

CASE STUDY

Policy and financial support for REEE rehabilitations

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Energy Smart Mediterranean Schools Network - ESMES project

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1 INTRODUCTION

The ESMES project, which stands for Energy Smart Mediterranean Schools Network, aims to improve the energy efficiency and renewable energy production of public buildings, particularly professional institutes and technical schools, within each country. The project involves active participation from professors and students in various activities. It focuses on three main levels of intervention:

Installation of renewable energy systems: The project supports the implementation of photovoltaic (PV) systems to generate renewable energy in public buildings. Additionally, energy efficiency measures are executed to reduce energy consumption in selected buildings.

School contest: The project organizes a contest in schools to raise awareness about energy-saving issues within the school community.

ESMES project emphasizes collaboration among countries to exchange experiences, improve best practices, and enhance knowledge for the benefit of public institutions, energy policies, and studies.

ESMES is implemented in five Mediterranean countries, involving five partner organizations, in addition to the beneficiary Institute for University Cooperation (ICU): the German Jordanian University (GJU), the Lebanese Center for Energy Conservation (LCEC), the National Agency for Energy Management of Tunisia (ANME), the Ribera Consortium of Valencia (CRIB), and the Alcamo Municipality in Italy (Alcamo).

The investments in the ESMES project primarily focus on various types of educational buildings and centers, such as vocational schools and primary schools. The entire school community, national energy hubs, as well as other public entities like local authorities, and private stakeholders such as SMEs, collaborate in designing and executing renewable energy and energy efficiency (REEE) investments.

This case study aims to highlight the partner countries' existing policies and financial support for renewable energy and energy efficiency. It provides an overview of the measures and initiatives in place to promote and incentivize the adoption of sustainable energy practices. The focus is on how these policies and financial support mechanisms contribute to the successful implementation of renewable energy and energy efficiency projects within the partner countries.

2 SCOPE OF THE DOCUMENT

This document aims to provide a comprehensive overview of the policies and financial support mechanisms in place among the partner countries to promote renewable energy and energy

efficiency. It focuses on the specific scope of policy measures and financial incentives related to sustainable energy practices. The document covers the following key areas:

It is important to note that the scope of this document is limited to the partner countries involved in the ESMES project. While efforts have been made to provide up-to-date and accurate information, the policies and financial support measures described are subject to change as governments and institutions update their frameworks and initiatives.

3 CASE STUDIES ON REE PROJECT PORTFOLIO SOLUTIONS FOR ENHANCED ENERGY REHABILITATION

ESMES project partners have jointly developed the following case studies where policy and financial support for REEE rehabilitations in partners territories have been collected thanks to cross-border cooperation work.

3.1 ITALY – MUNICIPALITY OF ALCAMO

ENERGY CONSUMPTION PATTERN

Italy is currently confronted with the challenge of an energy consumption deficit. In 2021, 74.9% of the energy was imported.

In 2021, the demand for electricity in Italy surged to 317.6 TWh, representing a notable growth of 5.5% compared to the previous year. During the same period, wind energy experienced a remarkable milestone by achieving its highest production, generating nearly 21 TWh of electricity.

POTENTIAL FOR REEE REHABILITATION

Renewable energy sources (RES) were widely used in 2021 for both electricity production, heat production, and in the form of biofuels; overall, the share of RES in the total final consumption is estimated at around 19%.

MEASURES TO REDUCE IN ENERGY CONSUMPTION AND THEIR IMPACTS

The Municipality of Alcamo made a strategic decision, to promote energy efficiency measures, by joining the Consip "Servizio Luce 4" convention. Enel X Global Retail, a leading company in energy supply and efficiency, was awarded the relevant tender. Under this agreement, Enel X will manage the public lighting system for nine years. In addition to regular maintenance, Enel X will carry out interventions at its expense to enhance the energy efficiency of the municipal lighting stock by 2024. These interventions involve replacing old fixtures with LED fixtures, replacing electrical

control panels and outdated supports, as well as upgrading power lines. The anticipated outcome is annual energy savings of 3,761,979 kWh.

POLICIES OR REGULATIONS TO ENCOURAGE OR MANDATE REEE

The city council approved the Sustainable Energy and Climate Action Plan (PAESC) on August 4, 2021. The plan outlines the strategy for promoting energy conservation, increasing energy efficiency, and adopting renewable sources. By 2030, the administration commits to reduce GHG emissions by 40 (as envisaged by the European Union through the Covenant of Mayors), involving citizenship and stakeholders in the implementation phase.

