AUB American University of Beirut
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Issam Fares Institute for Public Policy and International Affairs
معهد عصام فارس للسياسات العامة والشؤون الدولية

Natural Resource Governance Institute

WHAT DRIVES SOLAR ENERGY DEVELOPMENT?

Evidence from Lebanon, Jordan, and Yemen

Documentary Team

Marc Ayoub, *Associate Fellow, IFI-AUB*
Neil McCulloch, *Director, The Policy Practice*
Mayssa Otayek, *Intern, Energy Policy and Security Program, IFI-AUB*

Regional Experts

Amjad Kashman, *Energy market specialist, Jordan*
Abeer El-Eryani, *Doctoral Researcher, Sustainability Transitions, Yemen*

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INTRODUCTION

Lebanon continues to plunge into one of the world's worst economic crises since the mid-1800s (World Bank, 2021). The collapse of the economy has pushed the majority of the population into poverty, whose money has plummeted in value as the cost of nearly everything has skyrocketed. Annual inflation reached 206% in April 2022 (The National News, 2022), while real GDP is estimated to have declined by 10.5% in 2021, on the back of a 21.4% contraction in 2020. Lebanon's GDP was a mere USD 21.8 billion in 2021 from around USD 52 billion in 2019, the largest recent contraction among 193 countries worldwide.

While a staff-level agreement was reached with the International Monetary Fund (IMF) in April 2022, solutions are yet to materialize. A full-fledged IMF agreement still awaits much-needed reforms, one of the most important being for the electricity sector. This was one of the first sectors to reflect the depth of the economic collapse since early 2020. Lebanon's electricity system has aging infrastructure operating on shrinking imports of expensive heavy fuel oil and gas oil, and a deteriorating grid with high technical and non-technical losses. The result has been ever-increasing hours of blackouts. This has led to increasing reliance on the network of private generators running on diesel; since the removal of fuel subsidies, electricity has become expensive and unaffordable for most Lebanese families.

One of the few positive outcomes of the crisis has been a rising awareness among citizens and communities of the importance of Renewable Energy (RE) – and solar energy systems in particular – as a tool to reduce dependence on diesel and avoid long hours of blackouts. Since early 2021, these systems have spread across the country, installed by small and medium-sized businesses, shops, and anyone able to afford them.

However, this growth has been accompanied by numerous challenges. Although the government has tried to organize and regulate this rapidly-evolving sector, whether by implementing a process for the issuance of permits or leveraging financing mechanism to support these systems, the sector remains largely unregulated. As a result, providers often use unreliable or incompatible equipment that can harm the long-term efficiency and viability of such systems. Moreover, the social acceptability of solar energy is still a matter of debate, which also affects the speed of the energy transition[1].

The Issam Fares Institute for Public Policy and International Affairs (IFI) at the American University of Beirut (AUB) and the Natural Resources Governance Institute (NRGI) have joined forces to shed light on citizen-led initiatives driving the energy transition during this time of crisis through the production of ***Chasing the Sun***. This documentary aims to contribute to an advocacy and awareness campaign to help citizens understand and implement best practices when it comes to the development of solar systems, as well as decision-makers to adopt the necessary regulations for this sector to grow. It highlights the obstacles faced to develop the sector and explains where Lebanon stands compared to other countries in the region that witnessed a remarkable boom in solar generation during crises or immediately thereafter.

The documentary team conducted interviews with a wide range of stakeholders in Lebanon, including energy experts working on the financial, legal and policy issues, solar energy businesses involved in implementation, as well as consumers with the means to install solar energy systems.

This policy brief examines the drivers of renewable energy development in Lebanon, policy challenges to the development of the sector, case studies from Jordan and Yemen, as well as lessons learned for Lebanon.

1 Social acceptability refers to the capacity of residents and communities to adopt a new technology in relation to its cultural frame (Meyer-Abich 1999, 309). Acceptability takes place as discussions between different stakeholders in a given socio-cultural background, eventually reaching political importance.

