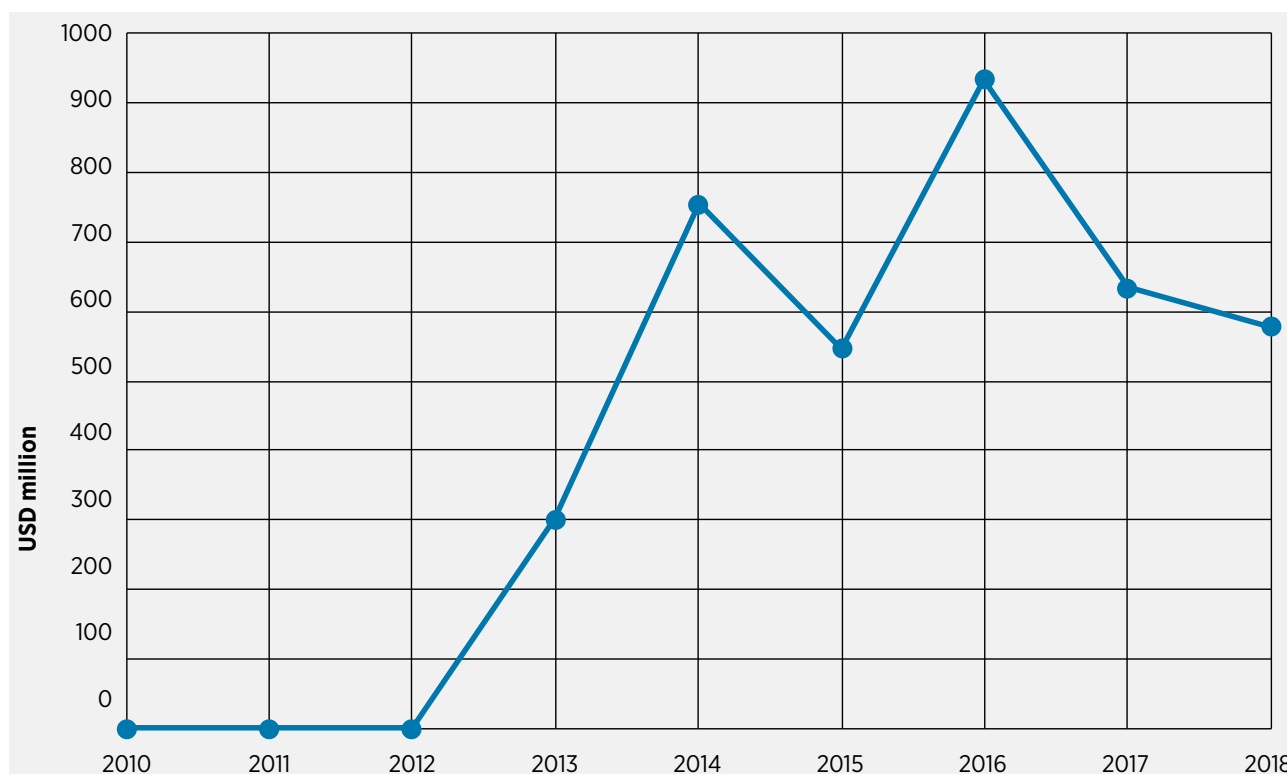


4.2 Catalysing investments to meet renewables ambition

Investment flows into the renewable energy sector have grown substantially since the Renewable Energy and Energy Efficiency Law (13) of 2012 was passed. Beginning from a negligible base in 2012, investments rose in 2013 to USD 300 million, rising to USD 935 million in 2016 and reaching USD 580 million in 2018 (Figure 11). A large share of the investments were targeted at solar PV and wind projects being developed under the various schemes discussed in the previous section.

