Energy Efficiency Utility (EEU):

an EEU is a specialized entity that is responsible for implementing energy efficiency programs and projects on a large scale. It operates similarly to a traditional utility but focuses on delivering energy savings and promoting efficiency measures. The EEU may offer financial incentives, technical assistance, and project implementation support.

9 Cooling as a Service (CaaS):

is an innovative business model that aims to make cooling technologies more accessible and sustainable. It is a pay-for-service model where the end-user pays for the cooling service provided by the equipment, rather than purchasing and owning the cooling equipment itself. The CaaS model is particularly relevant in the context of air conditioning systems. some key elements of the Cooling as a Service (CaaS) model can state as below:

Service-based Approach: Instead of buying and owning cooling equipment, the user enters into a service agreement with a provider who supplies and maintains the cooling system. The provider remains responsible for the equipment's installation, operation, maintenance, and performance.

Performance-based Payments: The user pays for the cooling service based on the actual cooling capacity and energy efficiency of the system. Payments are typically structured as a fixed fee, or a variable fee based on the amount of cooling delivered or the energy consumption of the equipment.

Equipment Ownership: In the CaaS model, the provider retains ownership of the cooling equipment throughout the service agreement. This eliminates the upfront capital investment required from the user and the associated financial risks.

Maintenance and Upgrades: The provider is responsible for the regular maintenance, repairs, and upgrades of the cooling equipment to ensure optimal performance and energy efficiency. This relieves the user from the burden of equipment maintenance and associated costs.

Energy Efficiency and Performance Guarantees: CaaS providers often offer performance guarantees, ensuring that the cooling systems meet specified energy efficiency and performance targets. If the system fails to deliver the agreed-upon cooling capacity or energy savings, the provider is responsible for remedying the situation.

Flexibility and Scalability: CaaS allows for flexibility in meeting the user's cooling demands. The provider can adjust the cooling capacity or upgrade the equipment as per the user's changing needs, ensuring optimal efficiency and cost-effectiveness.

Sustainability Benefits: The CaaS model promotes the use of energy-efficient cooling technologies, reducing greenhouse gas emissions and environmental impact. It encourages the adoption of more sustainable refrigerants and the implementation of efficient cooling practices.

CaaS offers several advantages, including reduced upfront costs, access to modern and energy-efficient cooling technologies, and the transfer of operational and performance risks to the service provider. By shifting the focus from equipment ownership to the provision of cooling services, CaaS aims to accelerate the adoption of energy-efficient cooling solutions and contribute to sustainable cooling practices.

10 Extended Producer Responsibility (EPR):

Is a policy approach that holds producers responsible for the entire lifecycle of their products, including their post-consumer stage. The EPR module is a framework that incorporates the concept of Extended Producer Responsibility into waste management systems. Here are the key elements of the EPR module:

Legal Framework: The EPR module operates within a legal framework that establishes the obligations and responsibilities of producers for the management of their products at the end of their life. Governments enact laws and regulations that require producers to take responsibility for the collection, recycling, or proper disposal of their products.

Product Scope: The EPR module defines the scope of products that fall under the extended producer responsibility. This scope may include various types of products, such as electronics, batteries, packaging, vehicles, or other items with significant environmental impact.

Producer Responsibility: Producers become responsible for the post-consumer stage of their products. They are obligated to develop and implement systems for the collection, treatment, and recycling of their products to ensure their proper management and minimize their environmental impact.

Collection Infrastructure: The EPR module considers the establishment of collection infrastructure, such as drop-off points, collection centers, or take-back programs. These facilities provide convenient options for consumers to return their used products, ensuring their proper handling and preventing them from entering the general waste stream.

Recycling and Disposal: Producers are responsible for ensuring that their products are recycled or disposed of in an environmentally sound manner. They may collaborate with recycling facilities or waste management service providers to establish appropriate processes for the treatment and recovery of valuable materials from the products.

Funding Mechanism: The EPR module typically includes a funding mechanism to support the costs associated with the management of end-of-life products. Producers may contribute financially to cover the expenses of collection, recycling, and disposal activities. This funding can be achieved through various mechanisms, such as fees, levies, or product-specific recycling funds.

Reporting and Compliance: Producers are required to report on their EPR activities, including the quantities of products collected, recycled, or disposed of, as well as the environmental outcomes achieved. Government agencies or regulatory bodies monitor compliance with EPR regulations and may enforce penalties or sanctions for non-compliance.

11 Material Recovery and Sale (MRS)

Is a process that involves the collection, sorting, and sale of recyclable materials to promote resource recovery and support the circular economy.

Collection: The MRS module begins with the collection of recyclable materials from various sources, such as households, businesses, and industrial facilities. Collection methods may include curbside pickup, drop-off centers, or specialized collection programs.

Sorting and Segregation: Once collected, the recyclable materials go through a sorting and segregation process. This step involves separating different types of materials, such as paper, plastics, glass, metals, and others. Technologies like conveyor belts, manual sorting, and automated systems are utilized to efficiently separate the materials.

Quality Control: Quality control measures are implemented to ensure that the sorted materials meet the required standards for recycling. Contaminated or non-recyclable items are removed to maintain the quality and marketability of the recovered materials.

Processing and Treatment: After sorting, the materials undergo processing and treatment procedures. This may include shredding, crushing, compacting, cleaning, or any other necessary treatments to prepare the materials for further use or sale.

Market Identification and Sales: The MRS module involves identifying potential markets for the recovered materials. Market research is conducted to determine buyers who are interested in purchasing recyclable materials for manufacturing new products. Sales negotiations and contracts are established with buyers to facilitate the sale and delivery of the recovered materials.

Logistics and Transportation: The MRS module includes logistics and transportation arrangements to move the recovered materials from the sorting and processing facilities to the buyers. This may involve coordinating with transportation providers, arranging packaging and shipping, and ensuring compliance with relevant regulations.

Revenue Generation: The sale of the recovered materials generates revenue, which can help offset the costs associated with collection, sorting, and processing. The revenue may be reinvested in the MRS system to improve infrastructure, expand collection efforts, or fund public awareness campaigns.

Environmental Benefits: By recovering and recycling materials, the MRS module contributes to reducing the extraction of raw materials, conserving natural resources, and minimizing waste generation. It supports the principles of the circular economy by transforming waste materials into valuable resources.

During activity 5.1.1 we will highlight 10 financing projects in link with the demo actions planned within the other work packages in each country. The goal is to create financially viable and sustainable models that enable the implementation of energy-efficient measures and accelerate the transition to more eco-friendly environment through three final projects.