WHAT DRIVES RENEWABLE ENERGY PENETRATION?

An in-depth review of the literature shows that the growth of RE depends on a set of policy, economic, environmental, social, and geopolitical drivers.

Policy instruments at the national level have a significant impact on the drive towards greater RE adoption. Case studies have shown that instruments like feed-in tariffs[2], renewable portfolio standards[3], market deployment policies, energy subsidies, tenders and tax incentives are effective mechanisms for stimulating the deployment of RE sources as facilitators of both supply and production (Bird, et al., 2005; Sardianou & Genoudi, 2013; Makki & Mosly, 2020; Kilinc-Ata, 2016; Carley, et al., 2016; Gan & Smith, 2011). Regional policy instruments can also promote RE such as EU directives[4] (Marques, et al., 2011) that are binding on member states, as well as some country-specific measures including subsidy reforms to reduce interference in price regulation and decrease government expenditure (Luthra, et al., 2016), a carbon tax (Hao & Shao, 2021) and improvements in energy governance structure (Fatima, et al., 2021).

Economic considerations play an important role in driving RE penetration. These are mainly linked to international oil prices, technology prices, market structure and dynamics, as well as to financial incentives and country GDP. In fact, countries with well-developed financial markets experience stronger growth in the RE sector due to easier access to external financing (Kim & Park, 2016; Lin & Omoju, 2017). GDP also has a significant effect as countries with a higher GDP emphasize the development of RE (Sadorsky, 2009; Marques, et al., 2011; Gan & Smith, 2011), as they are generally more concerned about environmental issues and have greater financial capabilities than lower income countries. Other market drivers include consumer demand for green power, natural gas price volatility, and wholesale market rules, as highlighted by Bird et al. (2005). Iweh, et al. (2021), also note that the liberalization of the electricity market, as well as the drop in the cost of renewable energy system components act as push factors for RE deployment.

On the ***environmental*** front, the literature explores the impact of climate change vulnerability and carbon intensity on renewable energy deployment. A key driver for RE has been the need to reduce greenhouse gas emissions. Hao & Shao (2021) show countries that are more vulnerable to climate change and have less carbon-intensive economies deploy higher shares of RE in their total energy consumption. Omri & Nguyen (2014) find that increases in CO2 emissions are a major driver of RE consumption. Iweh, et al. (2021), also note that environmental drivers play a significant role in RE penetration, only if backed by strong regulations that require actors in the power sector to meet environmental standards.

Recent literature also shows that ***social factors*** may influence RE dissemination, including education of professionals, training programs and awareness creation (Camacho Ballesta, et al., 2022; Oguntona, et al., 2021). Fatima et al. (2021) shed light on public acceptance, seen in the case of Pakistan to be a key contributor to the growth of RE. In addition, He, et al. (2022), establish that social networks, information diffusion and social pressure play a key role in the adoption of RE technologies.

Finally, the role of ***geopolitics*** as a driver of RE penetration has also been investigated. Geopolitical uncertainty motivates countries to rely on RE sources to reduce the risk of being unable to obtain fossil fuels (Sweidan, 2021a; Sweidan, 2021b). Wang, et al. (2018) find that energy security considerations have positively contributed to the growth in RE consumption in China over the past 20 years. RE integration is particularly relevant for countries that face geopolitical conflicts and are at risk of energy insecurity. A recent example is the Russian invasion of Ukraine, which has increased regional geopolitical tensions resulting in the EU accelerating its transition to RE to reduce its dependence on Russian oil and gas (Vetter, 2022).

Other factors, such as demographic (Nyiwul, 2017), geographical (Anam, et al., 2022; Marques, et al., 2011) and technical factors (system innovation and technology advancement) have also been mentioned as contributors to RE development.

2 Feed-in tariff (FiT) is a price-driven policy for promoting RE expansion whereby the government offers a guaranteed purchasing price for electricity produced from RE sources for fixed periods of time.