Recall that urbanized areas are responsible for more than 40% of greenhouse gas emissions from human activities, so adhering to the Covenant of Mayors and preparing the PAESC means for the Administration to formally commit to reducing, as specified above, at least 40 % of climate-changing emissions derived from energy consumption related to its area of responsibility.

This important document represents a new starting point for planning future investments.

In the coming years the challenge for everyone, public bodies, companies and citizens, will be environmental sustainability. If we do not become aware that, often our habits harm the environment, we will miss great opportunities. In the near future, many of the financial resources allocated to public administrations will be directed toward projects that aim to increase energy efficiency, reduce emissions and mitigate environmental risks. These resources will open doors to new and more innovative business activities and opportunities for our children.

FINANCIAL INSTRUMENTS SET TO SUPPORT REEE AND BARRIERS TO ACCESSING FINANCIAL SUPPORT The Italian state, through the European Union, provides non-repayable grants to municipalities for projects related to energy efficiency and sustainable territorial development. The allocated funds amount to 500 million euros and are distributed among municipalities based on their population. The grants can be utilized for various purposes, including energy efficiency works in public lighting, public buildings, and the installation of renewable energy production systems. The funds also support sustainable territorial development, such as sustainable mobility, retrofitting of schools and public buildings, and the removal of architectural barriers.

PLANS FOR SCALING UP THE ADOPTION OF REEE

The municipality of Alcamo is actively participating in state and European energy efficiency calls, aiming to reduce energy consumption, adopt more energy-efficient practices, and increase participation in energy efficiency projects. These initiatives involve citizens, businesses, and the

municipal government. The City Council's approval of the Sustainable Energy and Climate Action Plan serves as a foundation for future investments and reinforces the municipality's commitment to environmental sustainability.

3.2 SPAIN – Valencia Region

ENERGY CONSUMPTION PATTERN

In the Valencia region, the primary energy consumption in 2020 was 10 Mtep (Million tons of oil equivalent), of which 33,5% is due to petroleum, 28,6% natural gas, 23,5% nuclear power, 7,3% renewables (RES) and 7,1% imports.

In 2020, the breakdown of final energy consumption reveals the following composition:

- renewables (RES) 5.6%,
- petroleum products 41.9%,
- natural gas 25.9%,
- electricity 26.6%.

POTENTIAL AND TARGET FOR REEE

The Spanish Integrated National Energy and Climate Strategy (INECP) 2021-2030 has set targets for sustainable energy. By 2030, the targets include:

- 23% reduction in greenhouse gas (GHG) emissions compared to 1991,
- 42% share of renewables in energy end-use,
- 39.5% improvement in energy efficiency, and a 74% share of renewable energy in electricity generation.

MEASURES TO REDUCE IN ENERGY CONSUMPTION AND THEIR IMPACTS

Valencia region has a significant potential for solar and wind energy and the promotion of renewable energy sources (RES) has been a primary measure taken to reduce energy consumption.

Besides, efforts are made to reduce energy consumption through energy savings (EE) initiatives, specifically targeting areas such as public lighting and building installations.

Spain ranks as the 10th largest investor in renewable energy globally (2022) according to Bloomberg - Climatescope.

FINANCIAL INSTRUMENTS SET TO SUPPORT REEE AND BARRIERS TO ACCESSING FINANCIAL SUPPORT

To support the adoption of REEE rehabilitation, Valancia region has set various financial instruments available; such as subsidies, tax incentives, and low-interest loans. However, major renovation actions with longer payback periods may face barriers in accessing financial support.

PUBLIC AWARENESS AND SUPPORT FOR REEE REHABILITATIONS

The CRIB (Covenant of Mayors Regional Implementation Hub) provides support to local authorities in the development of sustainable energy plans and action plans, aimed at improving public awareness and support for REEE rehabilitations.

3.3 JORDAN

ENERGY CONSUMPTION PATTERN

According to the latest 2021 Annual Report published by the National Electric Power Company (NEPCO), the available capacity for electrical power generation is 3977 MW and 1579 MW using conventional and renewable energy, respectively (28% RE). As for fuel consumption for electricity generation, 19.9 TTOE, 3114.9 TTOE, and 1.6 TTOE of heavy fuel, natural gas, and diesel were consumed in 2021, respectively. It can be seen that over the past few years, natural gas consumption for electricity generation has dramatically increased, while heavy fuel and diesel consumption is dying out. Additionally, the purchased electrical energy by NEPCO from the various electricity generation plants based on fuel type is distributed as follows: 0.42% from heavy fuel, 77.30% from natural gas, 0.02% from Diesel, 0.93% from oil shale, 0.10% from hydro power, 8.13% from wind energy, and 11.02% from solar energy.