The share of foreign investment in the sector is high at 75%, with limited participation of the local financial institutions especially in the utility-scale segment (Climatescope/BNEF, 2019). The key actors involved in the renewable energy financing ecosystem in Jordan vary greatly depending on the scale and nature of the project. These usually involve local and international commercial banks, development finance institutions, the Central Bank of Jordan, NEPCO, the Jordan Renewable Energy and Energy Efficiency Fund and enterprise development entities, as well as a number of donor agencies such as Foundations and National Development Banks. Table 4 provides an overview of the main stakeholders and the main areas of financing activities.

Figure 16. Investment in renewable energy in Jordan (2010-2018)



Source: Climatescope/BNEF (2019)

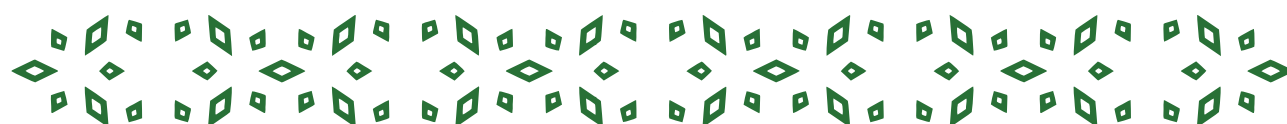


Table 4. Overview of stakeholders and main areas of financing activities

	Utility-scale	Distributed	Transmission and distribution infrastructure	SME financing	Technical assistance and capacity building
Local commercial banks (e.g., Cario Amman Bank, Bank al Etihad, Arab Bank, Bank of Jordan)	X	X		X	
International commercial banks (e.g., Standard Chartered, Shinhan Bank)	X				
Development finance institutions (e.g., EIB, EBRD, Netherlands Development Finance Company FMO, German Investment Corporation – KfW DEG, ADFD, IFC, JICA)	X	X	X		X
Government grants (e.g., EU, Spain)	X		X		X
Foundations/Donor agencies (e.g., IKEA Foundation, NRC)	X	X			X
Central Bank of Jordan		X (on-lending)			
NEPCO			X		
JREEEF		X		X	X
Jordan Enterprise Development Corporation				X	X
Jordan Chamber of Industry Factories Support Programme		X			

Note: denotes relevant area of financing activity

Financing utility-scale renewable energy projects and infrastructure

International development finance institutions have actively participated in the financing of utility-scale renewable energy projects. Unless developed under government-to-government agreements, the majority of the utility-scale plants have been developed under a project financing structure. Table 5 provides an overview of the financing structure of selected utility-scale solar and wind projects in Jordan, as well as the Green Corridor transmission project.

The European Bank of Reconstruction and Development (EBRD) has played a key role as a financier of renewable energy projects and infrastructure in Jordan. EBRD has committed over USD 350 million so far for a total of 392 MW of utility-scale wind and solar projects in Jordan.¹⁵ The majority of the investments are in the form of senior secured loans, in partnership with other financiers involving

commercial banks (e.g., Europe Arab Bank) and development finance institutions (e.g., Development Energy Bank, Netherlands Development Finance Company [FMO], Proparco [subsidiary of the French Development Agency]). The International Finance Corporation (IFC) has also played a key role in the financing of renewable energy projects in Jordan as a direct financier as well as a lead arranger for project financing.

While some local banks are co-financing large projects with multilateral development banks, the local financial institutions are still not very actively involved with utility-scale renewable energy financing, especially related to non-recourse financing that requires larger volumes of investment, longer tenor and unique documentation. Over time, capacity is being developed as the understanding of the sector improves. Increasingly, local banks are involved in refinancing projects that initially received international financing.