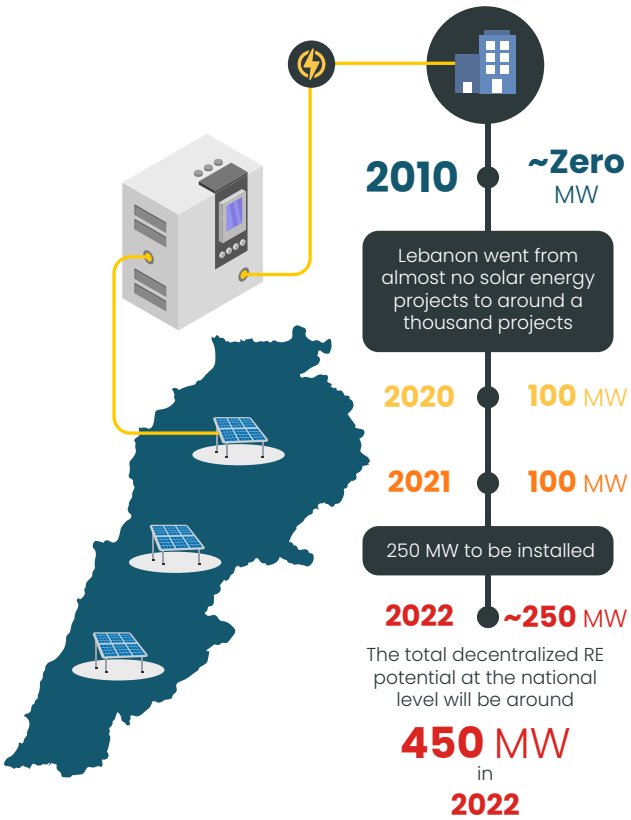
3 A Renewable Portfolio Standard (RPS) is a regulatory mandate to increase production of energy from renewable sources such as wind, solar, biomass and other alternatives to fossil and nuclear electric generation. It is also known as a renewable electricity standard.

4 EU Directive 2001/77/EC of 2001, updated by Directive 2009/28/EC, imposes mandatory targets for member countries to promote strong commitment towards the adoption of renewables.

THE EXPERIENCE OF LEBANON: A DECADE OF CHASING THE SUN

Even before the outbreak of the economic crisis, access to electricity across the country was extremely unequal. These inequalities were exacerbated by the crisis, as the removal of energy subsidies made electricity unaffordable for many[5]. Yet, the solar energy market experienced unprecedented growth in demand since the summer of 2020, as the electricity supply across the country steadily worsened due to acute fuel shortages. Citizens able to afford the cost, with access to cash and/or fresh funds[6] rushed to install solar energy systems.

According to the Ministry of Energy and Water (MoEW), Lebanon went from almost no solar energy projects in 2010 to around a thousand in 2020, with a combined capacity of about 100 Megawatts (MW). Another 100 MW were installed in 2021 alone, and officials expect around 250 MW to be installed in 2022, raising the total decentralized RE potential at the national level to 450 MW. Currently, there are around 130 companies specializing in the solar energy sector.



The growth in the market has been accompanied by a series of government measures including capacity building for engineers and technicians, raising awareness within local communities on the importance of RE, and improving the required specifications for imported solar products to ensure high quality. The government has also set ambitious RE targets for 2020 (12%) and 2030 (30%), although the 2019 share of renewables in total annual electricity generation stood at only 7.83% (combining solar photovoltaics (PV), hydropower, and waste incineration). However, it is clear that the main driver for the growth of RE in Lebanon has been the economic crisis and not government policy.

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Prior to the crisis, the top three sectors leading the solar PV market in installed capacity were the industrial (25.54 MWp), commercial (15.71 MWp), and agricultural sectors (10.56 MWp) (LCEC, 2021). The residential sector was not far behind the agricultural sector but managed to pick up since 2019 and currently leads in the use of solar energy.