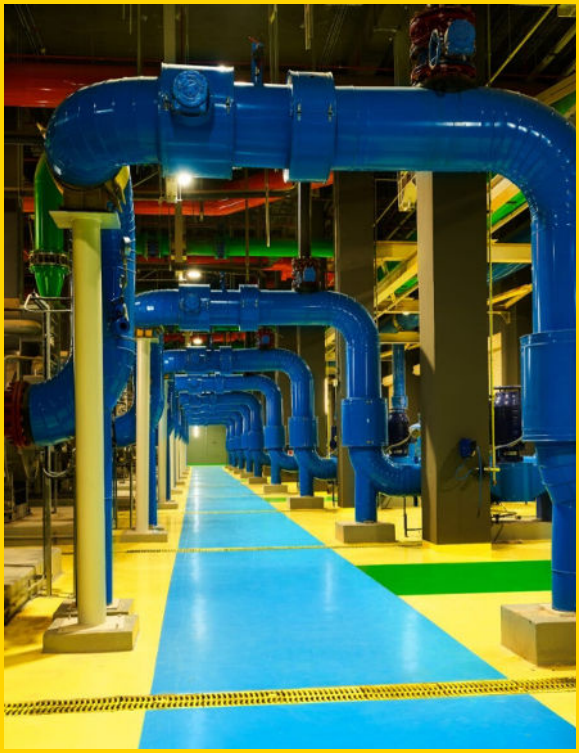
Egypt

District Cooling Plant - B (DCP – B) Project

The Administrative Capital for Urban Development (ACUD), an Egyptian investment platform, proposed the district cooling project for the New Administrative Capital. This plant is financed by ACUD, the landlord and main developer of the New Administrative Capital. The Capital DCP is a collaborative effort led by key industry leaders, including GASCOOL as the Main Contractor, Hassan Allam as the MEP Contractor, and PETROJET, responsible for constructing the chilled water network.

From the early planning stages of the city, the goal of providing affordable and clean energy was aligned with SDG 7 (Affordable and Clean Energy). This focus led to the adoption of district cooling as a high-efficiency air conditioning technology, ensuring sustainability and maintaining consistent service quality during regular operating hours.

District cooling in financial and commercial buildings enables the use of technologies not typically applicable to residential buildings, significantly reducing energy consumption. It reduced the required electrical capacity by about **20%.** Additionally, it reduces operating costs by utilizing large-scale chillers, cooling towers, and pumps, which offer more efficient and cost-effective solutions.

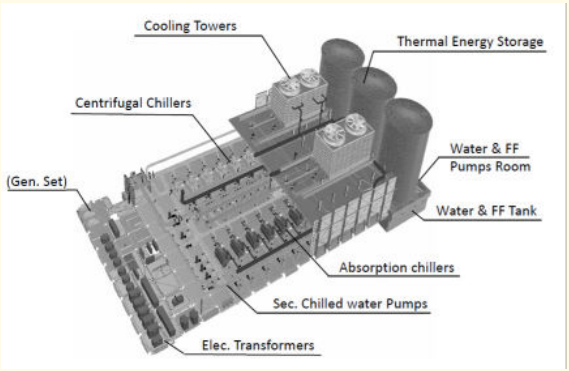


Technical Details

Phase 1: DCP-A

As part of ACUD's vision to optimize energy consumption and maximize resource efficiency, the company is developing four Mega District Cooling Plants over the next five years. These plants will serve major areas within the New Administrative Capital (Diplomatic District – 64,000 TR). The station relies on an energy storage system during the night for usage in peak periods, which reduced the required electrical capacity by about 20%. Using this system led to a reduction in electrical power usage from 60 thousand M.Watt to 37 thousand M.Watt for 64 thousand tons

This initiative underscores ACUD's commitment to sustainable urban development, ensuring a more energy-efficient and environmentally responsible future for the city. A sincere gratitude to ACUD for its unwavering support, facilitation of cooperation, and hospitality towards RCREEE and meetMED teams during visits and engagements. ACUD's leadership in urban development plays a key role in driving innovation and sustainability within the New Administrative Capital.



This advanced cooling system serves key areas within the New Administrative Capital, including the Government District, Financial District, and an additional **210 buildings**. The cooling needs of these areas are met by two plants: DCP-A and DCP-B. DCP-A, the first phase, is already operational, while DCP-B will be developed in the second phase.

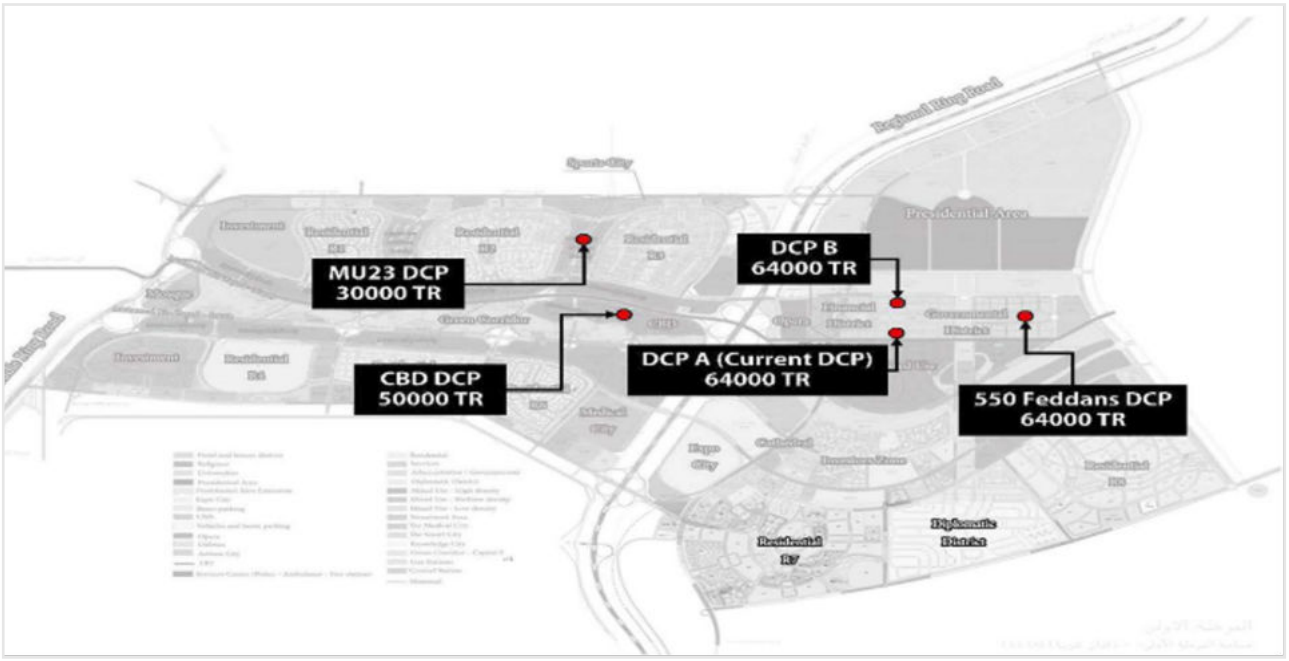
Completed over four years (from the tender phase to commercial operation), DCP-A has achieved a significant **35%** reduction in energy consumption, demonstrating its efficiency and commitment to sustainability. The project achieved specific consumption of **0.6 kW/Ton.**