POTENTIAL FOR REEE

Jordan has been a leader in the integration of REEE solutions within the region and there is yet high potential for further infiltration of such technologies. Although there seemed to be higher encouragement for RE systems in the past, recent actions taken by electricity sector key stakeholders, such as capping wheeling systems to 100 kW only as well as imposing tariff fees for owners of RE solutions, the population and investors have become either more conservative when considering RE systems or unable to implement large scale projects. Nonetheless, the Jordan National Energy Strategy 2020 - 2030 has set forth ambitious goals to increase the share of renewable energy share of the entire energy mix from 11% in 2020 to 14% by 2030 and improve the use of energy efficiency in various sectors to 9% by 2030 compared to the average energy consumption in 2018. Therefore, further expansion is expected to be observed in parallel with sectoral reforms. In terms of EE solutions, there has been widespread adoption of such technologies and this is yet to be further expanded as the population has become more aware of the benefits of integrating EE solutions on their electricity bills.

MEASURES TO REDUCE IN ENERGY CONSUMPTION AND THEIR IMPACTS

The integration of REEE solutions is motivated due to multiple factors: the favourable environmental and weather conditions, as well as the enabled governance environment that Jordan has. Jordan is in the earth-sun belt area, which makes it receive a high amount of solar energy with 316 sunny days a year on average. Also, many areas in Jordan are suitable places for the construction of wind power plants due to the arrival of wind speeds between 7 and 8.5 m/s, which are considered appropriate speeds for this purpose. Jordan has also been a pioneer when it comes to passing governance mechanism to support REEE integration.

In order to reduce energy consumption, best practice has shown that integrating EE solutions is the way to go, in addition to raising awareness about energy conservation/saving behaviours. The Project Partner has extensively covered this aspect through the integration of EE solutions within its schools of intervention, as well as facilitated many awareness sessions and activities to introduce the targeted communities to energy conservation/saving behaviours and technologies from both technical and financial aspects.

POLICIES OR REGULATIONS TO ENCOURAGE OR MANDATE REEE

Jordan has passed regulation, set long term strategies for the integration of REEE solutions including, and published supportive guides to encourage and mandate REEE: "Jordan 2025: A National Vision and Strategy," "National Energy Sector Strategy 2020 - 2030," "The Executive Action Plan of Jordan Energy Strategy 2020-2030," "Renewable Energy and Energy Efficiency Law (Law. No. 13 for the year 2012)," "Bylaw No. 73 for the year 2012 on regulating energy conservation and efficiency procedures," "Energy Efficient Buildings Code and Energy Efficient Buildings Manual," and "Jordan Green Building Guide," among many others. More details can be found here:

<https://docs.google.com/document/d/1x2MO0t-OXJ6YtuJYp2b6Bq9RWpGoobh8t6DBgsoqerw/edit?usp=sharing>

KEY STAKEHOLDERS INVOLVED IN THE IMPLEMENTATION OF REEE

- Ministry of Energy and Mineral Resources (MEMR)
- Energy and Minerals Regulatory Commission (EMRC)
- Jordan Renewable Energy and Energy Efficiency Fund (JREEEF)
- Jordan Green Building Council
- National Electric Power Company (NEPCO)
- Three electricity distribution companies (IDECO, EDCO, JEPKO)
- International funds, grants, and donors
- Ministry of Environment (MoEnv)
- Renewable energy developers, operation, and maintenance companies

FINANCIAL INSTRUMENTS SET TO SUPPORT REEE AND BARRIERS TO ACCESSING FINANCIAL SUPPORT

Jordan enforces tax exemptions on REEE solutions. Additionally, the Ministry of Energy and Mineral Resources (MEMR) as part of the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) have introduced programs that offer partial financing for REEE solutions. JREEEF is currently the main public tool for financing the support of EE and RE in Jordan. It offers financing programs within the residential, industrial, public and government buildings, and tourism sectors.

EFFECTIVENESS OF THE CURRENT POLICY AND FINANCIAL FRAMEWORKS IN SUPPORTING REEE

Current policies and financial frameworks are effective in supporting the adoption of REEE as national goals are consistent and streamlined within all national and international efforts. Additionally, the availability of multiple financial support mechanisms further emphasizes this. With such consistent streamlining and resources availability, the uptake of REEE systems has been evident, proving the effectiveness of the present structures.