An adequate and all-encompassing regulatory framework for RE is still missing. A draft law for Distributed RE generation (DRE Law) was approved by the Council of Ministers (CoM) in March 2022[7] and is pending parliament ratification. This draft law is expected to provide the basis for establishing distributed projects of up to 10 MW. It also promotes net-metering[8] in all its forms, trading through direct power purchase agreements (PPAs), as well as power wheeling[9]. Similarly, the draft Energy Efficiency Law, which was also endorsed by the CoM, aims to promote behavioral changes and the use of more efficient appliances and equipment

5 Energy subsidies consisted of covering the difference between the price of gasoline and diesel based on the official exchange rate and the market price of the Lebanese Pound to the USD. Once the subsidies were completely removed, the prices offered by private generators skyrocketed.

6 Fresh funds refer to foreign exchange deposits that do not pre-date October 2019, having entered the banking system after the outbreak of the crisis.

7 إقرار مجلس الوزراء لمشروع قانون انتاج الطاقة المتجددة الموزعة وإحالته إلى مجلس النواب https://lcec.org.lb/node/4404

8 Net-metering allows a renewable energy plant owner to export excess RE to the Utility grid and benefit from a deduction on its customers' electricity import/consumption bill. The net-metering tracks both energy consumed from the utility grid, and energy exported by the renewable energy system, allowing the utility to bill the customer based on the net electricity consumed during the billing period set by EDL.

9 In electric power transmission, wheeling is the transportation of electric energy from within an electrical grid to an electrical load outside the grid boundaries, e.g., from one region to another.

through a combination of economic policies and incentives (Ayat, et al., 2021). These are expected to complement Law 462 of 2002 (Regulation of the Electricity Sector), which allows the production of renewable and clean energy for personal use up to a maximum capacity of 1.5 MW, without the need for a license from the (yet to be established) Electricity Regulatory Authority (ERA).[10] For larger systems, 11 new licenses for 165 MW of PV capacity (PV Magazine, 2022)[11] were approved in May 2022 by the CoM, as part of a 180 MW solar tender initiated in January 2017 intended for the Bekaa, Mount Lebanon, South, and North Lebanon.

> ***More sustainable financing mechanisms (including micro-financing, loans, and grants) are needed to enable this approach to scale-up.***

With the onset of the economic crisis, the biggest bottleneck has become the inability to secure funds to carry out ongoing, as well as new projects[12]. Prior to the crisis, the banking sector engaged in substantial lending to businesses and individuals through different financial schemes supported by both the central bank (e.g., NEEREA scheme[13]) and international organizations (the GEFF[14] and LEEREF[15] schemes). The loans provided had long maturities at low interest rates and allowed the financing of more than a thousand projects.[16] The total cumulative investments in the solar PV sector increased from USD 2.29 million in 2010 to USD 125.83 million in 2019, 54% of which were funded by NEEREA[17]. Yet, funding for the NEEREA program was halted in mid-2019, prior to onset of the economic crisis. With the recent demand increase for solar systems, Lebanon's Banque de L'Habitat[18] rolled out a new scheme in June 2022 to provide loans for Lebanese households to buy and install PV systems (Tsagas, 2022). Loans range between LBP 75 million[19] and LBP 200 million[20] (Banque de L'Habitat, 2022).

The outburst of interest in solar systems has led to a debate among experts about whether it might be possible to deploy these resources in ways that serve more citizens. In particular, community micro and mini grids[21] have been touted as potentially mitigating the shortcomings of the central government in delivering reliable electricity to Lebanese citizens and institutions. Municipalities have played a key role in this context, although they have also faced major financial difficulties due to the crisis, with limited access to necessary funding[22]. It is estimated that as of June 2021, around nine solar-based community microgrids have been set across the country, according to a joint survey conducted by the UNDP in Lebanon and IFI/AUB in 2021[23]. All of these were installed between 2016 and 2020 with an estimated total capacity of 1,693 kWp[24]. However, most of these projects were financed through grants from international organizations and NGOs, while the rest were carried out through private investments. More sustainable financing mechanisms (including micro-financing, loans, and grants) are needed to enable this approach to scale-up.