¹⁵ www.ebrd.com/work-with-us/project-finance/project-summary-documents.html?l=1&filterCountry=Jordan

Table 5. Insights on financing structure of selected utility-scale projects

Type of project	Project	Financing structure
Solar PV	60.3 MW King Hussein Bin Talal development area, Mafraq region	Two USD 27 million loans: A loan from EBRD and B loan from FMO.
	133.4 MW FRV Al Mafraq	Mafraq I received financing from the IFC, FMO and the Europe Arab Bank.
		Mafraq II received financial support the EBRD and the Society for Proparco.
	50 MW Risha	EBRD provided a senior secured limited recourse loan of up to USD 27.6 million. The German Development Bank (DEG) and Arab Bank met the rest of the financing requirements.
	200 MW Baynouna	An IFC-arranged financing package included a USD 54 million loan from the IFC and USD 134 million from other senior lenders, including Japan International Cooperation Agency (JICA). Other lenders included FMO, Europe Arab Bank, the OPEC Fund for International Development and DEG.
	103 MW Al Quweira	The project is funded by MEMR through a grant from the Abu Dhabi Fund for Development.
51 MW Al Safawi	Up to USD 70 million senior secured loan split between EBRD and FMO.	
Onshore wind	50 MW New Tafileh Wind – “Korea Southern Power Company Ltd.” & “Daelim Energy Company Ltd.”	The IFC is 1) providing a USD 10 million loan for its own account; 2) structuring an equity bridge loan of USD 26 million – its first in project financing; and 3) mobilising loans of USD 26 million from its Managed Co-Lending Portfolio Programme, as well as USD 27.7 million from Standard Chartered Bank and USD 8 million from Korea’s Shinhan Bank.
	89.1 MW Fujeij	USD 6 million direct loan by the Export-Import Bank of Korea (K-Exim) and a USD 52 million K-Exim covered facility provided by Mizuho Bank Ltd. and Sumitomo Mitsui Banking Corp. Europe Ltd. Equity bridge facilities of a combined USD 81 million are being funded by commercial banks.
	82 MW Al-Rajef	EBRD approved a USD 68 million loan, while Proparco provided USD 50m project financing. A USD 19 million loan will later be provided by DEG.
	45 MW Shobak	Provision of a senior secured loan by EBRD of up to USD 52 million.
Transmission infrastructure	Green Corridor	EBRD extended a USD 72 million loan, Proparco provided a USD 55 million soft loan, NEPCO contributed USD 12.6 million, and the EU provided a grant of USD 20.2 million.

Source: Rahim and Eid (2017); Carvalho (2018); EBRD (2016); Maisch (2017), EBRD (n.d.)



Financing self-consumption and small-scale renewables

The scale of self-consumption renewable energy projects can vary from tens of megawatts of wheeling projects to a few kilowatts of net metered installations for use by households or public buildings/institutions. With the exception of a few large wheeling projects – such as the 37 MW Orange Jordan project, which follow a similar financing structure to large utility-scale projects – self-consumption projects generally see a stronger participation of local financing institutions. Such projects also benefit from several government finance promotion programmes by the Central Bank of Jordan (CBJ) and the JREEEF.

Since 2011, the CBJ has offered a credit facility with reduced interest rates to support economic activities in nine key sectors, including renewable energy and energy efficiency. It offers a low interest rate to local banks of around 1.75% for projects in Amman and 1% for projects outside Amman, allowing these banks to on-lend at final interest rates up to 4.5% for projects up to a limit of JOD 4 million (USD 5.6 million). As part of the post-Covid-19 recovery plan for Jordan, interest rates of around 0.75% are offered inside Amman and 0.5% outside Amman. The facility offers the loan for a period that can reach ten years with a one-year grace period. As of December 2018, more than 270 renewable energy and energy efficiency projects have been financed, amounting to JOD 182 million (USD 257 million). The CBJ's concessional financing scheme can only be accessed by the beneficiary and not the project implementor. With certain beneficiaries unwilling to take debt against their balance sheets, several developers have asked the CBJ to consider expanding the programme for them to take loans on behalf of end-users.

While the CBJ programme for renewable energy and energy efficiency is part of a broader package to support economic activities, it serves as an important blueprint for tailored financing programmes for sectors covering specific end-use sectors and applications (e.g., dedicated funding line for industries, portfolio financing of developers). Such programmes will support the objective of local banks being more aggressively involved in financing non-utility-scale renewable energy projects. A key lesson from the CBJ programme has also been the need to focus on capacity building of project proponents on project documentation preparation, including costings and feasibility analysis.

