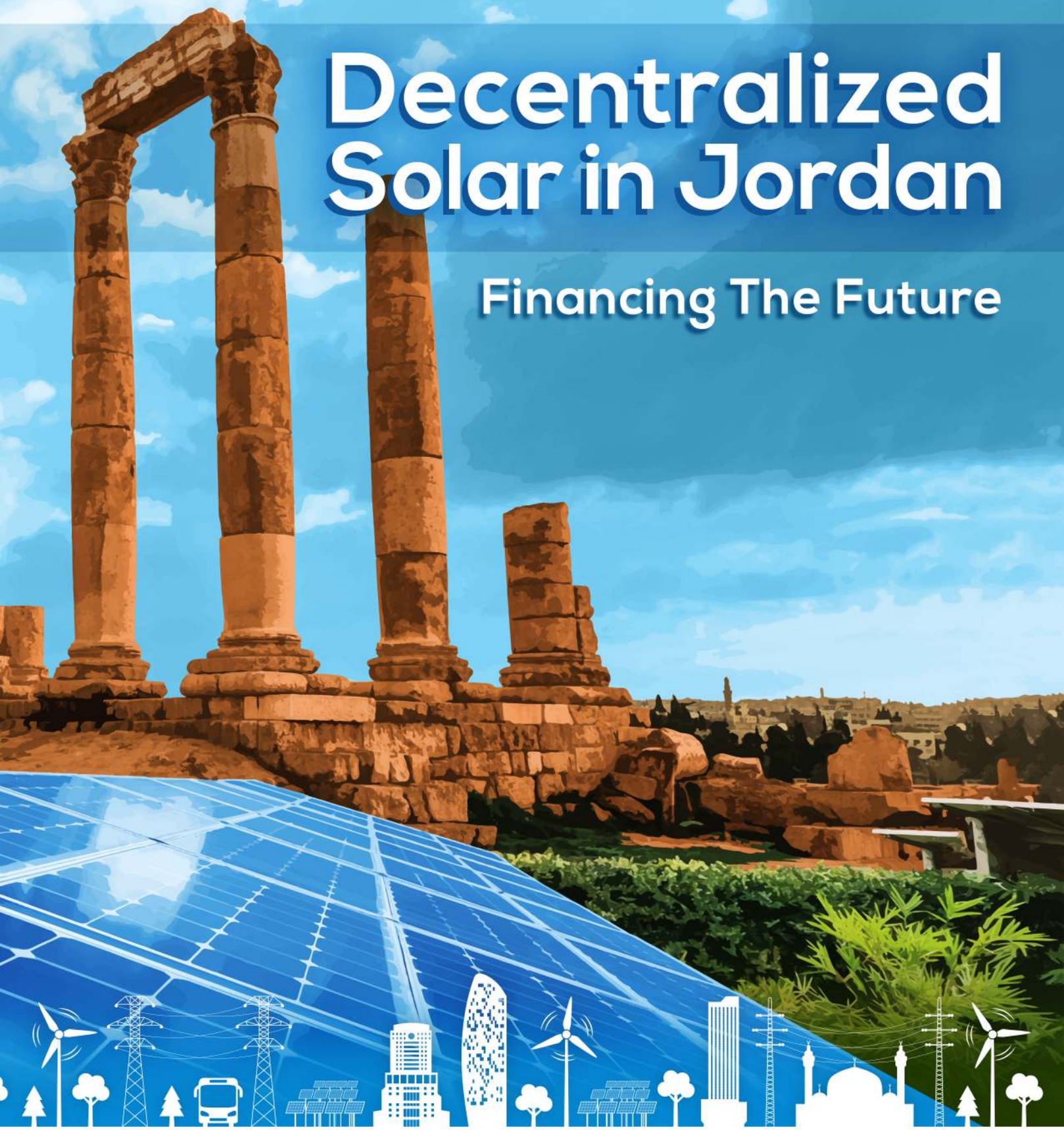
Decentralized Solar in Jordan

Financing The Future



Report to the Friedrich-Ebert-Stiftung | January 2021

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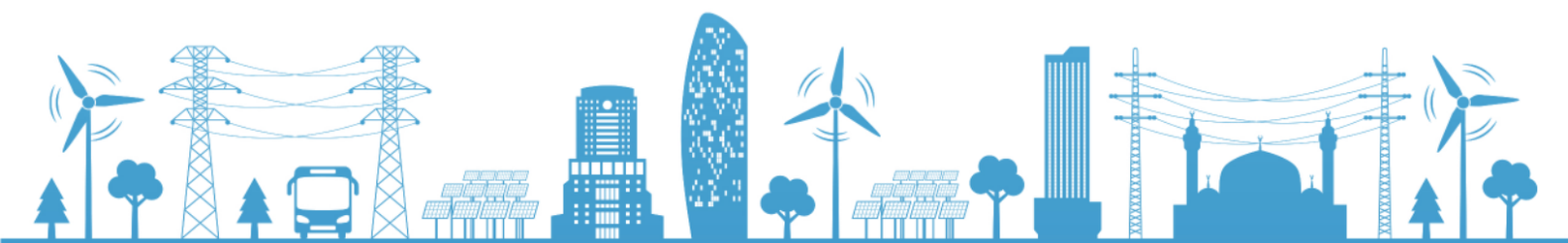

Title: Decentralized Solar in Jordan - Financing The Future
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Published by: Friedrich-Ebert-Stiftung Jordan & Iraq

ISBN: 978-9923-759-26-4

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Acknowledgements:

EDAMA, Finergreen and SolarPower Europe would like to extend special thanks to the Friedrich-Ebert-Stiftung for its support to this project and to Samer Judeh ,Hana Zaghloul, Maher Matalka, Basel Tahboub, Aseel Rayan (EDAMA), Mohammad Ramadan (SEED), Rasmi Hamzah and Yafa Jeaidi (JREEEF), Alaa Ledawi (MASE), Noor Alheeh and Tariq Almuhaissen (CBJ), Fadi Marji (Izzat Marji group), Hana Zaghloul and Mahmoud Salameh (Kawar group), George Hanania (Hanania group), Emil Alasis (REEE II TA, EU), Wael Bayyari (Capital Bank), Haitham Foudeh (Arab bank), Ghaith Assamak (EBRD), Hamza Abdeen (World Plastics for Construction Industries), Maen Ayasreh (JCI), Bader Alsafadi (Firas Press), Hana Abu Qdairi (Alnojom Alssatiea Association), Lubna Kherfan and Yazid Ammari (Cairo Amman Bank), Mohammad Ayasreh (Darb Alsafsaf Association).

EDAMA is a Jordanian business association that was founded in 2009. The word EDAMA was derived from the Arabic word, which means sustainability. The association envisions Jordan as the regional hub and successful model for green growth, furthermore, it's an NGO recognized for creating a thriving green economy. EDAMA empowers businesses to play a leadership role in transforming Jordan's energy, water, and environment sectors.

Finergreen is an international financial advisory boutique specialized in the renewable energy sector (solar, wind, hydro, biomass and storage). Founded in 2013, the company has completed EUR 2.1 billion of transactions over more than 6 GW of assets. With a team of 50+ people based in Paris, Dubai, Singapore, Mexico, Abidjan, Nairobi, Madrid and Budapest the company operates through 3 main segments: Project Finance, Mergers & Acquisitions, Strategic Advisory.

Friedrich-Ebert-Stiftung is the oldest German political foundation and advocates for the advancement of social democracy. Through its Jordan based Regional Climate and Energy Project MENA, it brings together government representatives with civil society organizations, supports research and provides policy recommendations, to promote and achieve a socially just energy transition and climate justice for all, in the MENA region.

SolarPower Europe is the voice of the solar industry in Europe, with more than 200 members active along the whole solar PV value chain. Awarded Overall Best European Association at the European Association Awards in 2019, SolarPower Europe's mission is to shape the regulatory environment and enhance business opportunities for solar in Europe and beyond. It develops award winning business intelligence and best practices reports on markets, industry and technologies, informing its members and external stakeholders on the latest trends of the solar PV industry.

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3.0: ACRONYMS

Acronym	Description
ACC	Agricultural Credit Corporation
BOT	Build-Own-Transfer
BVDB	Cities and Villages Development Bank
CAPEX	Capital Expenditure
CBJ	The Central Bank of Jordan
COD	Cash on Delivery
C&I	Commercial and Industrial
DES	Decentralized Energy System
DSS	Decentralized Solar System
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EMRC	Energy and Minerals Regulatory Commission
EPC	Engineering, Procurement, and Construction
ERI	Economic Resilience Initiative
EVN	Electricity of Vietnam
FiT	Feed In Tariff
GCC	Gulf Cooperation Council
GCPF	Global Climate Partnership Fund
GEF	Global Environment Facility
GW	Gigawatt
HSE	Health, Safety, and Environment
IFC	International Finance Corporation
IFIs	International Financial Institutions
IRENA	International Renewable Energy Agency
JREEEF	Jordan Renewable Energy and Energy Efficiency Fund
kW	Kilowatt
LCOE	Levelized Cost of Energy
MEMR	Ministry of Energy and Mineral Resources
MENA	Middle East and North Africa
MW	Megawatt
NEPCO	National Electric Power Company
NGO	Non-Governmental Organization
NMS	Net Metering System
O&M	Operations and Maintenance
PPA	Power Purchase Agreement
PV	Photovoltaic
SME	Small and Medium Enterprise
SPV	Special Purpose Vehicle
TWh	Terawatts Hour
UNDP	United Nations Development Programme

4.0: EXECUTIVE SUMMARY

Decentralized Energy Systems, especially Decentralized Solar Systems are fast gaining popularity due to their several advantages over centralised power generation systems. They play a key role in the ability of nations to achieve their sustainability and decarbonization targets along with ensuring energy access and security to their populations. The annual financial commitments to decentralized renewables increased from USD 250 000 in 2007 to USD 460 million in 2019. [1]

The volume of transactions indicates the realization of the potential of small to medium systems in terms of support to an easy and fast deployment of renewables, in addition to accompanied economic savings for the consumers or businesses. They realize significant savings on their energy bill which improves competitiveness, profitability and the standard of living.

However, one of the main reasons of their slow uptake and deployment, especially in Emerging Markets, is the difficulty to access affordable finance both for project developers and energy users.

For the case of Jordan, there are many highlights of the success of decentralized solar schemes, however there is an inherent need to improve and further promote the availability and access to financing to support the desired growth of DSS in the country.

Herein is a summary of recommendations to scale up decentralized solar energy investment and to further enable DSS. The recommendations are based on research where different stakeholders were surveyed to depict the current practice and propose adjustments that would contribute to scaling up the investment:

- Enhance clarity on long-term renewable energy targets and implementation strategies and ensure stability of regulatory frameworks in renewable energy projects.
- Develop the needed tools and mechanisms that contribute to the facilitation of financing in Jordanian Dinars and design the needed financial instruments that mitigate risks connected to the interest rate fluctuations.
- In regard to the public financing programs, work on the sustainability of the support, prepare public funding programs in cooperation with the concerned stakeholders and improve the access to public financing programs by easing the application process.
- Create an electronic platform that gathers information from all those concerned with financing renewable energy projects in Jordan.