10 Following several consecutive amendments to Law 462/2002, ERA powers are now transferred to the CoM, based on the prior proposal of both the MoEW and the Ministry of Finance. (why is this last part relevant?)

11 These include Ecosys-Kaco, Dawtec-Loop-Staunch and Labwe Solar Farm in the Bekaa region; Joun PV, Sibline Solar Farm and E/One in Mount Lebanon; South Power, Rimat 15 and Gds-Et-Nabatiyeh in South Lebanon; and Kfifane Phoenix Power Plant and Elect-Stc-Solistis in North Lebanon.

12 Another major challenge mentioned by one solar company in Beirut (May 2022) is the lack of qualified human resources in the field, whether engineers, technicians or even administrators, many of which have left the country.

13 The National Energy Efficiency and Renewable Energy Action (NEEREA) was a national financing mechanism that allowed private sector entities to get subsidized loans for any type of energy efficiency and renewable energy project. NEEREA was available through any Lebanese commercial bank under the management of the central bank.

14 The Green Economy Financing Facility (GEFF) - Lebanon aimed to provide EBRD financing of up to USD 190 million for on-lending to local commercial banks, and to finance energy efficiency, renewable energy, and resource efficiency projects.

15 The Lebanon Energy Efficiency & Renewable Energy Finance Facility (LEEREFF) consisted of a EUR 80 million global loan provided by EIB (EUR 50 million) and AFD (EUR 30 million) supporting small-scale investments in energy efficiency and renewable energy by private companies in Lebanon, with a particular focus on SMEs.

16 Interview with Energy Financing Expert, April 2022.

17 According to the 2019 Solar PV Status Report for Lebanon.

18 Banque de L'Habitat is 80%-owned by Lebanese commercial banks and 20%-owned by the Lebanese government.

19 Around USD 2,500 when calculated at the 30,000 LBP/USD exchange rate.

20 Around USD 7,000 when calculated at the 30,000 LBP/USD exchange rate.

21 A mini-grid is a set of small-scale electricity generators interconnected to a distribution network that supplies electricity to a small, localized group of customers. It usually operates independently from the national transmission grid.

22 Interview with a Manager at an International Organization, April 2022.

23 A work-in-progress, unpublished report.

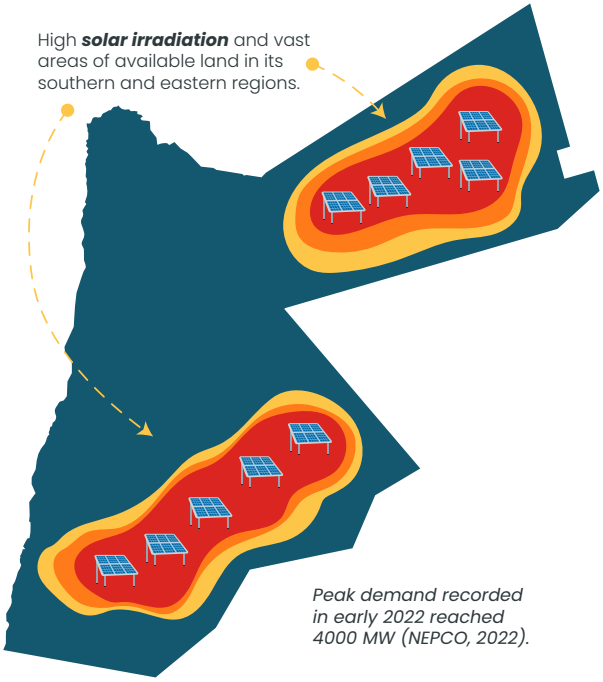
24 This represents around 1-2% of the total installed capacity (around 100 MW) between 2010 and 2020.