Phase 2: DCP-B

The DCP-B project is currently in the planning phase and will have a cooling capacity of 80,000 TR, with an estimated cost of **7 billion EGP.** It will serve the same areas as DCP-A. The project is expected to take four years to completion. DCP-B is also anticipated to achieve a **35%** reduction in energy consumption, similar to the DCP-A plant.

Proposed BM

1. Cooling as a Service (CaaS)
2. ESCO
3. Design-Build-Finance-Operation-Own/ Transfer (DBFOO/DBFOT)



Jordan

Developing the ESCO Market and Energy Performance Contracting (EPC) Framework

To accelerate Jordan's energy transition and unlock private sector participation in energy efficiency, a national initiative is proposed to develop a robust Energy Service Company (ESCO) market and implement standardized Energy Performance Contracts (EPCs). This initiative is rooted in the 3rd National Energy Efficiency Action Plan (NEEAP) through measures C9 and C9.1 and seeks to address persistent barriers in the ESCO ecosystem such as unclear licensing schemes, limited awareness, lack of standard contractual models, and the absence of dedicated financing mechanisms.

By leveraging the technical and institutional experience of meetMED II partner countries, the initiative aims to introduce best practices and regulatory guidance through peer exchange and targeted technical assistance. The goal is to establish a functioning ESCO market and introduce EPCs as a sustainable financing model to scale up energy efficiency in industry and other sectors.

Technical Details

The initiative will unfold through two parallel and complementary streams:

1 ESCO Market Development (C9):

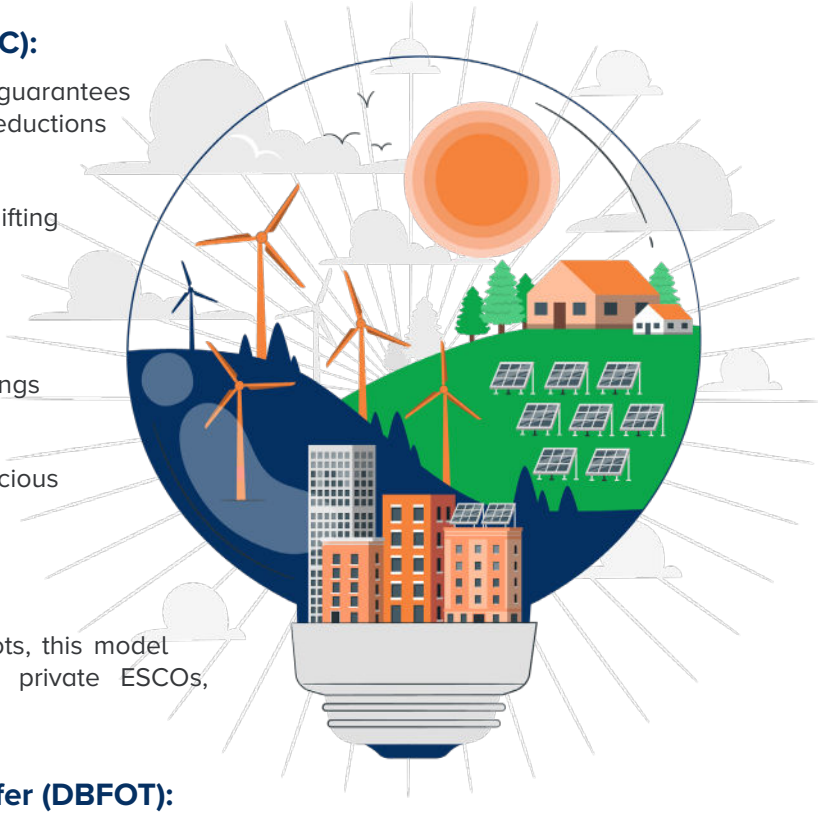
- Preparation of a national ESCO market roadmap including strategic milestones.
- Development of an ESCO Licensing Scheme with regulatory definitions and clear operational frameworks.
- Design of standard EPC templates adapted to Jordan's legal and regulatory environment.
- Stakeholder engagement activities targeting public institutions, industrial users, financial institutions, and local chambers.
- Capacity-building programs targeting ESCOs, engineers, and energy consultants, focusing on EPC delivery, M&V techniques, and risk-sharing models.
- Launch of pilot demonstration projects using the ESCO model in public and industrial buildings to validate the approach.

2 EPCs for the Industrial Sector (C9.1):

- Development of a legal and contractual EPC framework specific to industry.
- Design and piloting of EPC templates and risk-sharing models tailored to Jordanian industrial needs.
- Selection and implementation of up to 10 industrial EPC pilot projects.
- Assessment of EPC outcomes using M&V tools and stakeholder feedback.
- Awareness and technical training for industrial energy managers and finance teams on EPC contracting principles and performance-based incentives.

This initiative provides a scalable foundation to expand EPC adoption beyond the industrial sector, enabling municipalities and public institutions to follow with confidence.

Proposed Business Models



1 Energy Performance Contracting (EPC):

A results-based model where the ESCO guarantees specific savings and is repaid through the cost reductions achieved.

Reduces the financial risk on clients by shifting responsibility to the service provider.

2 Pay-for-Performance:

Repayment is directly tied to energy savings verified through M&V protocols.

Ideal for industrial clients and performance-conscious stakeholders.

3 Public-Private Partnership (PPP):

Especially relevant in the industrial EPC pilots, this model involves co-investment by public agencies and private ESCOs, improving trust and risk-sharing.

4 Design-Build-Finance-Operate-Transfer (DBFOT):

A turnkey approach allowing ESCOs to design and implement long-term energy efficiency upgrades with eventual asset transfer to the client.

5 Energy Service Agreement (ESA):

An operational variant of EPC suited for ongoing facility management contracts, particularly relevant for large industrial clients.