CHALLENGES FACED ASSOCIATED TO REEE

At this stage, and only recently, some confusion has been observed in terms of the overall national movement in fostering REEE. As mentioned above, recently, key sector stakeholders have placed a cap on wheeling projects (due to grid capacity limitations) and have imposed electricity bill fees for RE system owners. Although the National Energy Strategy still encourages and set high goals for REEE adoption, some confusion has been observed locally as to the government's intentions as imposing capacity caps and fees does not seem conducive to encouraging REEE systems. Intersecting obstacles, such as the country's already overburdened grid, infrastructural shortcomings and prior fossil fuel commitments must be surmounted for the country to maintain its current momentum. Also, challenges such as variability in net load, power quality fluctuations, and intermittency of supply have caused grid instability, which caused electricity distributors to impose additional limitations on the integration of REEE systems.

PLANS FOR SCALING UP THE ADOPTION OF REEE

The National Energy Strategy 2020-2030 has set forth ambitious goals for the adoption of REEE. Additionally, sector stakeholders have been exploring various solutions such as the integration of smart meters and grids, variable tariffs, international electrical interconnection projects with neighbouring countries, and energy storage to tackle grid issues and allow for expansion.

THE CURRENT LEVEL OF INVESTMENT IN REEE

Jordan is one of the leading countries in the Middle East and North Africa (MENA) region in renewable energy adoption and clean energy growth. As of 2021, 28% of the installed generation capacity was from RE powerplants.

PLAN FOR IMPROVING PUBLIC AWARENESS

ESMES Project has worked on raising awareness on the benefits of REEE systems and has invested in rehabilitating multiple public schools. Seeing that the ESMES project is coming to an end, the Project will work with local entities to handover the work done and ensure that previous efforts are continued sustainably.

3.4 TUNISIA

ENERGY CONSUMPTION PATTERN

Tunisia is currently facing significant challenges in its energy sector, with a deficit of 4.8 Mtoe. The country has experienced a 13% decrease in oil production and a 7% decrease in dry gas production compared to 2021.

One of the pressing concerns is the country's energy dependence, with only a 50% rate of self-sufficiency. This figure represents a 6% increase compared to the previous year, indicating a growing reliance on energy imports. The rising deficit in the energy trade balance and the declining production of oil and gas pose substantial challenges for Tunisia's energy security and overall economic stability.

Addressing these energy deficits and promoting sustainable solutions will be crucial for Tunisia's future. It necessitates the implementation of strategies to boost domestic energy production, reduce reliance on imports, and enhance energy efficiency measures. These initiatives are not only vital for ensuring a stable energy supply but also for bolstering the country's economy and fostering a more sustainable and resilient future for Tunisia.

POTENTIAL AND TARGET FOR REEE

The building sector stands as the largest consumer of final energy across all economic sectors, accounting for a staggering 36% share. This sector encompasses residential, commercial, and institutional buildings and plays a significant role in energy consumption and greenhouse gas emissions. Furthermore, electricity consumption within the building sector has emerged as a prominent contributor, representing nearly half of the total energy consumption in 2021.

Tunisia has set ambitious targets to address its carbon footprint and transition towards a more sustainable future. The country has committed to reducing carbon intensity by 45% by 2030 compared to 2010 levels. This goal is crucial in mitigating climate change and ensuring a greener and more resilient economy.

To achieve this target, 75% of the reduction is expected to be generated through the implementation of the national energy transition program. This program focuses on diversifying the energy mix, promoting renewable energy sources, and improving energy efficiency across various sectors.

One key objective in Tunisia's sustainability agenda is to reduce primary energy demand by 30% by 2030, based on the 2010 consumption level. The building sector plays a pivotal role in achieving this target, as it accounts for a significant portion of energy consumption. In addition to reducing energy demand, Tunisia has set a target to reach 35% of its electricity generation comes from renewable sources by 2030. This commitment emphasizes the country's focus on transitioning to a cleaner energy mix, including wind, solar, and other renewable resources. By increasing the share of renewable energy in the electricity grid, Tunisia can reduce its reliance on fossil fuels and significantly decrease carbon emissions.