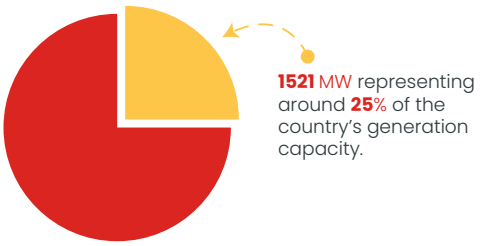
LESSONS FROM SELECTED ARAB COUNTRIES

Jordan

Jordan has built a reputation as a regional leader in the field of renewable energy. The shift to solar and wind resources was a reaction to the regional and global energy supply crises that hit the country in 2008 and 2010. With a robust legal framework, continuous support from international lenders and financiers, and engagement of both the private sector and consumers, Jordan managed to increase its renewable energy capacity to 2171 MW by 2021 (IRENA, 2022).

Solar energy, PV technology in particular, has played a major role in Jordan's energy transition. The country enjoys high solar irradiation and vast areas of available land in its southern and eastern regions. In terms of installed capacity, 1521 MW of solar PV was installed by 2021, representing around 25% of the country's generation capacity. To contextualize, peak demand recorded in early 2022 reached 4000 MW (NEPCO, 2022). However, this level of demand is rare with typical demand ranging between 2000 MW and 3000 MW. Thanks to the relatively high-capacity factors of solar projects in Jordan, solar energy can cover a substantial amount of demand[25] during the daytime most of the year.





The swift transition to renewables in Jordan was supported by solid legal foundations. The Renewable Energy and Energy Efficiency Law of 2012 established renewable energy systems in two parallel streams. The first stream allowed the government to tender large-scale projects under direct proposals. The second stream targeted net metering, giving end-users the right to install solar systems to cover their own demand. This was later extended to allow the installation of systems in locations different than the point of consumption under a wheeling scheme. Other measures to boost renewable energy sources included exemptions from duty and taxation, as well as government guarantees and long-term power purchase agreements for utility scale projects.

The growth of solar energy in Jordan has contributed to the country's development in a number of ways. For example, by creating job opportunities in remote areas, where most large-scale projects are located and that are areas suffering from high unemployment rates. On a macro level, solar energy has attracted millions of dollars of foreign direct investment to the country. Smaller installments under the net metering schemes allowed many consumers and small enterprises to reduce or entirely cover their electricity bills. However, the increase in the solar energy share in the Jordanian electricity mix has not translated into a drop in overall electricity prices[26]. This has highlighted the need for more effective market design as well as holistic planning efforts in the future.

25 The latest data from NEPCO estimates that solar energy could cover around 15% of total electricity demand in 2021.

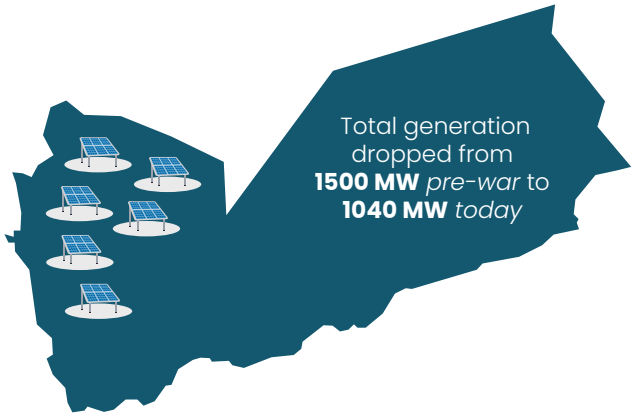
26 This comes as a result of the relatively high price of electricity purchased from the first awarded wind and solar projects in Jordan, as well as the excess conventional generation capacity. Both sources are purchased via long- term take or pay contracts leaving no flexibility for the off-taker and grid operator NEPCO.