This report comes as part of a series that aims at promoting decentralized solar energy through introducing recommendations and proposing solutions to the barriers hindering the development of small to medium solar projects in Jordan. The first report examined the administrative procedures in order to identify barriers to the deployment of decentralized solar as well as to provide recommendations for the improvement of the regulatory and procedural framework, aiming at contributing to maximising socio-economic benefits of Decentralized Solar Systems.

1 Global Landscape of Renewable Energy Finance, IRENA, 2020.

Globally the distributed PV segment will resume growth between 2023-25 as global economic recovery supports faster adoption of commercial and residential systems. The decentralized solar energy that is dedicated to self-consumption has proven its worth in converting electricity bills to zero-values. This has several economic and social impacts on SMEs and Individuals, namely attributed to technological maturity and dramatically decreasing prices in the last decade. The high electricity tariffs remain a key reason for converting to renewable energy in Jordan.

Jordan has one of the most successful journeys in the renewable energy transition with high record investments for clean energy. This report will highlight the success of decentralized solar schemes, mechanisms, and tools of financing. Also, to promote the availability and access to financing to support the desired growth of decentralized solar in Jordan.

EDAMA, SolarPower Europe, Finergreen, and Friedrich-Ebert-Stiftung will continue this collaboration to exchange knowledge, best practices, and market information to create new solar business opportunities in Europe region, and Jordan. We invite you to join this endeavor.

Foreword signed by:

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Director of The Regional Climate and Energy Project, FES

6.1 What is Decentralized Solar

Decentralized solar refers to small-scale solar installations, connected to the low-to-medium-voltage distribution grid and located close to the consumption points it serves. This is in contrast to large utility-scale plants connected to consumption points via large high-voltage power lines, which are part of the traditional centralized electricity systems that were developed historically.

In most cases, decentralized solar is located on rooftops and buildings. Although decentralized solar is often perceived as solar roofs on residential buildings, in reality decentralized solar includes a wider range of systems, for instance rooftop solar on small and medium-sized enterprises' (SMEs), offices' or commercial and industrial buildings and structures. A general understanding of decentralized solar includes:

- The residential rooftop segment, typically below 10kW capacity
- The commercial segment, between 10 and 250kW capacity
- The industrial segment, between 250kW to above 1MW capacity

Worth to mention that Decentralized System mostly refer to small capacity systems, there is no maximum capacity set by definition. Some projects today being developed, with capacity of over 35MWp (Ex. Orange – Wheeling structure) or 17MWp (Carrefour – Majid Al Futtaim) and can fall into the category of decentralized systems as well.

6.2 Why Decentralized Solar

A decentralized energy system allows for incorporation and more optimal use of renewable energy as a source of heat and/or power which directly reduces fossil fuel use and increases eco-efficiency. Because it is close to consumption points and often installed and owned by the power consumers themselves, decentralized solar is linked to **the notion of prosumer**. This concept, derived from the words producer and consumer, refers to the shift from the passivity of the consumer in the energy system, limited to the mere act of receiving and consuming energy, to a more active participation in the energy system. Producing one's own energy and exporting to the grid, is an act of public participation in the energy system, if done in a systematic way and on a large scale it will give the people the freedom to control their own energy and prevent electricity generation and distribution monopolies from occurring, and achieves a realization of energy democratization. In addition to that, it is a much-needed step to develop the next generation electrical systems that incorporates smart grids and peer to peer energy trading. There exist many different economic and technological benefits for a decentralized solar system:

- Energy security and independence – control over power generation and less dependency on the grid or fossil fuels, particularly critical to island nations and remote users not connected to the grid.
- Economic feasibility – cheaper to produce and use power on site, or generate savings by exporting to the grid rather than procure all the energy from national grid, in an environment where power prices are rising for most countries in the world.

- Energy reliability – using storage systems or diesel backup, ensure reliability of power where grid connection is vulnerable and unstable.

- Meet demand for energy – decentralized systems can be deployed faster and more economically to meet demand for growing populations where extending capital-intensive grid infrastructure may not be possible.

- Local content and capacity building – Construction and operation of such plants which are modular in nature and can be deployed on a small to medium scale stimulates local economic activity, creates jobs, and adds skills and training to local population.

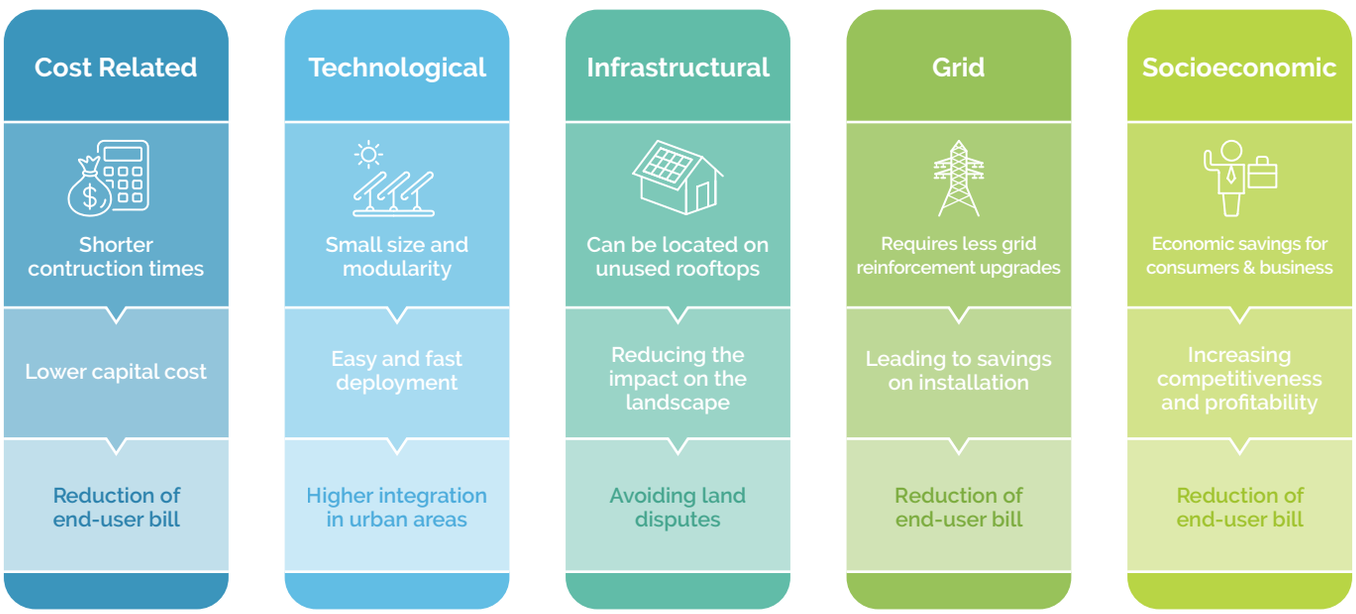

Figure 1: Decentralized Solar Benefits

Some of the challenges faced are:

- **Financing Issues** – Depending on the nature of the system and the economic model, financing can be a bottleneck in the development process of decentralized systems. For e.g. rooftop solar is one of the most popular DSS implemented today and in many developed markets with reliable support mechanisms such as net-metering, Feed In Tariffs (FiT), bankable Power Purchase Agreements (PPA) and a critical size such systems can be easily financed. However, off grid systems such as community minigrid systems or solar hybrid systems often rely purely on equity or grants and subsidies to be financed, with very less access to cheaper sources of funds.

- **Regulatory and Grid Challenges** – Grid connected DSS add variable power injections into the grid. If the grid infrastructure is not planned in a way to absorb this power or is in a state of disrepair, capacity increase may become a challenge and can disrupt the growth of this sector. Additionally, macroeconomic conditions can also force adverse changes in the regulatory landscape (levying new taxes, grid fees, cap on maximum size of rooftop plants etc.) that can cause the business model of such systems to take a hit.

6.3 Global & Regional Trends

The latest 2020 report by IEA estimates that global distributed PV additions are forecast **to be 8% lower in 2020 than in 2019** as the current economic uncertainty shifts the financial priorities of both individuals and small/medium-sized enterprises in some countries. However, the distributed PV segment will **resume growth during 2023-25** as global economic recovery supports faster adoption of commercial and residential systems.

Driven by China and the United States, net installed renewable capacity will grow by **nearly 4% globally in 2020**, reaching almost 200 GW. Deployment of distributed PV applications is sluggish in large markets such as China and the United States, although activity in most European markets, Australia and Brazil has not been hampered significantly. Still, the share of distributed applications in total PV deployment is **expected to decline to 37% this year, the lowest since 2017**.

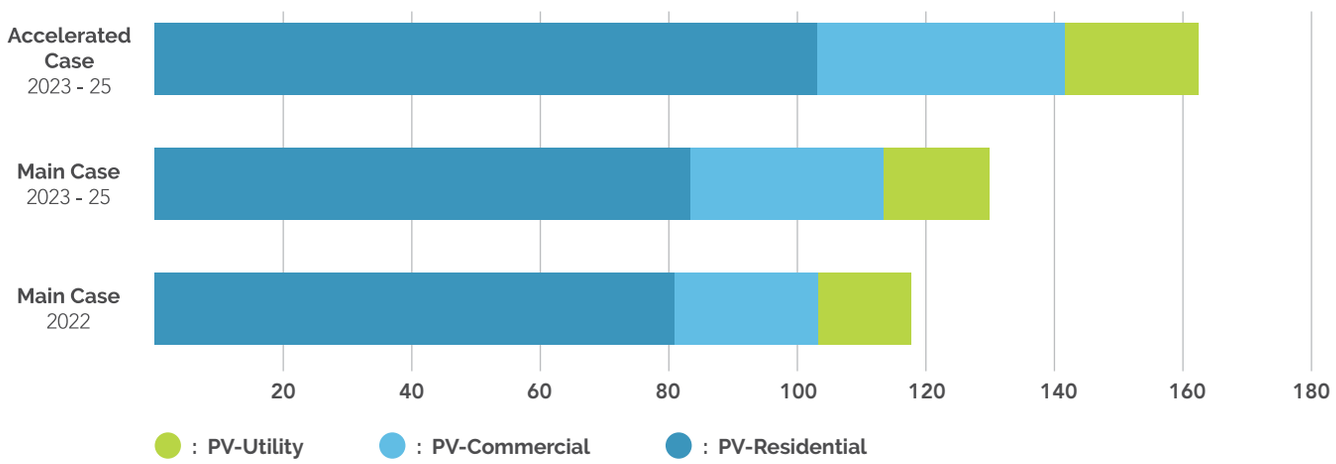

Figure 2: Average Global Annual Capacity Additions (in GW) in Main and Accelerated Cases, 2023-25, IEA Renewables 2020

In 2018, distributed solar photovoltaic (PV) additions reached a record 41 GW, accounting for more than 40% of total PV and one-quarter of all renewable capacity growth. With this expansion, global distributed PV capacity (led by commercial/industrial applications) reached 213 GW.
With around 80 GW installed capacity as of 2019, the European Union is home of the largest distributed solar PV fleet. This corresponds to about 68% of the EU's total installed solar PV capacity.
In the MENA region including UAE, Oman KSA, Bahrain, Kuwait (GCC), Jordan, Lebanon, Egypt, Tunisia, Morocco and Algeria, the clear frontrunners in terms of installed capacity[2] are Jordan, UAE, Egypt and Tunisia.