Note: EPC is both a policy output and a demonstration mechanism for the initiative. It is included here as a business model because its implementation in pilot projects is essential for validating and refining the proposed national EPC framework.

Implementation of Resource Efficient and Cleaner Production practices in 15 Jordanian industries Project , Jordan

Project Overview

- Location: 15 industries in Jordan (Amman, Zarqa, Karak, Maan, and Aqaba).
- Scope: Resource Efficient and Cleaner Production (RECP) Assessments.
- Status: Phase 2 in progress.

Technical Details

The project aims to provide technical assistance in conducting an integrated study on RECP practices across 15 industrial facilities. The goal is to identify opportunities for energy, water, and raw material savings, while improving environmental performance, productivity, and competitiveness.

The implementation of the RECP assessment follows several stages: planning, implementation, monitoring of performance, and continues improvement by providing technical support for industries to implement environmentally, technically, and financially feasible practices that can be carried out in the short term. The energy efficiency assessment of the 15 industries will be conducted by specialists from the National Energy Research Centre (NERC), while the material and water efficiency assessment will be managed by experts from the Water, Environment, and Climate Change Centre (WEC)/Cleaner Production Unit (CPU).

Budget and Financing

- Estimated Budget: **JOD 233,000.**
- Funding Sources: European Union (EU) grant supporting the transition to green economy in Jordan.

Timeline

- Planning Phase: 2023-2024.
- Implementation Phase: 2024–2025.

Financial Model

- European Union (EU) grant supporting the transition to green economy in Jordan
- As part of the project, large and medium-sized industries participating in the project are required to contribute 10% of the study's costs, excluding small industries. This contribution ensures the commitment and interest of the participating industries, with the allocated funds being used to directly implement the outcomes of the RECP assessment study.
- Long-Term Savings: The assessments are in progress.

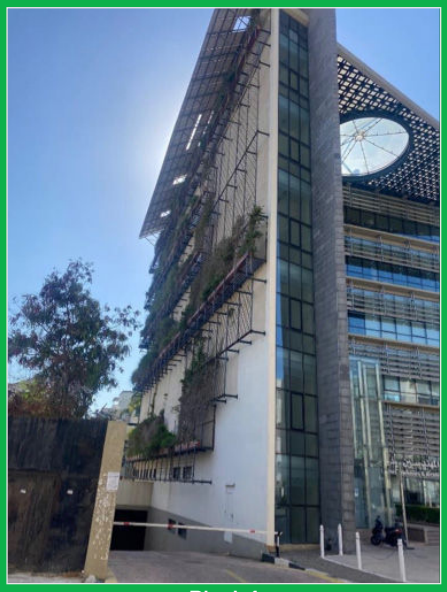
Proposed BM

1. Energy Performance Contracting (EPC) for guaranteed savings interventions,
2. Pay-for-Performance models for modular implementations,
3. Public–Private Partnerships (PPP) where co-investment de-risks the uptake

Lebanon

Implementing RE/EE measures in OEA headquarter in Tripoli

As part of Lebanon's vision for Net-Zero Communities, the Order of Engineers and Architects (OEA) in Tripoli relocated from its old premises to two new buildings. To enhance energy efficiency, reduce the carbon footprint, and lower heating loads, various renewable energy and energy efficiency solutions were implemented in the new OEA Tripoli buildings in 2013. The project was initially self-funded by OEA's own resources before Lebanon's economic crisis, while the current solar installation was funded by a donor.



Block 1

Block 2

The project incorporated various energy efficiency solutions such as:

- Facade and roof insulation.
- Planting vegetation on the southern walls of the buildings.
- Extensive use of glass facades to reduce the need for daytime lighting.
- Installation of **210 solar panels**, with total capacity of **100 kW**, supported by **24 lithium batteries** to power lighting, essential operation and two elevators within block 1.
- Heating and cooling systems powered by separate diesel generators **(350 and 500 kVA)**.

The implemented project's baseline energy consumption was **500 MWh/year,** which was reduced to **400 MWh/year** after implementation, resulting in a **20%** savings. This reduction led to a decrease of **51.3 tons** of CO2[1] decrease. The savings was achieved through the installation of **210** solar panels with a total capacity of **100 kW.** The largest energy consumption comes from the use of three chillers, which cool the buildings for about 6 months each year and are powered by diesel generators. The transformation of the OEA building took approximately 3 years to complete, with a total project cost of **$15 million.**

Technical Details

The proposed next step involves operating one chiller using solar power, with an additional 100 kW capacity. This aims to increase savings by up to **40%.** The project is expected to achieve **20%** energy savings of the total consumption at OEA Tripoli, resulting in 100 MWh of energy savings, equivalent to a reduction of **51.3 tons** of CO2.[2]

Proposed BM

1. The Design-Build-Finance-Operate-Own/ Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Pay-for-Performance
4. On-Bill Financing
5. Peer-to-Peer (P2P) Financing
6. Energy Efficiency Utility (EEU)

1 Carbon emission factor is 0.513 Ton CO2/MWh, for further details please visit: https://hal.science/hal-03489911/document

2 Carbon emission factor is 0.513 Ton CO2/MWh, for further details please visit: https://hal.science/hal-03489911/document

Implementing RE/EE measures in OEA headquarter in Beirut

In collaboration with UNDP and funded by the EU, the Order of Engineers and Architects (OEA) in Beirut proposed an energy efficiency and renewable energy project aimed at reducing the building's energy consumption, improving energy efficiency, lowering its carbon footprint, and minimizing heating loads.

Technical Details

OEA Beirut project involves implementation of eleven (11) RE/EE measures. These measures include various energy efficiency solutions such as

- Day lighting control.
- Motion detectors.
- Installation of VFDs on fans and primary pumps.
- EC motor replacement for AHUs.
- Demand control ventilation.
- BMS installation.
- Chillers and water loop retrofit.
- Renewable energy solutions, such as solar photovoltaic systems.

Among the above projects , one has been chosen and has a developed feasibility studies :

- The replacement of the old chilled water system with new chillers having high COPs and a system with VFD and variable pumping system .

The project would reduce the cooling energy consumption by over **30%** saving **166000kwh** annually around **75 tons of CO2** with payback period of **2.5 years.**

Proposed BM

Energy Performance Contracting (EPC)

Morocco

Marrakech District Cooling Project

Morocco selected Marrakech as its pilot city to study the feasibility of its first district cooling project in the touristic area of Hivernage. The project was officially launched during the 22nd Conference of the Parties (COP22) to the United Nations Framework Convention on Climate Change, which took place in Marrakech in 2016.