JREEEF implements dedicated public financing programmes for renewable energy and energy efficiency. JREEEF offers financial support to consumers through loan guarantees, interest rate subsidies and grants for solar water heaters and PV systems, as well as for implementing energy efficiency measures (e.g., solar streetlights, energy audits in industries). JREEEF had a programme that offered loan guarantees and covered interest on loans, while also offering grants of up to 50% for solar water heaters and 30% for solar PV (up to 2 kilowatt -peak (kWp) through 220 local CBOs building on the experience of the Global Environmental Finance (GEF) Small Grants Programme (Box 7). Over 24 000 solar water heaters have been installed under the now-concluded programmes (JREEEF, 2020).

A new programme for 30% support on solar water heater and solar PV systems up to 3.6 kW was issued in November 2019 (Bellini, 2019). For this phase of the programme, JREEEF is partnering with local commercial banks, such as the Jordan Islamic Bank, for the provision of soft loans for renewable energy systems including household PV systems and solar water heaters (Bank of Jordan, 2017). The banks offer attractive loans to cover 70% of the system costs, while JREEEF takes 30-50% of the cost of the system or the full grant for end-users with limited creditworthiness so that the beneficiaries receive almost interest-free loans.

A key difference between the subsequent JREEEF programmes has been that end-users are now able to select among different accredited technology suppliers and access financing by approaching various commercial banks. This compares to the earlier case wherein a single supplier had been selected through a competitive process to supply all systems deployed through CBOs. A key challenge with the new phase has been that the customers looking to secure financing from commercial banks are not able to meet the bankability requirements, which are more stringent compared to lending through CBOs. Further, limited experience among participating banks and the challenge faced by installers to unlock financing available for end-users through the new JREEEF programme have been identified. Targeted capacity building programmes are needed to strengthen Green Lending Units within financing institutions by improving awareness of technologies and financing programmes (at the branch-level) and understanding of accurately estimating the risks and costs of renewable energy projects.

JREEEF also provides financial support to industry for conducting energy audits. It covers 50% of the cost of the audit. There are lessons that can be extracted from the energy audits with the opportunity to develop industry-specific recommended energy-saving measures and energy-use indexes.

Another public financing instrument that has been established is the Rural Electrification Fund (Fils Il Reef). The MEMR has issued the first round out of several to install 2113 solar PV systems of 2kW size that will be installed at no cost for applicants with sufficient roof space, those who are on national support (approximately 85 000 families) and have monthly electricity consumption under 300 kWh.

Financing renewable energy enterprises

Renewable energy enterprises have varying funding needs depending on the part of the renewable energy value chain they are part of. Jordan has established entities that offer equity products to new and established companies. The Jordan Enterprise Development Corporation (JEDCO), for instance, supports start-up companies by allowing up to 80% of equity in renewable energy projects, as well as SMEs. The cost of equity is significantly reduced because JEDCO requires only a 10% return on any profits. However, the fund has not seen great take-up (RCREEE, 2018). The World Bank also launched the Innovative Startups Fund Project in Jordan with a USD 50 million investment complemented by USD 49 million in co-financing from the CBJ. It has been designed to provide early stage financing for start-ups across several sectors, including green energy (World Bank, 2017).

A non-refundable capital subsidy for small industrial enterprises looking to install either solar PV or solar water heaters is offered by the Jordan Chamber of Industry Factories Support Program. The programme's objective is to familiarise industry with the technology by installing small projects. The subsidy covers up to 50% of the product costs if the product is made in Jordan and up to 35% if the product is imported (IRENA, 2018; RCREEE, 2018).

The development of dedicated enterprise funds can play a catalytic role in supporting local industry and facilitating innovation in the renewable energy sector as well as complementary technologies such as storage, smart grids, demand side management and digitisation.