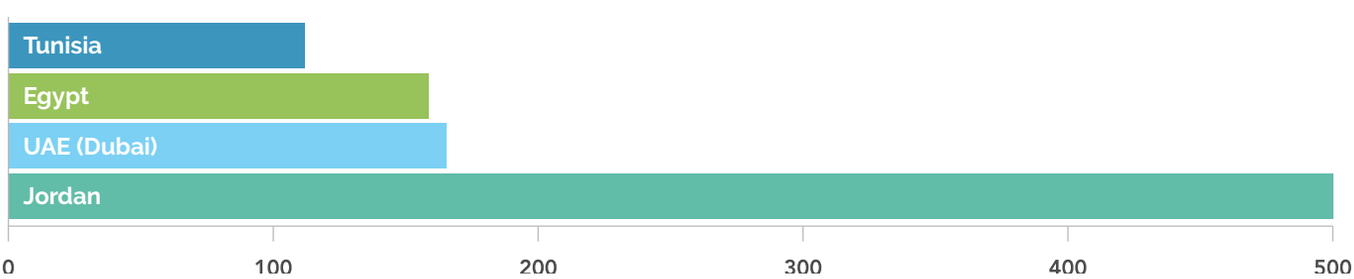

Figure 3: Capacity in MW

2 Reported data for the following years: Jordan –2018; UAE –2019; Egypt – October 2020; Tunisia - 2019

The oil producing GCC countries except for UAE have not been able to officially implement a decentralized solar energy market, as regulatory hurdles have been difficult and taken long to overcome.

- Kuwait has implemented rooftop schemes but only in specific sectors like government buildings.
- Bahrain has delayed the implementation of its solar rooftop tender.
- Oman has been active in the residential sector with a poorly subscribed program leading to very limited installations, while the country focuses on implementing an extensive hybrid solar-diesel-storage system in its rural areas.
- KSA has suffered many roadblocks in its launching of rooftop regulations, while it focused on boosting the renewables capacity through large utility scale projects. However, there are projects being developed by large C&I clients who wish to offset their energy consumption, provided that regulatory landscape has more clarity.
- In Lebanon solar systems of ~60 MW have been installed (2018) however owing to its political turmoil most new projects have not taken off.
- In North Africa, Morocco has announced new net metering rules which are yet to be put in force, however there is a massive demand from C&I clients, and some have been successful in implementing rooftop projects. Algeria as well has been sluggish and is still navigating political changes.

7.1 General Concepts of Renewable Energy Financing

With the growth of the renewable energy markets, project sponsors and stakeholders need to find the most appropriate structure to develop the business overall or in certain countries. A suitable structure can ensure the project can meet local regulatory requirements, raise correct form of financing, allocate benefits to all stakeholders, and ultimately make the project a reality.

Project Finance or Non-recourse finance – In Project Finance, financing is raised at a specific project level, without any recourse to the mother company. Lenders are only considering the project future cash flows for paying back their loan.

Corporate Finance - In traditional Corporate Finance, financing is raised at the company level, depending on its creditworthiness and with recourse on its own assets.

7.2 Corporate Finance vs. Project Finance

The salient features of these financing methodologies of renewable energy projects, also applicable to decentralized solar are as explained below.

	Project Finance	Corporate Finance
Activity Financed	Specific project or group of projects	Corporate borrower's entire activity (unless otherwise specified) at its own discretion
Duration	Usually long term, maximum up to Project duration	Anything between a few months to perpetuity but depends on corporate's creditworthiness
Sizing	Depends on the project's ability to generate cash flow (and sensitivities on cash flow) only	Depends on corporate's creditworthiness
Interest Rate	Depends mainly on Project structure, counterparties, and collateral	Depends on corporate's creditworthiness
Recourse to Sponsor	No recourse on Sponsor (except stake in project)	Full recourse on corporate
Guarantees	Project based exclusively (real assets, project receivables…)	Corporate borrower's balance sheet
Impact on Sponsor	Theoretically, none or very limited	Degrades corporate rating and reduces further capacity for borrowing
Accounting Treatment	Under some conditions, off the sponsor's balance sheet	On the corporate's balance sheet
Relevance in Decentralized Solar in MENA Region	Several grid-connected PV plants have been financed through this mechanism, sizes ranging from 2 MW – 20+ MW. Even smaller projects can be grouped together in a portfolio to reach critical size to be financed economically by interested banks	Highly popular for small to medium size projects, especially in the "lease" model type of financing where developers invest equity to construct the PV systems
Examples in Decentralized Solar	**Egypt** – rooftop projects developed by local developers and financed on a non-recourse basis through subsidized "green" loans **Jordan** – rooftop and ground mounted projects developed for C&I clients and financed by regional and international banks on a non-recourse basis **UAE** - portfolio financed by APICORP for $ 50M for developer Siraj Power	**UAE** – rooftop projects developed by major players like Siraj Power, Yellow Door Energy, Cleanmax Solar, Total Solar etc. **Jordan** – rooftop and ground-mount projects developed by major players like Yellow Door Energy, Kawar Energy etc. **Bahrain** – pending tender of 3 MW PV capacity to be financed on full equity model

Table 1: Corporate vs. Project Financing

7.3 Methods of Financing Decentralized Solar Projects

Solar PV projects are considered a mature technology today. According to Bloomberg, large scale utility solar PV and onshore wind have the lowest Levelised Cost of Energy (LCOE) for power generation in two-thirds of the world, aided by rapidly falling technology costs. Even decentralized solar has benefited from the favourable dynamics of the solar industry, and thus solar project financing for both large scale grid connected as well as small-medium scale decentralized solar assets has evolved over the years as the industry has progressed. It is widely accepted that unlocking cost effective financing is key to grow the sector, which becomes especially important in the case of Emerging markets and the decentralized solar landscape. Some prevalent financing mechanisms are the following:

- **Upfront purchase (EPC or CAPEX Model)** – This involves the purchase of the entire solar PV system with upfront cash. A certified EPC contractor provides a firm quotation to construct and install the PV system. The user enters into a contract and based on payment milestones, pays the full amount to the contractor to connect the system and generate savings as soon as a month that can be offered by these PV systems. This method is popular with businesses/users who have surplus cash or have a budget assigned towards sustainability goals, however for the majority of users under economic hardships it becomes very difficult to purchase a system upfront.

- **Grants** – Many multilateral and international development financing institutions offer grants to projects owners and stakeholders in Developing countries to directly support the installation of renewable energy systems. These grants can be arranged on a bilateral basis between entities for e.g. EIB providing a grant through its Economic Resilience Initiative (ERI), designed to strengthen EU Southern Neighbouring countries' ability to address key challenges to Cities and Villages Development Bank (CVDB) in Jordan to support the implementation of the CVDB – Municipal Energy Efficiency Programme that includes installation of solar systems. It can also be organised on an international or national scale, by releasing a Call for Proposals attracting different developers, from which successful grantees are selected through a demand-driven, competitive, and transparent process, incorporating international best practices for social, environmental, and project design. The grants are then disbursed over a pre-approved timeline according to the need of funds of the project. Sometimes, the grant can also be offered not as a direct payment to meet construction costs, but as a lump sum payout to the user after meeting certain criteria (for e.g. after successful connection of the solar system to the grid).

- **Subsidized loans/Solar loans** – These are loans offered by local commercial banks to support users to "go green" and be able to finance installation of small-scale solar PV systems in their premises. Usually these loan conditions are designed to facilitate flexible and easy repayment with lower interest rates. Some typical features are – covering up to 70-80% of the total system costs, no upfront fees or down payment, no closing costs, grace period of no interest payment of 12-18 months, loan tenor ranging from 5-15years and low fixed interest rates. These subsidized loans are often made available by larger international DFIs offering credit lines to local banks through country central bank, who can then disburse these loans to end users for e.g. Agence Française de Développement (AFD) offering SUNREF - a green credit line developed for companies that implement projects in renewable energy (solar, wind, geothermal, hydro, biomass).

- **Leasing** – Leasing is a model where a third party purchases and installs a PV system on a consumer's rooftop and leases it with a fixed monthly/annual leasing fee, over a long period of time (10-20 years). The scheme involves three contracts: a rooftop access contract, a leasing contract and a maintenance contract. Although the lease contract can be transferred from a consumer to another, in case the building occupier changes, there is no guarantee that a new occupier will want to maintain the lease contract.

- **Financial aggregation** – Most rooftop solar PV have a certain disadvantage in terms of access to attracting large-scale investors, since the relatively small size of these projects sometimes does not justify the transaction and due diligence costs inherent to solar projects. The pooling of many smaller-scale assets, such as rooftop projects, usually done by using securitisation, can improve their access to financing sources and investors customers are able to attract more capital providers. However, building a replicable aggregation model that can be scaled up requires strong support and commitment from governments as well as consensus on specific terms of standardisation from industry stakeholders. International public finance organisations (EBRD, EIB, IFC, etc.) and national public finance institutions (German KFW, French CDC, etc.) have an important role to play for project aggregation and securitisation to take place.

- **Crowdfunding** – More prevalent in Europe, UK & the US, this form of financing is a very promising solar financing scheme where a large number of people each put in small amounts of money into a scheme in order to raise money for a PV project, often structured as an SPV. Crowdfunding platforms provide financing in the form of loans, equity or grants, with equity crowdfunding being the most common. Crowdfunding is often combined with bank loans or equity and popularise a project to the local community or to a more sustainability focused population. There are also often substantial tax benefits to crowdfunded finance. It could also prove helpful when a project might struggle to get other forms of financing, especially for innovative and small-scale projects.[3]

The below schemes of financing, which are gaining in popularity, are applicable to third party developers who develop, finance, construct and operate solar systems for the benefit of the user (residential, commercial or industrial)

- **Full equity financing (corporate financing)** – A very common structure seen in developers who offer the lease or a Build-Own-Transfer (BOT) model to users. The construction costs of the system is financed by the company directly (either through its equity or corporate debt), and the developer signs a contract with the user (a lease or PPA) which provides revenues to the developer for the duration of the contract.

- **Equity with refinancing** – Consequently following the trend of pure equity financing (as above) where developers take on full risk of construction, performance and cashflows at first, there is a possibility to seek bank debt to refinance a sizeable portfolio of assets after a few years post operation. This way, the bank debt reimburses some of the equity for the developer which can then be used to further develop more projects.

- **Short term debt with refinancing** – In some cases where banks do lend debt during construction, often the banking market is not mature or deep enough to offer attractive financing conditions. Usually then to avoid using equity for CAPEX, such kind of short term debt can be taken to finance construction, after which cheaper and longer debt is available after a few years post commissioning, allowing time for proven plant performance and maturity of banking market.

- **Portfolio Financing (Borrowing based facility)** –A type of trade finance instrument, and more specifically a type of working capital facility, whose structure relies on the principle that the amount of money which the borrower can borrow is based on the value of a pool of assets held by the company, referred to as the 'borrowing base'. In other words, the amount of credit granted to the developer will be determined by the value of the developer's current assets. The pool of assets can vary from time to time, meaning that the credit will vary in accordance with the value of assets.[4] This is applicable to a portfolio of rooftop assets that have users with varying levels

3 EU-wide-solar-PV-business-models-PV-Financing, Solar Power Europe

4 www.tradefinanceglobal.com

of creditworthiness and allows for the easy entry/exit of similar risk users into the portfolio to maintain average credit risk constant.