The objective of the project is to enhance the commercial viability of district cooling systems in the North African region by centralizing the production and distribution of chilled water for cooling multiple buildings or facilities. By implementing this system in the Hivernage area of Marrakech, the project aims to provide efficient cooling services to the touristic zone. This not only improves the comfort of the area but also reduces energy consumption and greenhouse gas emissions associated with traditional cooling methods.

The project aims to demonstrate the technical and economic feasibility of district cooling in a real-world setting, highlighting its benefits and potential for replication in other parts of Morocco and the broader North African region. It likely involves collaboration between government entities, private sector stakeholders, international organizations, and technology providers to ensure successful implementation and foster knowledge sharing.

Technical Details

The assessment phase of the project was launched in May 2017 by the city of Marrakech, the Moroccan Agency for Energy Efficiency, the Italian Ministry, and UN Environment. The project, with total capacity of **6,500 TR,** aims to achieve a **46%** reduction in CO2 emissions. It has been studied by Politecnico di Milano in collaboration with the Moroccan Agency for Energy Efficiency, with the added benefit of a **10%** cost reduction for consumer space cooling. Additionally, the project will evaluate the potential contribution of district cooling systems to refrigerant phasing out under the Montreal Protocol and the Kigali Amendment.

Proposed BM

1. Cooling as a Service (CaaS)
2. ESCO
3. Design-Build-Finance-Operation-Own/Transfer (DBFOO/DBFOT)

Palestine

Street Lighting Replacement Project (First project)

The Palestinian Energy and Natural Resources Authority (PENRA) launched the LED street lighting project as part of its strategy to enhance energy efficiency, implement energy-efficient solutions, and adopt the latest technologies.

The project, which began in 2013, marks the country's first national initiative to replace conventional street lighting with energy-efficient and environmentally friendly LED lights, with support from the World Bank.

It was implemented across all governorates of Palestine, focusing on major streets in each area.

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The project, which began in 2013, marks the country's first national initiative to replace conventional street lighting with energy-efficient and environmentally friendly LED lights, with support from the World Bank.

It was implemented across all governorates of Palestine, focusing on major streets in each area.

By 2018, LED lighting had become a priority for municipalities, local councils, and other governing bodies. As a result, the Ramallah Municipality initiated a tender to replace **4,520 street lighting units** in the city. This initiative aims to achieve an average **60% reduction** in the street lighting bill, while also improving visibility and extending the operational life of the lighting to up to **50,000 working hours.** The Palestinian Energy Authority hopes that other municipalities and local bodies will follow this example by adopting energy-efficient lighting solutions to reduce electricity costs and minimize energy losses, ultimately benefiting the end-users.

PENRA has expanded the project into a second phase, which is on a larger scale and includes all the main streets in the cities. The project was expected to take one to two years to complete, depending on funding availability. It was proposed that **50% for Gaza**, and **50% for West Bank**, including electricity meters to be installed on each street to monitor and verify the savings achieved after implementation. However, due to a lack of sufficient funding, parts of the project were implemented by local authorities. The Energy and Natural Resources Authority reconsidered the second phase in the National Energy Efficiency Plans 2021-2030, as well as in the revised National Energy Efficiency Plan 2025-2030.

Technical Details

- **First stage:**

The project involves replacing approximately **1,637 high-pressure sodium (HPS) lamps (250 kW)** with **120 kW LED lamps**. The replacement will focus on one street in each city. The total project cost is **$700,000**, funded by the World Bank.

The baseline energy consumption is **1.63 GWh**. It is expected to achieve **50%** to **60% savings**, which translates to around **0.813 GWh of energy saved**, resulting in a reduction of approximately **249.6 tons of CO2 emissions**. The expected lifespan of the LED lamps is 10 years, with a payback period of less than 4 years. The project has been completed successfully and serves as a model for future scaling.

- **Second stage:**

The second phase involves replacing **130,000 lamps** at a projected cost of **$30 million** (Revised cost, since costs have decreased significantly recently) . However, funding for this phase has not yet been secured. The baseline energy consumption for this stage is **120 GWh.**

Proposed BM

1. The Design-Build-Finance-Operate-Own/ Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Pay-for-Performance
4. On-Bill Financing
5. Peer-to-Peer (P2P) Financing
6. Energy Efficiency Utility (EEU)

Solar Water Heater Rehabilitation Project (Second Project)

The Palestinian Energy and Natural Resources Authority (PENRA) launched a project to rehabilitate the existing solar water heaters (SWHs). Approximately, **62%** of the **households use solar water heaters** to provide hot water for their domestic needs. These heaters were installed a long time ago. Due to a lack of regular maintenance, about **6%-8%** of these **SWHs** are **out of service**, and the owners replaced them with electric heaters. Palestine has very cold weather in Winter, especially during recent years due to the issue climate change. The demand for electricity has increased due to electric heaters. Therefore, PENRA initiated that project to maintain the existing SWHs, reduce energy consumption, and increase the harnessing of renewable energy sources.

The project will be launched in two phases; the first phase will include around **20-40 buildings** as a pilot project, while the second phase will contain about **50,000-60,000 homes** (National level). The prototype will be used to define the measures for the national project. Such projects in Palestine are feasible, and the payback period (PBP) is within **2-4 years**, depending on the number of family members, and the location of the house. The challenge associated with that project includes the availability of resources, capacity buildings for technicians, and access to rooftops due to privacy of the owner who will not allow access to their homes.

Technical Details

- **First stage:**

The project involves the rehabilitation of **40 non-functional solar water heaters** installed on the rooftops of residential buildings. The estimated project cost is **$20,000,** with a payback period ranging from **2 to 4 years**, depending on factors such as family size and hot water usage. The project is funded by ENABEL and is currently ongoing, with completion expected by the end of 2025. The budget for the project is secured. However, it is difficult to determine the exact baseline energy consumption and savings at this stage, as these depend on the number of homeowners who grant access to their rooftops, as well as the specific usage patterns and family sizes.