These objectives reflect Tunisia's commitment to sustainable development and align with global efforts to combat climate change. By implementing effective policies, investing in renewable energy infrastructure, and promoting energy efficiency, Tunisia is taking significant strides towards a greener and more sustainable future.

MEASURES TO REDUCE IN ENERGY CONSUMPTION AND THEIR IMPACTS

Tunisia has implemented various institutional programs and initiatives aimed at enhancing energy efficiency and reducing energy consumption across different sectors. One such program is the mandatory energy audit program, to identify opportunities for improvement. This initiative helps raise awareness about energy efficiency and encourages organizations to implement measures to optimize their energy consumption.

National programs focusing on energy consumption reduction in mosques and public lighting have also been implemented. These programs aim to upgrade lighting systems, promote the use of energy-efficient technologies, and raise awareness about energy conservation within religious institutions and public spaces.

International cooperation projects, such as the Energy Sustainability in the Mediterranean Sea Area (ESMES) project, have played a crucial role in supporting Tunisia's energy transition efforts. These projects facilitate knowledge sharing, technical assistance, and project implementation in the field of energy efficiency and renewable energy. By collaborating with international partners, Tunisia can benefit from best practices and innovative solutions to accelerate its energy transition.

The energy transition program for public institutions focuses on enhancing energy efficiency and sustainability in public buildings, including schools, hospitals, and administrative buildings. By implementing energy-saving measures and integrating renewable energy technologies, public institutions can serve as role models for energy efficiency and contribute to reducing the country's overall energy consumption.

Innovative energy efficiency programs and initiatives have also emerged, aiming to foster technological advancements and behavioral changes in energy consumption.

POLICIES OR REGULATIONS TO ENCOURAGE OR MANDATE REEE

Tunisia has established a robust regulatory framework to promote energy efficiency and the adoption of renewable energy sources. In line with this, it has made it mandatory for tertiary sector establishments with a consumption exceeding 500 tons of oil equivalent (toe) to undergo energy audits. This requirement ensures that large energy consumers in the commercial and service sectors assess their energy usage and identify opportunities for optimization and conservation.

For establishments with a projected consumption exceeding 200 toe, Tunisia has implemented energy audits at the planning stage. This proactive approach enables the assessment of energy needs and the incorporation of energy-efficient measures from the outset, ensuring that energy consumption is minimized and resources are used efficiently.

In terms of electrical appliances, Tunisia has adopted Minimum Energy Performance Standards (MEPS) to regulate the distribution and use of household appliances. MEPS ensure that appliances meet minimum energy efficiency requirements, promoting the use of energy-saving devices and reducing overall electricity demand. This measure encourages consumers to choose energy-efficient appliances, contributing to a more sustainable and environmentally friendly approach to energy consumption.

Furthermore, Tunisia places a strong emphasis on promoting the use of renewable energy for electricity production. The country has implemented various policies and incentives to encourage investment in renewable energy sources. These initiatives aim to diversify the energy mix, reduce reliance on fossil fuels, and mitigate greenhouse gas emissions.

FINANCIAL INSTRUMENTS SET TO SUPPORT REE AND BARRIERS TO ACCESSING FINANCIAL SUPPORT

To support these initiatives, the Energy Transition Fund serves as a financial lever for energy management actions. This fund provides financing for energy efficiency projects, renewable energy installations, and other initiatives aimed at promoting energy conservation and sustainability. By offering financial support, the Energy Transition Fund helps accelerate the implementation of energy efficiency measures and contributes to the country's overall energy transition objectives.

The Fund's focus on renewable energy reflects Tunisia's commitment to diversifying its energy mix and reducing dependence on fossil fuels. By providing financial support for renewable energy projects, such as solar and wind power, the Fund has facilitated the development and deployment of clean and sustainable energy sources in the country. These investments not only contribute to mitigating climate change and reducing greenhouse gas emissions but also promote energy independence and security.

EFFECTIVENESS OF THE CURRENT POLICY AND FINANCIAL FRAMEWORKS IN SUPPORTING REE

The Energy Transition Fund in Tunisia has played a crucial role in supporting renewable energy and energy efficiency projects. Over the period from 2006 to 2020, the Fund has allocated a significant

amount of 309 million Tunisian Dinars (DT) for these initiatives. Out of this total, 64% of the funding has been dedicated to renewable energy projects, while the remaining portion has been allocated towards energy efficiency measures.

To facilitate the development of renewable energy production, in public and private institutions, Tunisia has established a comprehensive regulatory framework. This framework provides a supportive environment for the deployment of renewable energy projects

The combined efforts of the Energy Transition Fund and the regulatory framework have propelled Tunisia's transition towards a more sustainable energy future.