- **Project based non-recourse (Project Finance)** - Popular and most preferred way of implementing infrastructure and power projects including renewables and decentralized solar assets, where a project company is set up as a Special Purpose Vehicle (SPV). The project sponsor (a developer or user) secures funds for construction in the form of equity (20% - 40%) while the rest is raised as debt from local, regional or international banks. It Is preferable to have a minimum size of the project (~5 MW) to attract bank debt however there are availability of green loans via local banks thanks to support from DFI's that can even finance smaller projects (1 – 5 MW) on a fully non-recourse basis. A recent example being the 1 MW project developed by SolarizEgypt for Coca Cola which has been signed on the back of a 25Y PPA< and financed by EBRD through its Green Economy Finance Facility Egypt, which it developed with the backing of EU lender the European Investment Bank and French development agency Agence Française de Développement.[5]

7.4 Challenges of Financing of Decentralized Solar Assets

1. For the EPC/CAPEX model, lack of in house expertise in construction and operation of solar PV systems poses a major challenge in the self-financing of PV systems, as without technical know-how and support the average user cannot guarantee that the systems produce savings as expected.

2. To secure bank loans for construction of PV systems, banks may require credit analysis and guarantees/collaterals which may not be feasible for many small-medium users.

3. For third party developers, project development is critical to ensuring that a project can be successfully financed, constructed, and connected to generate the planned revenues and investment returns. If all technical, commercial and financial development steps are not up to the mark, then it is unlikely to attract competitive financing rates and achieve successful financial close.

4. The business model and project economic metrics must meet thresholds for financiers or meet industry benchmarks/expectations in order to attract financing. One of the biggest roadblocks for successful financing of projects on a non-recourse basis is its bankability. Multiple aspects contribute to this factor –the PPA or offtake agreement, track record and financial standing of the sponsor, quality of EPC & O&M contractor and overall country risk profile etc.

5 https://www.pv-magazine.com/2020/12/09/first-ppa-driven-solar-rooftop-in-egypt/

8.1 United Arab Emirates

8.1.1: Current Status of Decentralized Solar

The flagship program in UAE is implemented in the Emirate of Dubai - the Shams Dubai Program. This program allows individuals and businesses to install on-site, rooftop, grid connected solar plants. The program is based on the net metering system via credit, where solar energy injected into the grid is used to offset the consumption of energy from the grid. Since its first announcement in 2015, the Shams Dubai Program has resulted in 164 MW of distributed solar projects being connected to grid, with the main increase of capacity happening in the last 2-3 years. The uptake has mainly been from C&I users while the residential sector has been slow – as the resident population is mainly expat with less ownership of residences.

Regulation in Dubai is robust and has evolved recently to better manage the integration of several rooftop systems. The market today is active, competitive and dynamic, with a lot of interest from users to switch to solar, hence discounts of up to 60% from grid tariff have been offered in some projects.

In Abu Dhabi, a net metering program was planned to be launched but did not take off due to regulatory hurdles. However, projects can still be installed for self – consumption purposes which reduce energy bills. e.g. Masdar announcing the full turnkey solution of a 7 MWp rooftop PV plant for an amusement park.

In Sharjah and the Northern Emirates only some pilot and small scale on grid projects exist with plans to introduce new regulations soon.

However, there is a large market for off-grid solar and storage hybrid projects, coupled with diesel gensets, as some industrial areas in UAE are still running on diesel fuel as the grid connection is not feasible. Particularly the cement, metals, construction, island hotels and hospitality sectors benefit greatly from on-site solar power generation and adding storage can provide longer hours of energy.

In UAE the C&I addressable market is estimated to be around 2 GW, Dubai is clearly the pioneer in decentralized solar and the other Emirates are still in planning stages for establishing clear regulations.

8.1.2: What Are the Enabling Drivers?

- Strong government push as a part of UAE & Dubai Clean Energy Strategy
- In Dubai the highest slab of tariff paid by C&I users is ~12USD cents/kWh as a result of un-subsidization. Tariffs are not increased every year however 2% inflation can be expected annually in the years to come
- Regulation in Dubai is smooth and robust, with clear steps for constructing and connecting a rooftop solar plant
- Willingness and awareness of users to switch to solar, and for many multinational firms this falls under their sustainability criteria, as is evidenced by tenders issued by many firms to procure solar rooftop plants

- High uptake partially due to the availability of Lease – to – Own model, as no upfront CAPEX is required

- Due to high irradiation, competitive EPC & O&M costs and no corporate tax, high discounts (~40% - 60%) are possible from grid tariff

8.1.3: *Involvement of Financing Institutions - International and Local Financing*

The interest of international and local banks was mainly in financing large utility scale projects however recently there have been many advancements in the financing landscape.

In terms of equity, many developers are active in the country who are highly competitive and each comes with their own strengths. Local active players are Siraj Power, Yellow Door Energy, Cleanmax Solar, Enerwhere, Sharaf DG and international players such as Total Solar and Masdar (very selective) For debt, recently regional bank APICORP issued the first of its kind USD 50M portfolio financing for Siraj Power. Similar structures are being explored by other banks. Trend is towards refinancing of a sizeable portfolio of operational assets developed by a reputed developer, however we expect short term senior debt during construction will also be available as the market matures in the upcoming years.

8.1.4: *Best Practices in Terms of Financing Program/Incentives/Mechanisms*

To secure debt, it is very important to maintain standardized PPA's and contracts, with projects constructed by a strong EPC partner and proven plant performance.

Creditworthiness of off taker is important, however in a sizeable portfolio there can be a positive effect of averaging out this risk.

8.1.5: *Key Takeaways*

- UAE market is on track to enter the next phase of decentralized solar market progress – where banks offer debt to refinance sizeable portfolios. As more and more banks start looking at this, we expect competitive offers which will allow developers to aggressively sign new contracts and boost the capacity.

- The landscape today is highly competitive, and price driven.

- The EPC model is less popular, especially in the current economic environment, hence strong EPC players are gradually starting to look at project development.

- However, project development timelines can be long, as users are more familiar with solar PPA's and can negotiate terms better.

8.2 Vietnam

8.2.1: Current Status of Decentralized Solar

At end of 2018, rooftop solar capacity was only 29 MWp, almost all of which had been installed during 2018. In 2019, development of rooftop projects (1 MWp, connected < 35kV) had accelerated dramatically, driven mainly by C&I consumers. As of May 2020, industrial clients made up 56% of rooftop system users, while residential was 28% and commercial 11%. The rapid build-out in 2019 followed a number of policy clarifications beneficial for rooftop systems such as a standard PPA specifically for rooftop projects, and its implementation guidelines. The uptake was also driven by the first solar FiT (9.35 cents/kWh – same for rooftop and ground mounted solar projects) which created a rush of installations in June, just ahead of the expiry of the FiT. As a result, 117 MWp of new rooftop systems were installed in June 2019. Furthermore, the utility company of Vietnam has revealed that by September 2020, there were some 50,000 operational rooftop solar projects around Vietnam with a combined capacity of about 1,200 MW. Of these, 25,700 systems with 758.2 MWp were installed in the first eight months of 2020.[6] The main factor behind this rush is that for projects reaching COD from July 2019 up to December 2020 the applicable FiT is 8.38 USD/kWh.

8.2.2: What Are the Enabling Drivers?

- Vietnam's energy demand has shown a steady annual growth rate around 8.5%.
- There is a looming supply shortage which can cause frequent blackouts in the upcoming years, to meet growing demand Vietnam needs 6-7 GW of new capacity annually.
- Problems in transmission and distribution is severe, with high curtailment.
- Against the backdrop of strong economic growth, electricity consumption more than trebled from 46 TWh in 2005 to 192 TWh in 2018.
- The industrial sector is the main driver of electricity demand, accounting for over half (55%) of electricity consumption in 2018.
- Tariffs increase in avg. 5% every year in last 20Y, expected to increase as subsidies are reduced.
- The rapid growth of solar power –both ground-mounted and rooftop –has put in place a local Vietnam network of supply of relevant hardware and services.
- Electricity of Vietnam (EVN) the sole buyer of electricity sees rooftop systems as a way of quickly adding new power generation capacity, with less risk for network issues.
- In general even in the absence of a FiT rate since July, new rooftop system installations have continued.
- On the basis of Corporate PPA's (a Corporate PPA allows corporate consumers to purchase power on a long term basis directly from renewable energy generators providing price certainty for both the corporate (user) and the power producer) solar tariffs close to ~ 5-11% discounted from grid tariff can be achieved, while the surplus electricity is sold to the grid at the existing FiT.
- Limited land availability makes rooftop solar very popular.

6 https://www.eqmagpro.com/vietnam-home-to-nearly-50000-rooftop-solar-projects

8.2.3: Involvement of Financing Institutions - International and Local Financing

- Equity still plays an important source of finance for developers. A survey of developers conducted by USAID in Vietnam reveals that 47 % respondents claim that they financed their projects through full equity while 53% respondents claim both debt and equity used for project development.

- For equity financing there have been announcements from developers such as:
  - International players: Total Solar, Green Yellow
  - Local players: VinaCapital/SkyX Solar, VES
  - Regional players: Constant Energy, Symbior Solar, Cleantech Solar, M+, Lys Energy, etc.

- No known track record of debt financing of project in Vietnam itself, but efforts to increase local banks capacity (IFC loan to VP bank)

- Corporate loans to users wishing to install rooftop systems are available from banks such as HDBank with flexible terms such as loan amount up to 70% of system cost, tenor up to 10 years with the system itself being a collateral.

- Credit lines can also be accessed by large corporates from banks such as HSBC Vietnam, which can offer a term loan as well as trade finance facilities to support the import and guarantees of solar equipment.

8.2.4: Best Practices in Terms of Financing Program/Incentives/Mechanisms

- From the user point of view, the USAID survey concludes that 75% of users with rooftop systems used the EPC or CAPEX model to finance the project, while 25% used lease to own model for installing the solar plant.

- The users who used the CAPEX model used a mix of both only equity, and equity and debt (through a corporate loan)

- A clear driver and growth projection for uptake of rooftop systems is the Lease model of financing, as it minimizes risk of performance, delays in construction and compensates for the lack of in-house expertise for users wishing to install solar in their premises, by allowing third party developers to own the PV plant through the lease duration

- For local banks, main motivations for rooftop system financing is the commitment towards green projects, attractive business case for solar and to diversity product/solutions offerings to existing clients.

- Some preferred incentives to end users are low cost financing, tax incentives, buy-down incentives and accelerated depreciation

- From the developer point of view, it is imperative to first secure growth capital from equity for the initial 5- 10 MW (own financing) and then achieving successful operations on the initial portfolio to be able to leverage (secure debt) the portfolio early on

- To ensure scalability by working with the same standards across the portfolio (contractual, technical, operational, HSE etc.)