- **Second stage:**

The project involves the rehabilitation of **60,000 solar water heaters** in the residential sector. The expected project cost is **$ 24 Million**. However, the funding agency is not determined yet. Roughly, the Palestinian representative estimated energy saving in consumption to be **126 GWh**. This phase has been considered in NEEAP 2021-2030 and in the revised NEEAP 2025-2030

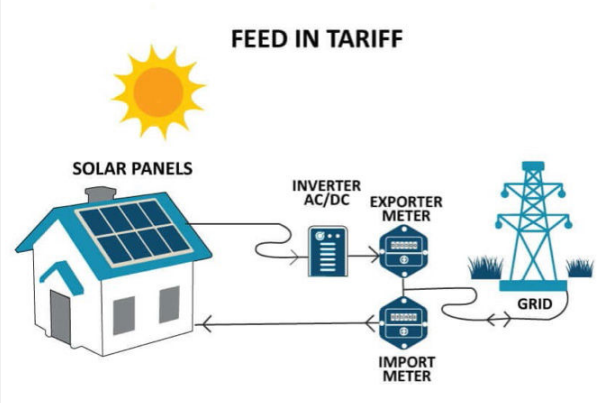
Proposed BM

1. The Design-Build-Finance-Operate-Own/ Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Pay-for-Performance
4. On-Bill Financing
5. Peer-to-Peer (P2P) Financing
6. Energy Efficiency Utility (EEU)

Libya

Implementing General Measures for Energy Savings at Homes

The project aims to spread the culture of rationalization of electricity consumption by homes. A preliminary study was conducted on **700 homes** in the city of Misurata, which is **200 km** east of the capital, Tripoli. The Renewable Energy Authority is responsible for the supervision and follow-up of the implementation of REAOL:



Objective: This initiative contributes to ensuring that the citizen does not have power outages and reducing the value of the electricity bill, reducing carbon dioxide emissions, and providing the value of producing this energy throughout the life of the system.

Renewable Energy Authority: The Renewable Energy Authority is responsible for supervising and following up on the establishment of this initiative by selecting contractors and approving the companies responsible for installing these systems in cooperation with the Ministry of Local Government represented by the Municipality of Misurata.

Financing: It is proposed that this project be financed by the government by **50%** while the remaining amount will be in installments through banks.

Initiative GO GREEN: The GO GREEN initiative launched by the Renewable Energy Authority is a starting point for this project by targeting household consumption in cooperation with the General Electricity Company, as this segment represents **70%** of the total electricity consumption in Libya.

Monitoring and Evaluation: This initiative will study and evaluate the environmental and social impact and track the benefits of applying energy efficiency in buildings, which contributes to reducing production costs from traditional fuels and other environmental indicators and providing the necessary support for upcoming initiatives.

Technical Details

The project involves renewable energy and energy efficiency solutions includes:

- Replacing existing lighting with energy saving types
- Installing solar energy systems on the roof of the building to share in the public load during the day.

Which contributes to the stability of the electrical grid. The pilot project will include about **700 homes.** IT while the second phase will be extended to included **12,227 homes.** The second phase is expected to save about **168,459 Ton** CO2 per year. It is proposed to install about **120 MW** of photovoltaic to the electrical gird. It expected to save about **30,236,942 LYD** of the annual fossil fuels consumption utilized by the General Electricity Authority in Libya.

Proposed BM

1. The Design-Build-Finance-Operate-Own/ Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Pay-for-Performance
4. On-Bill Financing
5. Peer-to-Peer (P2P) Financing
6. Energy Efficiency Utility (EEU)

Implementing Renewable Energy Solutions at Healthcare and medical centers (10 Hospitals)

The project aims to spread the culture of rationalizing electricity consumption by commercial sector, specifically public hospitals and medical centers. The significant consumers in the health care sector were monitored, and **10 hospitals** were selected for the first phase. It proposed to apply renewable energy solutions to the building to increase share of the renewable in the grid, thus, reduce dependence on electricity produced from fossil fuels. The Renewable Energy Authority is responsible for the supervision and follow-up of the implementation of REAOL:

Objective: This initiative contributes to ensuring that the citizen does not have power outages and reducing the value of the electricity bill, reducing carbon dioxide emissions, and providing the value of producing this energy throughout the life of the system.

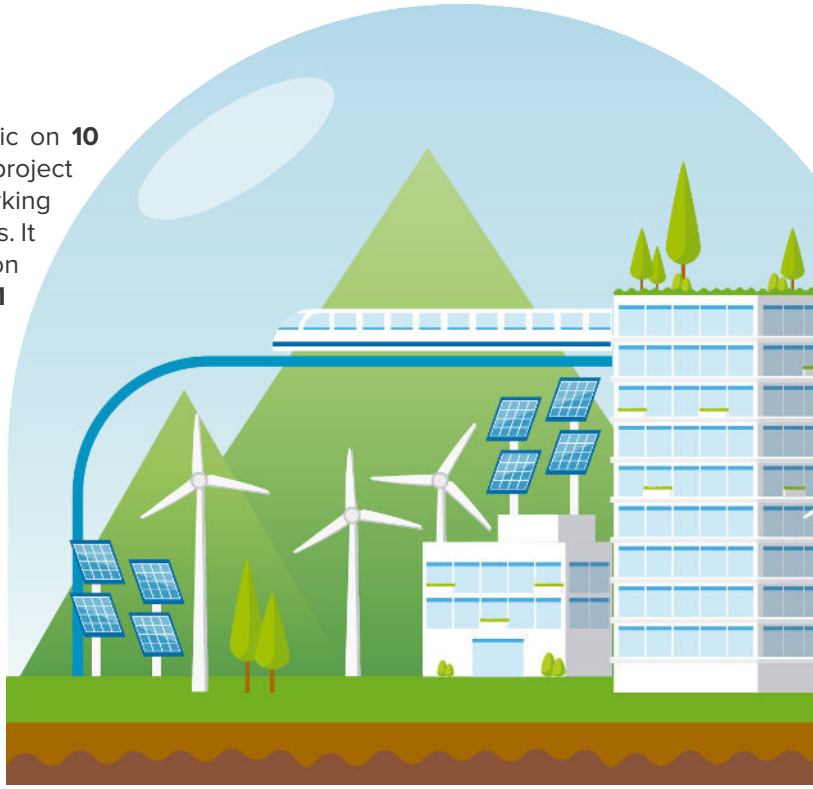
Renewable Energy Authority: The Renewable Energy Authority is responsible for supervising and following up on the establishment of this initiative by selecting contractors and approving the companies responsible for installing these systems in cooperation with the Ministry of Local Government represented by the Municipality of Misurata.

Financing: It is proposed that this project be financed by the government by **50%** while the remaining amount will be in installments through banks.

Monitoring and Evaluation: This initiative will study and evaluate the environmental and social impact and track the benefits of applying energy efficiency in buildings, which contributes to reducing production costs from traditional fuels and other environmental indicators and providing the necessary support for upcoming initiatives.

Technical Details

The project involves installing **15.9 MW** photovoltaic on **10 hospitals** that have the highest consumption. The project aims to install solar energy systems on the parking associated to the public hospitals and medical centers. It is expected to cover **50%** of the electricity consumption by these facilities. It expected to save about **21.1 million LYD** of the annual fossil fuels consumption utilized by the General Electricity Authority in Libya.