CHALLENGES FACED ASSOCIATED TO REEE

Developing renewable energy and energy efficiency in Tunisia faces various challenges that need to be addressed in order to achieve the country's objectives. One of the primary challenges lies in the need to update the current regulatory framework to better support the development of renewable energy sources.

A major hurdle is the insufficient production of electricity from renewable sources. Despite the efforts made, the current electricity mix in Tunisia still heavily relies on fossil fuels, accounting for over 97% of the total generation. To overcome this challenge, the country needs to accelerate the deployment of renewable energy projects, such as solar and wind power, and reduce its dependence on fossil fuel-based generation. This requires significant investments in renewable energy infrastructure, supportive policies, and incentives to attract private sector participation.

Another challenge is the financial aspect of implementing renewable energy. To address this, Tunisia needs to explore innovative financing mechanisms, such as green bonds, public-private partnerships. Additionally, raising awareness about the long-term cost savings and environmental benefits associated with energy efficiency can help drive adoption and overcome financial barriers.

While Tunisia has made significant strides in promoting renewable energy and energy efficiency, several challenges need to be addressed; updating the regulatory framework, increasing renewable energy production and arising awareness.

PLANS FOR SCALING UP THE ADOPTION OF REEE

Tunisia has a comprehensive plan for scaling up the adoption of REEE measures. Through concessions, PPA mechanisms, regulatory reforms, the utilization of the Green Fund, cooperation projects, and capacity building initiatives, Tunisia is well-positioned to accelerate its transition towards a sustainable and low-carbon energy future. These efforts will not only contribute to reducing greenhouse gas emissions but also foster economic growth, create job opportunities, and enhance energy security for the country.

THE CURRENT LEVEL OF INVESTMENT IN REEE

Tunisia's current level of investment in REEE demonstrates a proactive approach to sustainable energy development. The successful implementation of programs like PROSOL Elec, which aims to equip households with photovoltaic (PV) systems. The program has successfully installed over 170 MW of PV capacity across Tunisia, since its inception in 2010. Tunisia has also implemented the Solar Thermal Promotion Program that has resulted in the installation of over 1 million square meters of solar thermal collectors, associated to the creation of industrial fabric and jobs. Besides, national initiatives supported by the FTE and mandatory energy audits, showcases Tunisia's commitment to diversifying its energy mix, reducing greenhouse gas emissions, and promoting a more sustainable energy future.

PLAN FOR IMPROVING PUBLIC AWARENESS

Tunisia has set a comprehensive plan to improve public awareness for driving sustainable energy practices and fostering a sense of collective responsibility. Through grassroots engagement, awareness campaigns, targeted training programs, and cooperation initiatives in the public sector, we are targeting to educate and empower individuals, communities, and organizations to embrace energy efficiency, renewable energy, and sustainable behaviors.

3.5 LEBANON

ENERGY CONSUMPTION PATTERN

The electricity sector has suffered from a shortage of supply for many years, dating back to the 1970s since Lebanon relies heavily on fuel imports from different countries. Since 2021, electricity supply by the official utility, Electricité du Liban (EDL) decreased to an average of 3–4 hours per day largely because of insufficient cash flow, worsened by sector's structural currency mismatch (EDL's retail tariffs, which are in Lebanese pounds (LBP) have fallen to less than US\$ 1 per kilowatt hour (kWh) because of the significant depreciation of the currency in the past 1-2 years) and challenges in securing foreign currency to pay for the bulk of EDL's costs denominated in USD. Following that, and for a period of time, the electricity supply further decreased to 0-1 hours per day till February 2023.

As for the consumption, there is a severe mismatch between supply and demand. EDL estimated that it supplied only 59% of demand in 2016 and 67% of demand in 2017, with most of the remainder supplied by private generators at higher tariffs

In total, EDL has approximately 2,200 MW of generating capacity whereas EDL's estimated peak demand is around 3,500 MW (and is likely even higher). This results in significant shortage of generating capacity.

Lebanon relies on imports to satisfy its energy demand. In terms of primary energy, consumption is met using the following six major components: liquid petroleum gas (LPG), gasoline, gas oil, kerosene, fuel oil and bitumen.

In 2020, “EDL’s share of total electricity generation equaled 12.50 TWh while the solar PV share equaled 0.13 TWh or 1.03% of total electricity generation (up from 0.73% in 2019).