- Have flexible terms on the initial financing to allow for refinancing

- Achieving scale beyond the initial clients to absorb fixed operation and transaction costs

8.2.5: Key Takeaways

- Rooftop sector is fast booming but the available financing market is still structuring compared to other SEA countries such as Thailand.
- It is however quite promising and has captured significant interest from local, regional and international developers, especially in lights of high grid tariffs (especially commercial tariffs), and of the capacity to export any excess electricity to the grid through a FiT scheme.
- Lease to own model is fast gaining popularity while corporate green loans are available to users wishing to self-finance the rooftop projects
- Some challenges faced by users are hesitation to invest in solar systems due to the lack of information about product quality, operating methods, equipment warranty etc.
- Availability and attractivity of local non-recourse finance is still to be proven for portfolios of small scale assets.

8.3 France

8.3.1: Current Status of Decentralized Solar

The development of solar PV in France is supported by renewable energy tenders through a contract-for-difference system ("Complément de Rémunération"). Sub-500 kWp are still in a Feed in Tariff (obligation d'achat) through tenders. So far, tenders have proven to be a good method to spur the development of both medium and large-scale power plants. As of June 2020, France had a PV capacity of ~10 GW out of which decentralized solar capacity was at 4.7 GW.

8.3.2: What Are the Enabling Drivers?

- Government support in the form of 20-year Feed in Tariff / Feed in Premium contract
- Before 2016, there were no volume limits (any plant that met the criteria could get a tariff) but since 2017 capacity building is through regular tenders. This enabled the development of a strong network of small and medium size businesses in the industry, which are the main users of the decentralized solar systems
- Calls for tenders represent the main driver to achieve these targets with 2.9 GW scheduled every year. Two-thirds of these tenders will be ground-mounted installations while the remaining third will be attributed via calls for rooftop installations above 100 kW.
- An open FiT for rooftop installation below 100 kW, both for injection and self-consumption, brings around 250 MW of new capacities each year.
- Innovative business models such as collective self-consumption scheme encouraging local peer-to-peer energy trading which enables local energy sharing for generators and consumers under a specific grid tariff
- Flexible financial regulations allowing new mechanisms of financing such as crowdfunding options for many solar plants

8.3.3: Involvement of Financing Institutions - International and Local Financing

France has a very mature decentralized solar market, with many developers able to easily finance their projects with non-recourse debt on a standalone or portfolio basis, as banks are very familiar with such kinds of projects. Local French and European banks are very active in this sector. Recently a major French developer Urbasolar announced the closing of €124 million (one of the largest closings) with local bank Credit Agricole and other regional banks to finance 37 new solar plants that will include ground and roof-mounted systems, photovoltaic greenhouses and parking canopies.

Debt is available not only for construction of new plants but also for acquisition of portfolios. Developers are sophisticated and banks are willing to embark on new and complex transactions to differentiate themselves – for e.g. Technique Solaire closed a €111 M financing program with French banks, including brownfield and greenfield projects amounting to more than 200 rooftops for a total of 72.8 MWp. Such kind of transactions demonstrates the current positive dynamics of the developer and its ability to close complex financings, not only in financial aspects but also in legal structuring adapted to the specificities of multi-asset portfolios.

8.3.4: What Are the Enabling Drivers?

- There's always appetite to finance from banks, the matter is simply in the precise conditions of their offerings (sizing, interest rate, tenor etc.).
- Several instruments are available for financing such as senior debt, bridge financing, revolving facilities, refinancing facility etc.
- A mix of such instruments can also be tailored and customised for a portfolio of projects, that can support all stages of the solar rooftop project lifecycle – right from early development to post commissioning.
- In terms of crowdfunding, there are options for both equity and debt organized often via a dedicated online platform. There is the possibility of direct citizen involvement in projects (citizens who develop a project in their town, and have shares) and indirect citizen involvement (purely financial, through platforms) which can be as share capital or through bond-type products. Moreover, the annual tenders incentivize developers to add crowdfunding elements to the projects with an additional bonus on the tariff (€3/MWh for direct and €1/MWh for indirect).

8.3.5: Key Takeaways

- Standardized contracts and streamlined method to develop projects via call for tenders which make lenders more comfortable and agile with the uniformity of transactions
- Scalability and achieving critical size to ensure optimum financing
- Existing relationship with developers is important as banks value a long-standing partnership
- It is important to have a very efficient process to structure the transactions, which fits well with the fast-moving PV market
- Visibility on volume - one of the successes of the tender program was that volumes were announced in 2016 to cover the 2017-2019 period, which enabled developers to invest and plan for the long term
- Another success factor was systematic discussions between CRE (Commission de Regulation de l'Energie - Organizing authority of the tenders) and developers to be able to improve the program year on year.

Renewable energy projects in Jordan are growing exponentially since the issuance of the Renewable Energy and Energy Efficiency Law No. 13 of 2012, so that the contribution of renewable energy in the primary energy mix rose from 2% in 2013 to 8% in 2019 and is expected to reach 12% in 2021.[7]

The installed capacity of renewable energy projects amounted to about 1558 Megawatts (MW) till the end of 2019, so that the renewable electricity accounts for 18% of the electricity mix. Large utility scale projects amounted to about 985 Megawatts (MW) whereas small and medium solar projects amounted to about 500 Megawatts (MW) that were connected via the Net Metering System (NMS) and wheeling system.[8] Renewable energy constitutes about 25.7% of the total generation capacity of the Jordanian electrical system end of 2019.

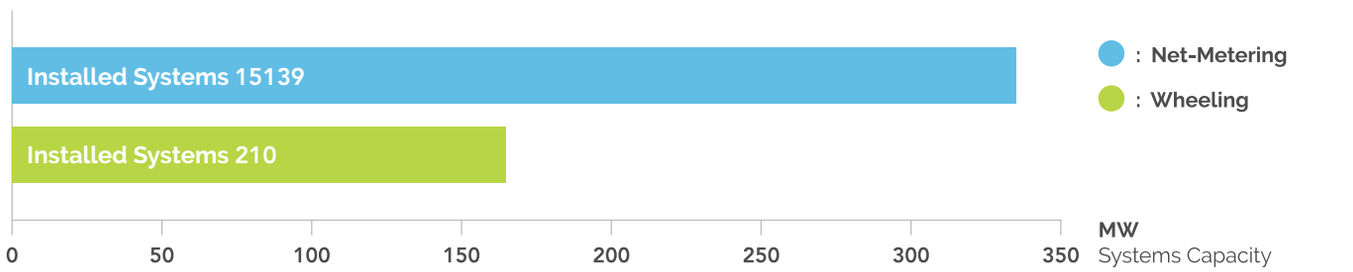

Figure 4: Decentralized Solar Projects Capacity by the End 2019

9.1 Investment in the Renewable Energy Sector in Jordan

The renewable energy sector in Jordan started to attract capital following the announcement of the first round of the direct proposal projects in 2011. Investments neared 300 million U.S. Dollars by the end of 2013 and rose up to reach its highest value at 934 million U.S. Dollars in 2016 and 3.947 billion U.S. Dollars by the end of 2019.[9] The foreign funding is estimated at 75%[10], which includes international banks and financing establishments that are mainly funding large-size projects.

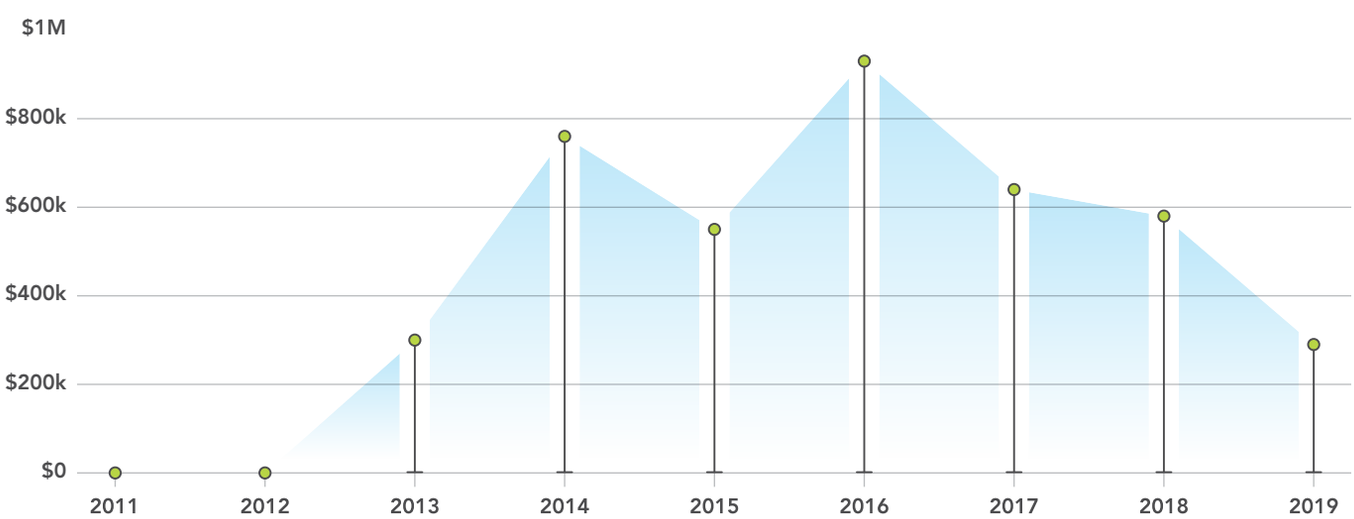

Figure 5: Volume of Investments in the Renewable Energy Sector in Jordan

7 Energy Brochure 2013 – 2019, Ministry of Energy and Mineral Resources.
8 Annual Report, Ministry of Energy and Mineral Resources (MEMR), 2019.
9 Climatescope by BloombergNEF, 2019.
10 Climatescope by BloombergNEF, 2020.

The renewable energy sector's ability in Jordan to attract capital from different financing agencies is attributed to the clarity of the legislative framework that governs the process of developing renewable energy projects. Efforts were exerted to mitigate risks that may stand in the way of investments in this sector, whether related to legislations and laws or market and demand for electricity. As for large projects, the direct proposal by-law was issued by the Ministry of Energy and Mineral Resources (MEMR) in 2015 to clarify projects implementation methodologies, in addition to developing models for power purchase agreements that are signed among the energy projects developers and the National Electric Power Company (NEPCO) which represents the off taker entity. The processes for the development of small and medium sized renewable energy systems were regulated through net metering and wheeling systems by NEPCO, in addition to the distribution companies, The Energy and Minerals Regulatory Commission (EMRC) issued guidelines on connecting these projects to the electrical grid.

Worth to mention that Administrative procedures are key to support deployment. Sound and tailored administrative procedures should therefore be developed, together with strategic initiatives, a summary of recommendations to further enable DSS were introduced in the previous study.[11]

9.1.1: Existing Opportunity

There are ongoing trends towards the transition to renewable energy in Jordan. According to the National Energy Sector Strategy 2020 - 2030, the renewable energy (installed and planned) capacity is expected to increase from 2,400 Megawatts (MW) in 2020 to 3,200 Megawatts (MW) in 2030, according to the action plan this capacity will be utilized to cover the end consumer needs through a model that has not yet been clarified in terms of whether or not it will follow the existing wheeling system or work on an entirely new model. PV power plants will be constructed, at a minimum of 20 to 50 megawatts (MW), using public government lands.