Proposed BM

1. The Design-Build-Finance-Operate-Own/ Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Peer-to-Peer (P2P) Financing
4. Energy Efficiency Utility (EEU)

Implementing Renewable Energy Solutions at Mosques

The project aims to spread the culture of rationalizing electricity consumption by public utilities sector, specifically General Authority of Endowments. The significant consumers in the mosques were monitored, and **100 mosques** were selected for the first phase. It proposed to apply renewable energy solutions to the building to increase share of the renewable in the grid, thus, reduce dependence on electricity produced from fossil fuels. The Renewable Energy Authority is responsible for the supervision and follow-up of the implementation of REAOL:

Objective: This initiative contributes to ensuring that the citizen does not have power outages and reducing the value of the electricity bill, reducing carbon dioxide emissions, and providing the value of producing this energy throughout the life of the system.

Renewable Energy Authority: The Renewable Energy Authority is responsible for supervising and following up on the establishment of this initiative by selecting contractors and approving the companies responsible for installing these systems in cooperation with the Ministry of Local Government represented by the Municipality of Misurata.

Financing: It is proposed that this project be financed by the government by **50%** while the remaining amount will be in installments through banks.

Monitoring and Evaluation: This initiative will study and evaluate the environmental and social impact and track the benefits of applying energy efficiency in buildings, which contributes to reducing production costs from traditional fuels and other environmental indicators and providing the necessary support for upcoming initiatives.

Technical Details

The first phase includes **100 mosques** that represents the largest share of electricity consumption. These **100 mosques** represent about **28%** of the total consumption of the General Authority of Endowments with total baseline consumption of **103,034,191 kWh/year.** It is expected to cover **50%** of the electricity consumption of these facilities. The project involves the installation of about **25.6 MW** of solar photovoltaic energy. The second phase proposes expanding the project to include 2,594 mosques. These **2,594 mosques** represent about 10.4% of the total consumption of major consumers with total baseline consumption of **366,540,604 kWh/year.** It expected to save about **35,031,625 LYD** of the annual fossil fuels consumption utilized by the General Electricity Authority in Libya.

Proposed BM

1. The Design-Build-Finance-Operate-Own/ Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Peer-to-Peer (P2P) Financing
4. Energy Efficiency Utility (EEU)

Implementing Renewable Energy Solutions at Universities

The project aims to spread the culture of rationalizing electricity consumption by commercial sector, specifically universities. The significant consumers in the universities were monitored. It proposed to apply renewable energy solutions to the building to increase share of the renewable in the grid, thus, reduce dependence on electricity produced from fossil fuels. The Renewable Energy Authority is responsible for the supervision and follow-up of the implementation of REAOL:

Objective: This initiative contributes to ensuring that the citizen does not have power outages and reducing the value of the electricity bill, reducing carbon dioxide emissions, and providing the value of producing this energy throughout the life of the system.

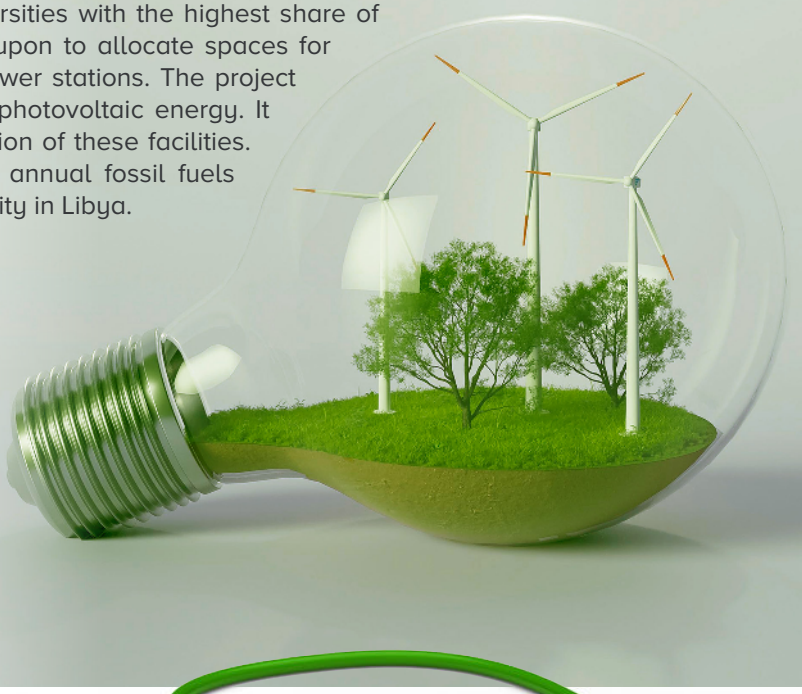
Renewable Energy Authority: The Renewable Energy Authority is responsible for supervising and following up on the establishment of this initiative by selecting contractors and approving the companies responsible for installing these systems in cooperation with the Ministry of Local Government represented by the Municipality of Misurata.

Financing: It is proposed that this project be financed by the government by **50%** while the remaining amount will be in installments through banks.

Monitoring and Evaluation: This initiative will study and evaluate the environmental and social impact and track the benefits of applying energy efficiency in buildings, which contributes to reducing production costs from traditional fuels and other environmental indicators and providing the necessary support for upcoming initiatives.

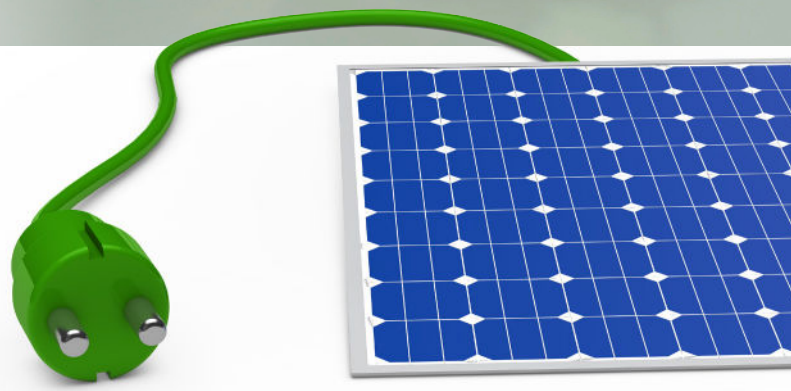
Technical Details

The project will be implemented as priority on universities with the highest share of electricity consumption. Universities will be agreed upon to allocate spaces for ground systems or on the roofs of buildings near power stations. The project involves the installation of about **15.8 MW** of solar photovoltaic energy. It is expected to cover **50%** of the electricity consumption of these facilities. It expected to save about **20.9 million LYD** of the annual fossil fuels consumption utilized by the General Electricity Authority in Libya.