With solar PV added to Hydro and Biogas, the share of renewables of the total annual electricity generation in 2020 reached 9.27%.” As per Lebanon's Solar PV Status Report 2020.

POTENTIAL FOR REEE

Lebanon’s commitment to scaling-up the use of renewable energy technologies is fortified by ongoing updates to its renewable energy targets. A new target aiming to meet 30% of electricity mix from renewables by 2030 has been set in 2018. Therefore, Lebanon ‘s renewable energy defines the total capacities for each technology to reach the 30% target by 2030 as follows: 473 MWp for hydro, 450 MWp for wind, 300 MWp for large scale solar PV, and 150 MWp for distributed solar PV.

To date, total installed renewable energy is 286 MW from hydropower sources, 7 MW from landfill and 800 MW from solar power.

MEASURES TO REDUCE IN ENERGY CONSUMPTION AND THEIR IMPACTS

The National Energy Efficiency Plan for Lebanon (NEEAP 2016-2020), has stressed in its second initiative on the importance of the adoption of an Energy Conservation Law.

The proposed law includes provisions related to energy conservation in both the public and the private sectors. Its ultimate goal is to decrease the energy consumption by enforcing the use of energy efficiency measures in Lebanon, with a focus on the development of energy efficiency policies and their proper implementations. The project law was approved by the council of ministers and shared with the Lebanese parliament for discussion and voting.

POLICIES OR REGULATIONS TO ENCOURAGE OR MANDATE REEE

Net metering was applied in Lebanon following a decision of the Board of Directors of EDL since 2012. The net metering scheme further encourages people to install renewable energy systems. In 2019, the Ministry of Energy and Water has decided to develop the legal framework and administrative protocols for net metering in all its facets

A steering committee, including representatives from MEW, EDL and LCEC, has been established in May 2019 to guide European Bank for Reconstruction and Development (EBRD) efforts in developing a distributed renewable energy law (DRE).

This law sets a basis for stimulating distributed renewable energy production by founding the main principles for the realization of projects using net metering in all its forms, and peer-to-peer (distributed) renewable energy trading through direct power purchase agreements and/or renewable energy equipment leasing. The draft of the law has been approved by the council of ministers, transferred to the Lebanese Parliament where it was discussed and amended by the committee of public works, transport and energy. It should be voted soon by the General Assembly.

KEY STAKEHOLDERS INVOLVED IN THE IMPLEMENTATION OF REEE

Several entities are involved in the implementation of REEE measures in Lebanon. Starting with the Ministry of Energy and Water through national RE projects and setting a reassuring regulatory framework. The Lebanese Center for Energy Conservation (LCEC) being the nation energy agency in Lebanon. LCEC's mission is to lead the efforts of Lebanon in the development of Energy Efficiency and Renewable Energy to increase energy security and de-carbonization levels, by proactively developing policies, implementing projects, and shaping the market in harmony with the global sustainable energy transition.

Other stakeholders are solar energy companies, suppliers and installers of those systems. And finally, the funding entities who can greatly speed up the implementation rate of solar PV systems through their funds.

FINANCIAL INSTRUMENTS SET TO SUPPORT REEE AND BARRIERS TO ACCESSING FINANCIAL SUPPORT

The National Energy Efficiency and Renewable Energy Action (NEEREA) initiative.

Developed in collaboration with the central bank of Lebanon (BDL), this facilitates the provision of low interest rate loans for all renewable energy applications and energy efficiency projects, with a loan ceiling of USD 10 million per project and a maximum term of 14 years – including a grace period of between six months and four years. Unfortunately, and due to the ongoing economic crisis, the initiative has been discontinued since 2019.

A new financing mechanism was launched in June 2022 by “Banque de L’Habitat” offering loans for solar photovoltaic systems to middle and low-income Lebanese citizens, with a repayment period of 5 years at an interest rate of 4.99%. To ensure high-quality installations, the LCEC acts as the technical arm of the bank in reviewing and filtering solar projects submitted for financing.

It is important to note that in Lebanon imported solar PV panels and some types of inverters are exempted of custom duties, to encourage people to further install solar PV systems. The implementation procedure of a new decision of the Council of Ministers is currently being proposed and it includes all components of a solar PV system.

EFFECTIVENESS OF THE CURRENT POLICY AND FINANCIAL FRAMEWORKS IN SUPPORTING REEE

The NEEREA financing scheme, designed to incentivize the market, has achieved remarkable success. Having financed more than 938 projects as of March 2019 it also signals the commitment and interest of both the public and private sectors to the deployment of renewable energy projects.