Electricity Demand is expected to increase despite the 2018 figures that reflected a reduction in demand at 2% compared to the year before. This is attributed to the traditional approach in which the demand for electricity is calculated that taking into consideration the increased income and is not computed based on the impact of installed renewable energy capacities.

The decentralized solar energy that is dedicated to self-consumption has proven its worth in converting electricity bills to zero-values. This has several economic and social impacts on SMEs, namely attributed to technological maturity and dramatically decreasing prices in the last decade. The high electricity tariffs remain a key reason for converting to renewable energy in Jordan.

9.1.2: The Challenges

Legislations, especially those related to project development methodologies, reflects directly on the ease of access to finance. Despite the announced targets to increase the renewable energy share in the total energy mix, progress in that direction seem to be slow in comparison to what has been achieved. The renewable energy capacity is supposed to increase over the upcoming decade by one third of what has already been installed during the last seven years.

The Cabinet Resolution that was issued at the beginning of 2019 calls for ceasing renewable energy projects exceeding 1 Megawatt (MW). This Resolution, albeit its validity, was issued due to some studies that are being undertaken by the MEMR concerning the assessment of the electricity grid

11 Decentralized Solar in Jordan, streamlining administrative procedures to maximize socio-economic benefits, 2019.

capacity. Recently, and based on the decreasing demand for electricity resulting from the lockdown because of the Coronavirus pandemic in 2020, NEPCO disconnected the renewable energy systems connected via wheeling scheme during the lockdown days, this in itself is an indication of the many technical challenges faced by the electrical grid and the level of seriousness to tackle these challenges and guarantee the ability of the grid to receive increasing amounts of renewable electricity in the future.

The suspension of the projects that exceed 1 Megawatts (MW) capacity, in addition to the hardship in getting approvals and permits to develop renewable energy projects and limited opportunities for future projects makes it hard to find ready to finance projects. This will adversely affect willingness of financial institutions to further engage in financing small and medium renewable energy projects and intentions of investing in building the capacities or develop the needed tools to mitigate correlated risks.

9.2 Public Financing Programs

The importance of Public financing programs lays in their ability to prepare an enabling investment environment, by designing the needed tools and programs that mitigate risks and obstacles investors face, which will be directly reflected on the availability of financing options for end user.

In this relatively new sector. The public finance share amounts to about 15% of the gross investment in the renewable energy sector,[12] worldwide. It is necessary to make the best of limited public funding; the developed programs and tools should help in mitigating the risks and barriers affecting private finance aimed at scaling up renewable energy investment and should apt to change according to the different developmental phases of technologies and the market.

Public financing programs and mechanisms are supposed to be re-directed from direct financing schemes through loans, grants, and concessional loans to designing of new tools that can increase the private sector and investors participation. This cannot be achieved unless staying up to date in terms of legislations and technical aspects that emerged in the sector, while keeping the needed support for financing projects that bear high social values.

9.2.1: The Central Bank of Jordan (CBJ)

In 2011, the Central Bank of Jordan launched a credit facility to support economic sectors and avail financing to all investment and operational purposes at low costs to increase the competitiveness of corporations, hence enabling them to expand their businesses and finance their operational activities based on concessional terms. The program value was 1200 million JOD, with a revolving ceiling. The program targeted 10 economic sectors, including the renewable energy sector, with 23% of the program budget allocated to this sector. The ceilings were set for all the sectors. The renewable energy sector had the highest celling of 4 million JOD and 10 years for repayment - with a 2-year grace period.

Financing is directed to the local banks at interest of 1.75% inside Amman. So local banks are capable to lend it to the final beneficiary at interest rate ranges between 4 - 5 %, whereas the offered interest to the rest of the Kingdom's governorates is 1%; the expected rate for refinancing through local banks is at 3.0 - 4.0%.

12 Unlocking Renewable Energy Investment: The Role of Risk Mitigation and Structured Finance, IRENA, 2016.

Interest rates were amended following the Coronavirus pandemic 2020 (COVID-19) and became 1% in Amman and 0.5% in the rest of the governorates. Lending from local banks is expected to be at an interest between 3.0% - 4.0% in Amman and 2.5% - 3.5% in the rest of the governorates.

Key Takeaways:

The Central Bank Program is one of the most important programs that give low cost finance and support the end beneficiary. Local banks and project developers appreciate the catalytic role of this program and its ability to expand small and medium sized energy projects in Jordan.
Among the most important aspects to be heeded to promote the role of the central bank are as follows:

- The program targeted segments include SMES however, their ability to benefit from this program is questionable. Most of these companies do not have audited financial statements hence find difficulties in fulfilling all the eligibility requirements that are needed for financial applications of this type.

- It is important to sustain continuous assessments of the market needs, and the demand for low-cost financing programs. The need varies according to the maturity of the renewable energy sector and its ability to attract investments and new financing resources. It is equally important to provide financing tools matching the current needs, so that they can overcome the risks related to the investments and financing such projects. Example - but not exclusively: creating and employing financial tools to mitigate the risk of interest rate fluctuations.

9.2.2: The Renewable Energy and Energy Efficiency Fund (JREEEF)

The Renewable Energy and Energy Efficiency Fund (JREEEF) was established in 2012 under the Renewable Energy and Energy Efficiency Law No. 13/2012. The fund was established under the umbrella of MEMR to establish and avail necessary funds and contributions for optimal utilization of renewable energy sources and energy consumption saving, inclusive small and medium renewable energy systems.

This was followed by the issuance of the Renewable Energy and Energy Efficiency Fund by-law in 2015 that set the working methodology of JREEEF, and defined its relations with the financial institutions, donors and concerned agencies that support renewable energy programs and projects.

Figure 6: Renewable Energy and Energy Efficiency Fund (JREEEF) Program

The sources of financing JREEEF are represented in annual public budgetary allocations in addition to foreign grants.

In light of the multiplicity of tasks that are entrusted to the Fund, several programs were developed to achieve the aspired goals. This included supportive programs to the household sector to install solar water heaters, systems and replacements of lighting fixtures; the industrial sector to conduct energy audit studies and install renewable energy systems; the tourism sector by supporting energy auditing services in addition to supporting public buildings.

The Photovoltaic Energy Systems Program for rooftops achieved a total of 13 Megawatts (MW) of small and medium sized systems that were installed; however, the lion's share of 73% was in favour of installed systems at government and public buildings; the rest were distributed among the agricultural, industrial and household sectors between 2015 - 2019. The total costs of this support reached about 19 Million JOD, while the total projects cost equals to 50 Million JOD.

Sectors	Agriculture	Industrial	Public Buildings		
			Schools	Local Associations	Worship Places
Financing Mechanisms	Interest Support	Interest Support	Grant 100% of the project's value	Grant 100% of the project's value	Grant 25% of the project's value
Projects Capacity (2015 - 2019)	**1.233** MW	**0.988** MW	**1.959** MW	**0.247** MW	**6.981** MW

Table 2: Key Programs and Methodologies of the JREEEF

9.2.2.0: Financing Windows

In order to execute JREEEF Program, it was necessary to cooperate with the concerned entities of each sector to facilitate the attainment of financing:

9.2.2.1: Agricultural Credit Corporation (ACC)

Towards the end of 2018, an agreement was drawn with the ACC to provide loans to farmers to install renewable energy systems and cover the consumptions that are not related to pumping out ground water from artesian wells, for a maximum of 15,000 JOD. JREEEF payed the interest rates throughout the payback interval. The corporation funded 124 agricultural projects, which amounted to one million Jordanian dinars, by the end of September 2020.

9.2.2.2: Jordan Chamber of Industry (JCI)

The establishment of the Energy Unit coincided with the start of JREEEF programs in 2015, industrial sector programs were implemented through this Unit. Funds were provided to 65 factories to conduct energy audit studies at 50%-50% sharing between the Fund and the final beneficiary. Furthermore, the energy efficiency technology implementation was included by supporting interest rates within a ceiling of 350,000 JOD. The decentralized solar energy systems were supported as well, allowing 18 factories to install photovoltaic systems. Thereafter the program was stopped and restricted to support energy efficiency measures only.

9.2.2.3: Local Associations

Building on the successful experience of the United Nations Development Programme (UNDP) in allocating the granted funds from the Global Environment Facility (GEF) to support local associations in terms of installing photovoltaic systems and solar water heaters for houses, contracts were made with 190 local associations, which were geographically distributed across the entire Kingdom to assist local communities to install solar PV systems by applying for the easy pay-back revolving fund.

9.2.2.4: Local Banks

Agreements were made with several local banks to implement a concessional financing program to the household sector, where financial support and loans are given to end consumers, 30%of the total cost of the system was offered as a grant through JREEEF. The beneficiary would then pay back the remaining part of the sum, i.e. 70% of the total cost of the system, over 48 months, within a higher ceiling of no more than 3.6 kilowatts (kW) or its value of 1,980 JOD.

Key Takeaways:

The support that is being provided by this Fund in the form of full or partial grants, in addition to supporting interest rate, has been adopted and implemented by many local banks, associations and consumer corporations to facilitate accessibility to whoever is interested. This is a vital support that is necessary to promote these types of projects. Work has been done continuously to improve the services provided by the fund; the simplification of application procedures, freedom for the beneficiary to choose the company that will implement the project, and the ability to pay the remaining sum in instalments. However, there are many remarks on the ongoing programs and the implemented mechanisms, namely:

- The readiness of financing windows to provide the service to the beneficiaries and their competencies in executing the program in the case of the local civil society associations.
- Lack of clarity in executing projects through intermediary agencies, lack of necessary studies to identify beneficiaries according to a well-studied eligibility criteria.
- Lack of a banking culture related to the needed requirements for each transaction, during the preparation of the programs which could have incorporated the easier adoption mechanisms by local banks to different programs.
- Lack of monitoring and evaluation programs that guarantee performance monitoring of all the financing windows and the intermediary agencies.
- Hardship in achieving the eligibility requirements to apply for support, particularly the first version of the Fund programs.
- The challenges that are faced by the implementing agencies, namely the payment instalments over the project lifetime, the financial dues that are adversely affecting the cash flow of the companies.
- Lack of an open database to monitor the beneficiaries from the program, so as not to overlap with other programs.

9.2.3: 'Fils al Reef'

In 2019, MEMR called upon the beneficiaries from the National Aid Fund to benefit from a project that installs photovoltaic and solar water heaters systems that is fully funded by the Ministry to benefit about 7,000 families annually across all the governorates in the Kingdom. The project aims at easing the monthly electricity bills burden, and expanding the segment of beneficiaries of 'Fils Al Reef' inside and outside the regulated areas that are connected to the electrical grid, not to mention the other benefits of expanding renewable energy usages. Ultimately, the project aims to reach 100,000 families of the beneficiaries from the National Aid Fund over several years.

By the end of 2019, the project had been carried out over two phases. The total number of beneficiaries from the first phase were 2,213 families and from the second phase 3,166 families at 2 kilowatts (kW) per family.