Proposed BM

1. The Design-Build-Finance-Operate-Own/ Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Peer-to-Peer (P2P) Financing
4. Energy Efficiency Utility (EEU)



Implementing Renewable Energy Solutions at Iron and Steel Factories

The project aims to spread the culture of rationalizing electricity consumption by the industrial sector, specifically iron and steel factories. It proposed to apply renewable energy solutions to the building to increase share of the renewable in the grid, thus, reduce dependence on electricity produced from fossil fuels. The Renewable Energy Authority is responsible for the supervision and follow-up of the implementation of REAOL:

Objective: This initiative contributes to ensuring that the citizen does not have power outages and reducing the value of the electricity bill, reducing carbon dioxide emissions, and providing the value of producing this energy throughout the life of the system.

Renewable Energy Authority: The Renewable Energy Authority is responsible for supervising and following up on the establishment of this initiative by selecting contractors and approving the companies responsible for installing these systems in cooperation with the Ministry of Local Government represented by the Municipality of Misurata.

Financing: It is proposed that this project be financed by the government by **50%** while the remaining amount will be in installments through banks.

Monitoring and Evaluation: This initiative will study and evaluate the environmental and social impact and track the benefits of applying energy efficiency in buildings, which contributes to reducing production costs from traditional fuels and other environmental indicators and providing the necessary support for upcoming initiatives.

Technical Details

The project involves the installation of about **49.3 MW** of solar photovoltaic energy. The installed system is proposed to produce about **96.1 million kWh** per year. Thus, it will cover about **20%** of the annual consumption of the facilities which consume about **480.6 million kWh** per year. It's expected to save about **65.3 million LYD** of the annual fossil fuels consumption utilized by the General Electricity Authority in Libya.

Proposed BM

1. The Design-Build-Finance-Operate-Own/Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Peer-to-Peer (P2P) Financing Energy Efficiency Utility (EEU)

Implementing Renewable Energy Solutions at Cement Factories

The project aims to spread the culture of rationalizing electricity consumption by the industrial sector, specifically cement factories. It proposed to apply renewable energy solutions to the building to increase share of the renewable in the grid, thus, reduce dependence on electricity produced from fossil fuels. The Renewable Energy Authority is responsible for the supervision and follow-up of the implementation of REAOL:

Objective: This initiative contributes to ensuring that the citizen does not have power outages and reducing the value of the electricity bill, reducing carbon dioxide emissions, and providing the value of producing this energy throughout the life of the system.

Renewable Energy Authority: The Renewable Energy Authority is responsible for supervising and following up on the establishment of this initiative by selecting contractors and approving the companies responsible for installing these systems in cooperation with the Ministry of Local Government represented by the Municipality of Misurata.

Financing: It is proposed that this project be financed by the government by 50% while the remaining amount will be in installments through banks.

Monitoring and Evaluation: This initiative will study and evaluate the environmental and social impact and track the benefits of applying energy efficiency in buildings, which contributes to reducing production costs from traditional fuels and other environmental indicators and providing the necessary support for upcoming initiatives.

Technical Details

The project involves the installation of about **56.6 MW** of solar photovoltaic energy. The installed system is proposed to produce about **110.3 million kWh** per year. Thus, it will cover about **10%** of the annual consumption of the facilities which consume about **1,103 million kWh** per year. It's expected to save about **75.1 million LYD** of the annual fossil fuels consumption utilized by the General Electricity Authority in Libya.

Proposed BM

1. The Design-Build-Finance-Operate-Own/Transfer (DBFOO/DBFOT) model
2. Energy Performance Contracting (EPC)
3. Peer-to-Peer (P2P) Financing Energy Efficiency Utility (EEU)

Conclusion: Catalyzing Scalable Energy Efficiency Models through Pilot Projects in Jordan, Lebanon, and Libya

The meetMED II initiative, under Activity A5.1.1, was designed to identify, document, and evaluate pioneering energy efficiency (EE) pilot projects across the Southern and Eastern Mediterranean region. The overarching objective is to extract actionable insights from national experiences that can inform scalable and replicable EE business models, thereby enhancing regional cooperation and investment in sustainable energy practices.

Herein, to fulfil this mandate, three pilot projects from Jordan, Lebanon, and Libya were selected and analyzed. These case studies represent geographically diverse and strategically distinct national approaches to advancing energy efficiency through innovative policy, market, and technical instruments. The selection underscores the importance of choosing different projects from different regulatory and socio-economic contexts, thereby offering a comprehensive perspective on the potential for broader replication within the MENA region.

Jordan Strategic Development of the ESCO Market

In Jordan, the government has spearheaded a systemic initiative to cultivate a functioning Energy Service Company (ESCO) market, with a particular focus on industrial electric motor systems. This effort is championed by the Ministry of Energy and Mineral Resources (MEMR) in collaboration with development partners and private sector actors. The project aims to establish a performance-based contracting environment that reduces risk for both ESCOs and end-users, laying the groundwork for long-term market sustainability.

Lebanon Renewable Energy and Energy Efficiency Retrofit of the OEA Building

In a landmark public-private collaboration, the Order of Engineers and Architects (OEA) in Beirut, with support from the European Union and the United Nations Development Programme (UNDP), undertook a comprehensive retrofit of its headquarters. The initiative integrates renewable energy systems (PV panels) and advanced EE measures, positioning the OEA building as a national benchmark for sustainable public architecture. The project would reduce the cooling energy consumption by over 30% saving 166,000 kWh annually around 75 tons of CO2 with payback period of 2.5 years

Targeting the commercial building sector, the retrofit involved optimizing HVAC systems, enhancing insulation, upgrading lighting to LED, and installing a solar PV system. The project not only demonstrates the technical and economic viability of EE retrofits in Lebanon's built environment but also leverages the influential role of the OEA in mainstreaming sustainable design principles among professional engineers and architects.

Libya Household Energy Rationalization in Misurata

In Libya, the Renewable Energy Authority of Libya (REAOL) initiated a pioneering program in the city of Misurata to address residential electricity overconsumption. Based on a detailed assessment of 700 households, the project sought to understand consumption behaviors and implement low-cost, high-impact energy-saving interventions.

Focusing on behavioral change, energy audits, and awareness campaigns, the initiative provides a data-driven foundation for promoting EE in a sector that accounts for a significant share of national electricity use. The program is notable for its engagement and its adaptability to Libya's unique socio-economic conditions.

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