Yemen

In 2015, the war in Yemen caused a complete collapse of the public power grid and severe shortages in fossil fuels. Total electricity generation in the capital Sana'a was estimated to have declined from 500 MW pre-war to around 280-350 MW in 2021, due to a combination of small capacity solar PV and a network of diesel-based micro-grids[27]. In government-controlled areas, total generation dropped from 1500 MW pre-war to 1040 MW today (McCulloch, et al., 2021).

As a result of the energy crisis, solar PV system sales and installation experienced massive growth in Yemen (Alsaqqaf, 2017). These conditions led to an estimated household penetration rate of solar PV systems of 75% in urban areas, and 50% in rural areas28. The Regional Centre for Renewable Energy and Energy Efficiency (RECEEE) estimated that around USD 1 billion was spent on solar energy systems from 2014-2017 by citizens and communities. Despite this progress, technical, financial, and political challenges remain (Mahmoud, et al., 2017).

Solar PV is geographically concentrated in the northern parts of the country, particularly in areas under Houthi control, the de facto authorities controlling most of the north and mid-western regions. This was partly driven by the fact that most Houthi-controlled areas were now disconnected from the national grid because of the destruction of transmission infrastructure due to the war, the difficulty of maintaining generation and distribution infrastructure, and the fact that the exchange rate has been more stable in these areas to install solar PV.



Furthermore, the electricity crisis and war conditions have provided the dominant players in Houthi-controlled areas a level of political leeway to introduce unpopular policies. These have included the removal of fuel subsidies, as well as full liberalization of the electricity sector including tariffs and expanding the role of the private sector. This has enabled providers to charge cost-reflective tariffs making the provision of electricity profitable.

The spread of solar systems in Yemen since 2015 can be divided into two phases. The first phase, 2015-2017, triggered by the initial electricity crisis, was dominated by the demand for Solar Home Systems (SHS) including solar panels and water heaters. Local authorities adopted a hands-off approach leading many actors to enter the sector, which limited control over the quality of imported products. From 2018, the demand for SHS declined significantly, while a subset of Solar PV products, such as Solar Powered Irrigations Systems and Pico Systems gained a larger share, driven by humanitarian aid and other international donor interventions.

The declining demand for SHS stemmed from several factors including:

- **User expectations:** because of poor quality, misuse, poor system design or unrealistic expectations due to a lack of information.
- **Economic factors:** including a significant decline in purchasing power due to the depreciation of the Yemeni riyal.
- **Political factors:** due to institutional and organizational fragmentation leading to:
  - Poor coordination between government agencies located in different regions controlled by different parties
  - Duplication of fees, imposed by each jurisdiction, leading to increased costs for consumers and investors
  - Overlap with the market for fuel, particularly imported diesel, which is a significant part of the war economy

Notwithstanding these challenges, the diffusion of solar PV resulted in a number of positive outcomes including: **(a)** increased societal awareness of more sustainable alternatives, **(b)** the creation of job opportunities and the formation of technical networks, and **(c)** the establishment of new technical training and research programs in universities and scientific institutes.

27 Data from the de facto authority-controlled Public Electricity Corporation (PEC) in Sana'a.

28 As reported by the Regional Centre for Renewable Energy and Energy Efficiency (RECEEE), in collaboration with the World Bank Yemen Energy Emergency Access Project.

LESSONS FOR LEBANON

Several lessons can be drawn for Lebanon from the experience of Jordan and Yemen. The experience of Jordan shows that:

1. Legal and regulatory frameworks serve as the foundation for renewable energy growth
2. Government support in the form of guarantees and purchase agreements is essential for bankable projects that attract the private sector and international donors
3. End users play an important role in driving the energy transition when suitable schemes are implemented, including net metering
4. Strategic holistic planning of the energy sector is essential to ensure a smooth transition to green technologies

The diffusion of Solar PV in Yemen and Lebanon share several characteristics. In both cases, the uptake of Solar PV was the outcome of an energy crisis coupled with economic and political instability. Sales were led by household demand with minimum government intervention. Remittances as a way to finance solar energy is also believed to have been an important factor in both countries, particularly in the early stages (Shabaka, 2021).