Key Takeaways:

This joint program between the Directorate of Fils Al Reef and the National Aid Fund, constitutes an important method that supports the spread of renewable energy projects among the less fortunate; it also brings forth projects that bear economic and social dimensions that touch all segments and strata of the community; it contributes to reducing the size of the segments that benefits from subsidized electricity tariffs; hence paving the way to mitigate cross subsidy and address the deformities in the electricity tariffs.

It is essential to conduct the needed studies to derive whether those beneficiaries have the technical capabilities to receive the photovoltaic energy system and ensure the sustainability.

9.3 The Role of International Financing Institutions

International financing institutions (IFIs) had a large role to play in the success of the direct proposal projects. The European Bank for Reconstruction and Development (EBRD) and the International Finance Corporation (IFC) funded most of the renewable energy projects of the first round and the infrastructure projects related to the electrical grid upgrading to increase its ability to host renewable energy projects. Moreover, IFIs had a vital role to play in technical assistance related to the standardization of the power purchase agreements and negotiating with investors and government authorities on behalf of the investors and project developers.

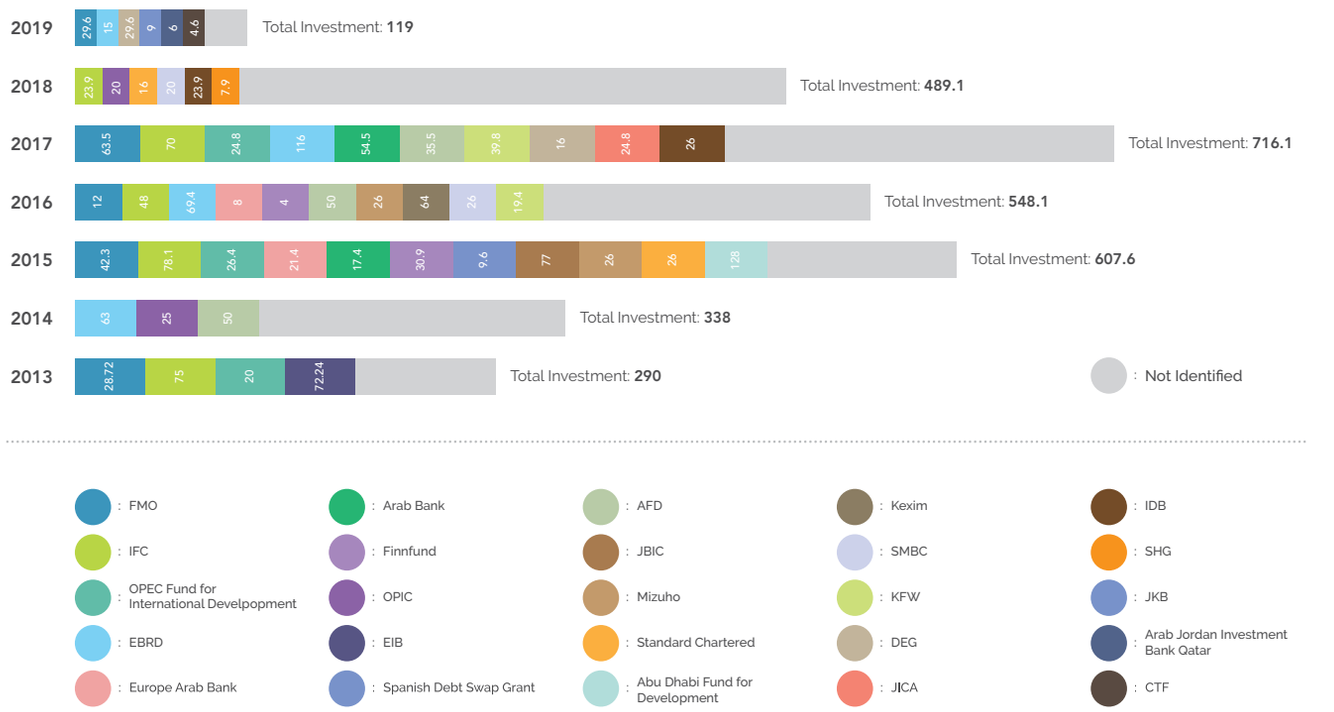

Figure 7: Financing Institutions Involved in Financing Renewable Energy Projects in Jordan (2013-2019) [13]

9.4 The Role of Local Banks

Ihe role played by local banks in financing renewable energy projects allowed some banks to build their capacities to work on project financing scheme, which enabled them to co-finance utility scale projects; while others continued to work on financing renewable energy projects through existing corporate financing programs. Local banks became active as the sole financing window to CBJ program and one of the financing windows to the JREEEF programs.

Furthermore, the role of local banks developed to a great extent simultaneously with the progress and development of the sector. It had been limited during the first development stage due to the lack of clarity on investment risks, technical and legal hardships that reflected on the structure of financing those projects; calling for qualified competencies. The capability of banks to lend for prolonged tenors - is also an unpresented matter.

The issuance of the law on placing movable assets as debt securities in 2018, enabled banks to go for contracts of pledges /pawning where it comes to the renewable energy projects, and hence increase their ability to finance RE projects.

13 Annex 1.

Other than the involvement in the public financing program some local banks such as Jordanian Islamic banks developed a bargaining scheme for small scale projects, in collaboration with renewable energy companies, in which the end user can pay the price of the system in instalments for 36 months.

Among the most crucial challenges that stood in the way of local bank engagement in renewable energy sector, or sufficiently so, was their ability to respond to rising financing opportunities, the reliance on corporate finance scheme and not being open to investing in building the capacity to deal with project financing type of transactions, particularly on the technical and contractual sides.

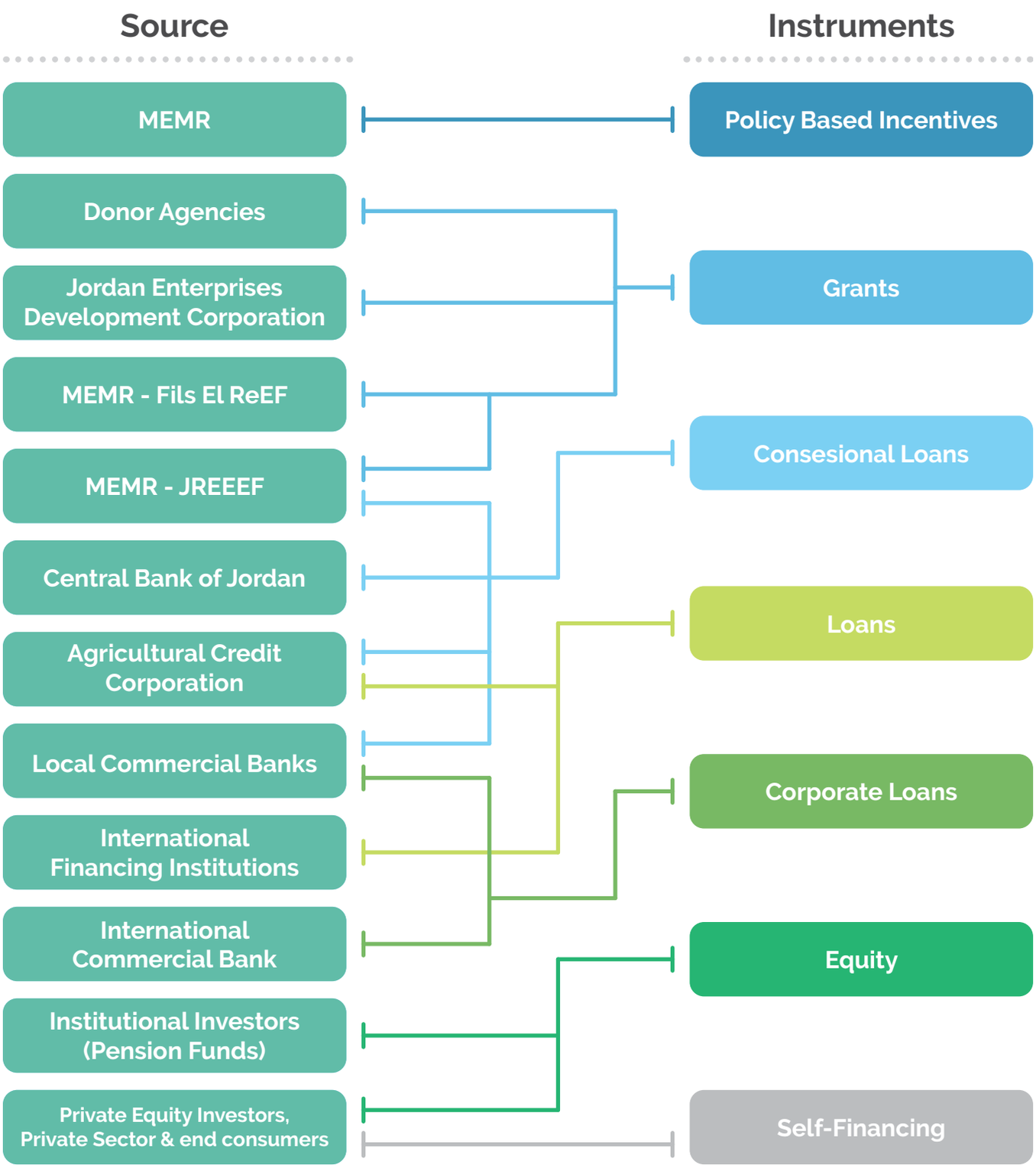

Figure 8: Renewable Energy Financing Landscape in Jordan

The clarity of the strategic direction towards the transition to self-reliance through investments in renewable energy resources, both utility and decentralized system, amongst the consecutive governments plans is the most important signal anyone interested in developing, investing, and funding such projects would look for. In this regard IRENA coalition[14] placed great emphasis on the clarity for long-term renewable energy targets and implementation strategies in addition to the importance of the stability of regulatory renewable energy frameworks.

Decision makers have to work on what guarantees the actual realization of this directive in terms of upgrading the electrical grid to cope with the increasing amounts of renewable energy, in addition to introducing storage projects and expedite the renewable energy connectivity projects with neighboring countries. Hereunder are the main specific recommendations that need to be taken into consideration to increase the access to finance and therefore will lead to an increase in the share of decentralized renewable energy systems in the total energy mix.

10.1 Public Financing Programs

- Develop the needed tools and mechanisms that contribute to the facilitation of financing in Jordanian Dinars and design the needed financial instruments that mitigate risks connected to the interest rate fluctuations.

- Work on the sustainability of the support that is given by JREEEF in such a way that would guarantee the non-dependency of the Fund on foreign grants, design financing products and programs commensurate the investment needs.

- Prepare public funding programs in cooperation with the concerned stakeholders in such a way that would guarantee a product that takes into consideration the nature of the institutions and facilitates implementations and applications; this has to be compatible and coincident with raising the awareness and building workers' capacities in this regard - to deal with such programs.

- Create an electronic platform that gathers information from all those concerned with financing renewable energy projects in Jordan; this includes a database on existing programs, progress mechanisms and benefiting entities.

- Improve the access to public financing programs by easing the application process through re-scoping the application forms based on sectors that consider and cater for the differences among the end beneficiaries; work on stipulations that decrease financing applications requirements to the minimum acceptable level.