In 2002, Law 462 included restructuring and unbundling the sector and creating an Electricity Regulatory Authority (ERA). This restructuring was intended to liberalize the generation and distribution segments of the sector under private sector management while ensuring independent oversight by ERA under the policy guidance of MEW, to regulate and set tariffs, issue licenses and authorizations, and ensure transparency and competition.

CHALLENGES FACED ASSOCIATED TO REEE

Lebanon has been enduring multiple crises since 2019, including devaluation of the currency causing economic collapse, political instability, COVID-19 pandemic, and severe shortage in electricity, fuel, and internet supply.

The abovementioned factors have led to pausing the progress of several national large-scale renewable energy projects.

PLANS FOR SCALING UP THE ADOPTION OF REEE

As per the national emergency plan aiming to provide eight to ten hours of electric supply by day, as part of the new electricity sector policy paper, a new tariff has been issued, starting February 2023. The price of the first 100 kilowatt hours (kWh) consumed is 10 cents per kWh, while every kWh after those costs 27 cents, based on the central bank's Sayrafa rate, which is continuously updated. Compared to the tariff in the 1990's, where the kWh was between \$0.02 to \$0.13. This step aims at eventual increase in power supply and help to stabilize the country's electricity sector. The tariff will be revised every month, or two, based on the actual cost of power generation, taking into consideration global oil prices. Therefore, increasing tariffs and reducing electricity subsidies may encourage public and private investments in renewable energy projects and allow for the proliferation of renewables through small- and medium-scale deployment.

Furthermore, the Lebanese Minister of Energy has signed contracts with 11 companies in the private sector to build solar power stations with a 15-megawatt capacity per station.

The ministry also signed three Power Purchase Agreements (PPA) with three private sector developers to build 226 MW of wind farms in the North region.

THE CURRENT LEVEL OF INVESTMENT IN REEE

Lebanon had been facing significant economic and political challenges, which might impact the investment in renewable energy and energy efficiency. However, Lebanon has recognized the importance of renewable energy and energy efficiency to address its energy security and

environmental concerns. The country aims to increase the share of renewable energy in its total energy mix. However, the progress has been relatively slow due to various challenges, including the lack of financial resources, political instability, among others.

In terms of investment, Lebanon has received funding and technical assistance from international organizations.

On a small-scale solar PV project, Lebanon observed a boom in installing solar PV systems with around 100 MWp installed in 2021 and 660 MWp installed in 2022.

PLAN FOR IMPROVING PUBLIC AWARENESS

The work of LCEC includes a multi-layer approach: technical support, legal and institutional development, awareness raising, capacity building, and financial mechanisms and incentives.

As such, and since awareness raising is part of LCEC's role, an ongoing effort is put in this matter. The LCEC team is conducting several types of trainings, technical assistance, and knowledge-sharing to empower local communities with different entities through the year. A national awareness raising campaign is also being prepared and will be published soon.

4 COMMON RECOMMENDATION AND LESSONS LEARNT

Project Partners have identified the following common lessons learnt:

- Strengthening the current policy and regulatory frameworks to promote and sustain REEE rehabilitations,
- Planning is essential for successful REEE rehabilitations, including conducting feasibility studies, identifying potential risks and challenges, and developing a comprehensive project plan.
- Implementing a dedicated financial scheme that involves the installation of photovoltaic systems across all municipal properties is a highly recommended approach due to its proven ability to substantially reduce electricity consumption.
- The adoption of REEE in the transport sector presents considerable challenges that need to be addressed.
- Skill development/upskilling, awareness raising campaign and the allocation of great importance to investments in renewable energy sources should be highlighted,
- Engaging stakeholders and working together, developing and implementing effective action plans for adopting energy efficient and renewable energy technologies
- Creating strong partnerships and ties with key stakeholders in both the private and public sector can facilitate knowledge exchange related to REEE systems as well as facilitate actions towards REEE integration.

- Working with public schools entails strong collaboration with not only the school administration and community, but also the Ministry of Education. This is because decisions related to public schools must be made by the Ministry. In Jordan, ministries are typically the decision-making, policy-making, and tendering bodies; therefore, all decisions related to schools must be made/approved by the Ministry of Education. Thus, strong communication and partnership building with the Ministry (in addition to the school administration) is essential whenever public schools are targeted.