> ***Individual initiatives implemented with regards to solar energy in Lebanon may be sufficient for now, but these are not necessarily sustainable. Indeed, it is better to move towards community solutions that reduce the clutter created by scattered and disordered individual actions.***

While private and public investments in Solar PV remain modest in both countries, the scale of the diffusion that occurred in a relatively short period of time, indicates the need for policies to:

- support the creation of an integrated market along the local value chain level
- facilitate the exchange of knowledge and experiences outside the scope of traditional actors to include wider community representatives
- create information hubs/platforms and facilitate dissemination of information on RE
- strive to balance short-term priorities and future strategic energy objectives

A key factor influencing the pace and quality of solar PV diffusion in all three countries has been the political context. Jordan has a reasonably stable and efficient political system that allows government to function, take decisions, and make progress when it comes to RE developments. This is not the case in Yemen. Solar PV development in Houthi-controlled areas increased because electricity was priced as a commercial commodity and private actors were allowed to supply it. However, effective diffusion of solar PV across the country requires a negotiated peace process building on the existing ceasefire that has been recently reached in the country.

> ***There is a necessity to support Electricite du Liban (EDL) in doing its job. EDL is the backbone of the electricity and energy sectors and as such, to accomplish its objectives and provide efficient electricity and energy solutions to the Lebanese population, it needs to be strong and independent.***

The case of Lebanon resembles the experience of Yemen much more than Jordan. While not being at war, Lebanon faces a deep-rooted political and financial crisis, which was already in desperate need of electricity reforms stalled due to lack of political consensus. Although the example of Yemen shows that some progress can be made based on individual RE initiatives, ultimately a functional electricity system requires an effective state to provide the framework and security for investments in renewable energy.

RECOMMENDATIONS

At the national level

Solar energy can be an important part of the solution to Lebanon's energy crisis and should play a central role in long-term energy planning. There is huge potential for solar PV as well. However, current initiatives are individual, unorganized, and fragmented. Greater impact could be achieved through larger-scale community and government initiatives that serve more people and bigger geographical areas.

Achieving this will require a bigger role for the government and better public-private cooperation in the following areas:

Legal

- Ensure the quality of imports and regulate the behavior of private service providers to protect consumers.
- Strengthen the legal and regulatory frameworks to serve as the foundation for renewable energy growth. This includes passing the Distributed Renewable Energy (DRE) and Energy Efficiency (EE) draft laws to facilitate the development of the sector and enhance the viability of larger schemes.
- Establish a national battery recycling scheme for citizens and private providers to adopt batteries' end-of-life management.
- Develop a certification and accreditation system for private providers to ensure the quality of services provided.

Financing

- Restore confidence and financial and macroeconomic stability in the country by implementing needed reforms to attract funding for renewable energy projects.
- Establish a sustainable financing mechanism for solar PV with the support of donors and other international financing institutions.

Institutional

- Appoint an independent regulator to license and oversee future renewable energy projects in line with the MoEW's long-term vision and strategy. oblige
- Require future community initiatives to connect to a strong electrical backbone run by the national grid and managed by national utility Électricité du Liban (EDL) (potentially the future national transmission company, as per Law 462/2002). Therefore, improving the independence and quality of services provided by EDL is essential.

At the citizen level

- Consult with well-established private providers of solar services prior to installing a system and ensure quality of installed equipment.
- Abide by the guidelines issued by relevant local institutions on the supporting metallic structures of solar systems.
- Identify the ultimate use of the solar system prior to installation to ensure appropriate system sizing.

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Issam Fares Institute for Public Policy and International Affairs American University of Beirut P.O.Box 11-0236 Riad El-Solh / Beirut 1107 2020 Lebanon

Issam Fares Institute Building AUB

961-1-350000 ext. 4150

+961-1-737627

ifi.comms@aub.edu.lb

www.aub.edu.lb/ifi

aub.ifi

@ifi_aub