- Similar to the rapid decrease in solar PV technology costs, boosted by pubic financial support in the past (through feed-in tariffs or investment grants), new technologies such as storage (that will help grid integration of renewables) requires public financial support to achieve further economies of scale. Solar & storage, which enable higher self-consumption rates, needs to be supported through the correct metering/support mechanisms (correctly designed feel-in tariffs and net-billing schemes) and grants in order to be profitable for the consumers and to drive down technology costs in the future.

14 Scaling Up Renewable Energy Investment in Jordan, IRENA Coalition for Action,2020.

10.2 Local Banks

- Keep abreast of all the recent developments and updates of project financing scheme by building the right competencies that can handle all the technical and contractual requirements.

- Work hand in hand with regional and international project sponsors to be able to cater to financing needs from renewable energy projects

10.3 International Funding Agencies

- Build and develop the local banks competencies towards project financing schemes and keep Up-to-date with the financing mechanisms in that direction; furthermore, take the necessary steps to help banks deal with next stage energy performance-based financing tools

- Cooperate with the local financing institutions to convert floating interest rate into fixed interest rate by developing the needed tools and swaps.

Acronym	Description
AFD	Agence Francaise de Developpement
CTF	Clean Technology Fund
DEG	Deutsche Investitions- und Entwicklungsgesellschaft
EBRD	European Bank for Reconstruction and Development.
EIB	European Investment Bank
Kexim	Export-Import Bank of Korea
Finnfund	Finnish Fund for Industrial Corporation
IFC	International Finance Corporation
IDB	Islamic Development Bank
JICA	Japan International Cooperation Agency
JBIC	Japan Bank for International Cooperation
JKB	Jordan Kuwait Bank
KfW	Kreditanstalt für Wiederaufbau
FMO	Netherlands Development Finance Company.
SHG	Shinhan Financial Group
SMBC	Sumitomo Mitsui Banking Corporation
OPIC	U.S. International Development Finance Corporation

Project	Year	Investment (MM USD)	Capacity (MW)	Debt (MM USD)	Debt Providers	Provided (MM USD)	Source
Tafila Wind Farm	2013	290	117	195.96	EIB	72.24	https://ppi.worldbank.org/en/snapshots/project/tafila-wind-farm-7618
					FMO	28.72	
					IFC	75	
					OPEC Fund for International Development	20	
EJRE Solar PV Plant	2014	65	20	48	AFD	24	https://ppi.worldbank.org/en/snapshots/project/tafila-wind-farm-7618
					EBRD	24	
Oryx Solar PV Plant	2014	30	10	26	AFD	13	https://ppi.worldbank.org/en/snapshots/project/oryx-solar-pv-plant-8286
					EBRD	13	
Green Land Solar CPV Plant	2014	30	10	26	AFD	13	https://ppi.worldbank.org/en/snapshots/project/green-land-solar-cpv-plant-8287
					EBRD	13	
SunEdison Ma'an Solar Power Project	2014	66	23.8	50	EBRD	25	https://ppi.worldbank.org/en/snapshots/project/sunedison-maan-solar-power-project-8283
					DFC	25	
Ma'an Wind Project 1+2	2014	147	80		-	-	https://www.sunwindenergy.com/wind-energy/gamesa-to-expand-wind-farm-jordan

Project	Year	Investment (MM USD)	Capacity (MW)	Debt (MM USD)	Debt Providers	Provided (MM USD)	Source
Shams Ma'an Power Generation PSC	2015	168	53	129	JBIC	77	https://ppi.worldbank.org/en/snapshots/project/shams-maan-pv-solar-power-plant-8306
					Mizuho	26	
					Standard Chartered	26	
Falcon Ma'an Solar PV Plant	2015	50	21	33.1	Finnfund	3	https://ppi.worldbank.org/en/snapshots/project/falcon-maan-solar-pv-plant-8289
					FMO	7.5	
					IFC	9.6	
					Europe Arab Bank	4	
					OPEC Fund for International Development	9	
Jordan Solar One PV Power Plant	2015	70	20	43.5	Arab Bank	8.7	https://ppi.worldbank.org/en/snapshots/project/jordan-solar-one-pv-power-plant-8294
					Finnfund	8.7	
					FMO	8.7	
					IFC	17.5	
					Europe Arab Bank	8.7	
Al Ward Al Joury Solar PV Plant	2015	30	10	23	Arab Bank	2.4	https://ppi.worldbank.org/en/snapshots/project/al-ward-al-joury-solar-pv-plant-8291
					Finnfund	2.4	
					FMO	2.4	
					IFC	11	
					Europe Arab Bank	2.4	
					OPEC Fund for International Development	2.4	
Al Zahrat Al Salam Solar PV Plant	2015	30	10		Arab Bank	2.4	https://ppi.worldbank.org/en/snapshots/project/al-zahrat-al-salam-solar-pv-plant-8292
					Finnfund	2.4	
					FMO	2.4	
					IFC	11	
					Europe Arab Bank	2.4	
					OPEC Fund for International Developmen	2.4	
Al Zanbaq Solar PV Plant	2015	30	10	23	Arab Bank	2.4	https://ppi.worldbank.org/en/snapshots/project/al-zanbaq-solar-pv-plant-8293
					Finnfund	2.4	
					FMO	2.4	
					IFC	11	
					Europe Arab Bank	2.4	
					OPEC Fund for International Development	2.4	

Project	Year	Investment (MM USD)	Capacity (MW)	Debt (MM USD)	Debt Providers	Provided (MM USD)	Source
Shamsuna Solar PV Power Plant	2015	20	10	15	Arab Bank	1.5	https://ppi.worldbank.org/en/snapshots/project/shamsuna-solar-pv-power-plant-8282
					Finnfund	1.5	
					FMO	1.5	
					IFC	7.5	
					Europe Arab Bank	1.5	
					OPEC Fund for International Developmen	1.5	
Arabia One	2015	30	10	21	Finnfund	10.5	https://ppi.worldbank.org/en/snapshots/project/arabia-one-solar-pv-power-plant-8290
					IFC	10.5	
Al Quweira	2015	128	103		Abu Dhabi Fund for Development		http://enviromena.com/casestudies/quweira-103-mw-solar-power-plant/
Azraq Camp	2015	9.6	2		Spanish Debt Swap Grant		https://www.unhcr.org/news/latest/2017/5/591bfdbb4/jordans-azraq-becomes-worlds-first-clean-energy-refugee-camp.html
Al Badiya Philadelphia	2015	42	8		AFD	-	https://www.philadelphia-solar.com/news/page/40/en/al-badiya-second-phase-expansion-cod-18th-feb-2019
					Central Bank of Jordan	-	
Fujeij Wind Farm	2016	197	89	116	Kexim	64	https://www.evwind.es/2019/10/16/jordans-fujeij-wind-energy-project-inaugurated/71345
					Mizuho	26	
					SMBC	26	
Al Rajef Wind Farm	2016	185.1	82	133.8	AFD	50	https://ppi.worldbank.org/en/snapshots/project/al-rajef-wind-farm-8851
					EBRD	69.4	
					KfW	19.4	
Al Mafraq PV IPP Project	2016	71	50		EBRD	39.2	https://www.elecnor.com/resources/files/1/projects/en/referencia-maan-jordan-en.pdf
					AFD	-	https://www.mottmac.com/releases/al-husainiyah-pv-plant-reaches-financial-close-jordan
Mafraq FRV Solar Plant	2016	95	50	72	Finnfund	4	https://ppi.worldbank.org/en/snapshots/project/mafraq-frv-solar-plant-8829
					FMO	12	
					IFC	24	
					Europe Arab Bank	8	
					IFC - Canada Climate Change Program	24	
Zaatri Refugee Camp	2017	17.4	11.1	15	KfW	-	https://www.unhcr.org/news/latest/2017/11/5a0ab9854/jordans-zaatari-camp-green-new-solar-plant.html

Project	Year	Investment (MM USD)	Capacity (MW)	Debt (MM USD)	Debt Providers	Provided (MM USD)	Source
Risha Solar Plant	2017	69	50	54	Arab Bank	16	https://ppi.worldbank.org/en/snapshots/project/risha-solar-plant-9267
					EBRD	22	
					DEG	16	
Shobak Wind Farm	2017	104	45	78	Arab Bank	26	https://ppi.worldbank.org/en/snapshots/project/shobak-wind-farm-9360
					EBRD	26	
					IDB	26	
Empire Solar PV Plant	2017	98.4	50	71	AFD	35.5	https://ppi.worldbank.org/en/snapshots/project/empire-solar-pv-plant-9032
					EBRD	35.5	
Safawi Solar Plant	2017	93.9	51	65	EBRD	32.5	https://ppi.worldbank.org/en/snapshots/project/safawi-solar-plant-9226
					FMO	32.5	
Baynouna Solar PV Plant	2017	280	200	188	Arab Bank	12.5	https://ppi.worldbank.org/en/snapshots/project/baynouna-solar-pv-plant-9285
					FMO	31	
					IFC	70	
					JICA	24.8	
					KfW	24.8	
					OPEC Fund for International Developmen	24.8	
King's Academy	2017	4	2.6		-	-	https://www.kingsacademy.edu.jo/news-and-events/school-news/news/~board/home-news/post/acwa-power-donates-solar-power-plant-to-kings-academy
East Amman PV Project	2017	50	52		-	-	https://www.pv-tech.org/news/jordan-minister-lays-foundation-stone-for-52mw-solar-project
Abour Wind Farm	2018	113	50		IFC		https://www.ameapower.com/projects/
					Islamic Development Bank		
MASS Wind Farm	2018	201	100		-	-	http://www.massgroupholding.com/English/Newsdetail-unit_2.aspx?jimare=14&title=Wind%20Power%20Project%20-%20AlTafila&cor=7
Hashemite Solar Plant	2018	50	52	40	OPIC	20	https://ppi.worldbank.org/en/snapshots/project/hashemite-solar-plant-9454
					SMBC	20	
Daehan Wind Power Plant	2018	103	50	71.7	IDB	23.9	https://ppi.worldbank.org/en/snapshots/project/daehan-wind-power-plant-9610
					IFC	23.9	
					Shinhan Financial Group (SHG)	7.9	
					Standard Chartered	16	

Project	Year	Investment (MM USD)	Capacity (MW)	Debt (MM USD)	Debt Providers	Provided (MM USD)	Source
Al Badiya Solar Plant Expansion	2018	12	11	-	-	-	https://ppi.worldbank.org/en/snapshots/project/al-badiya-solar-plant-expansion-9445
Expansion of Azraq PV	2018	10.1	5.75	-	IKEA Foundation's Brighter Lives for Refugees		https://reliefweb.int/report/jordan/azraq-refugee-camp-continues-embrace-clean-energy
Al Husainiyah	2019	74	50	59.2	FMO	29.6	https://ppi.worldbank.org/en/snapshots/project/al-husainiyah-solar-power-plant-10234
					DEG	29.6	
Orange Solar Farms EPC	2019	45	37	35	EBRD	15	https://www.unhcr.org/news/latest/2017/5/591bfdbb4/jordans-azraq-becomes-worlds-first-clean-energy-refugee-camp.html
					JKB	9	https://www.pv-tech.org/news/jordan-minister-lays-foundation-stone-for-52mw-solar-project
					Arab Jordan Investment Bank Qatar	6	
					CTF	4.6	