Box 7. Revolving fund for solar water heaters: The case of United Nations Development Programme (UNDP)-GEF and Sustainable Energy and Economic Development (SEED) project

The GEF Small Grants Programme provides grants of up to USD 50 000 directly to local communities including CBOs and other NGOs to set up revolving funds to finance renewable energy projects. In addition, the grants focus on building awareness and capacity among local communities on the benefits of renewable energy solutions. Through the programme, over 435 solar water heaters and 100kW solar PV systems have been developed since 2009. The use of the revolving fund financing instrument – small grants of USD 50 000 – has mobilised over USD 579 000 (JOD 406 000) worth of investments in renewable energy systems. The impacts of the programme have been multifold: lower expenditure on traditional fuels, reduced deforestation and emissions, improved health outcomes and biodiversity conservation.

SEED is a programme funded by the Global Affairs Canada and JREEEF from 2016 to 2020. It aims to improve the livelihoods, well-being and resilience of poor and disadvantaged groups in the Jordan Valley and Ajloun regions through uptake of renewable energy and energy efficiency measures. SEED worked in partnership with local CBOs to design a financing programme for solar water heaters and solar PV: the beneficiary pays 25% as down-payment, 50% is capital subsidy and the remainder is paid in instalments to the local CBO. The proceeds from the instalments create a revolving fund for CBOs to continue supporting the community after the project concludes. So far, over 1300 solar water heating systems and 987 on-grid solar PV systems have been installed. In addition, six public schools and five health clinics were equipped with 150 kWp on-grid PV systems and 12 solar water heaters.

4.3 Conclusion

The renewable energy sector in Jordan has grown rapidly over the past decade on the back of a robust policy and regulatory framework. The sector is at an important juncture. There is a strong track record of deploying renewables in the power sector, with a growing number of applications being demonstrated in heating/cooling and transport. Jordan can leverage the momentum and deepen the energy transition towards renewables. A continuing pursuit of renewable energy promises that a more secure, resilient and environmentally sustainable energy system can also be affordable, support industrialisation and bring a wide range of socio-economic benefits.

As argued in this chapter, to support the next phase of growth for renewables in Jordan, a broader policy mix will be needed that focuses on deployment, integration and the enabling conditions at the sector level to maximise benefits (e.g., local industry development, skills). Further, to unlock future growth of renewables, efforts for demand creation and electrification of end-uses will be crucial. Based on the analysis and extensive stakeholder engagement, the next chapter summarises the key recommendations for policy makers to scale up renewables deployment. Renewable energy should be seen in tandem with energy efficiency as mutually reinforcing components for Jordan to reach higher shares of local energy resources in the energy mix and reduce dependence on imported fuels. Box 7 outlines the current framework for energy efficiency in Jordan, highlighting the key aspects and emerging issues.



Box 8. Framework for energy efficiency in Jordan: Key aspects and emerging issues

The Renewable Energy and Energy Efficiency Law (13) of 2012 underlines the importance of pursuing renewable energy and energy efficiency in tandem. In addition to improving the reliability, security and cost-effectiveness of energy supply, a key objective of the National Energy Strategy 2007-2020 was also to improve energy efficiency to reduce imports and postpone the need for new investment.

In 2013, Jordan adopted its first NEEAP, which covered the period 2012-2014. It set a target of reducing energy consumption by 7.1% by 2014 (relative to the average consumption between 2006 and 2010). The target was divided across sectors: residential, industrial, commercial, water pumping and street lighting. The programme met with some success, reaching about 40% of the reduction originally targeted (Hamzeh, 2018). Jordan decided to update the NEEAP for the period 2018-2020, setting a target of reducing electricity consumption by 17.5% by 2020 (1975 GWh) compared to the annual average electricity consumption of the five-year period 2010-2014. Half of the reductions will be delivered from the residential sector, followed by industry and commercial and services.

Bylaw 73 (2012) mandates energy audits for all large consumers. However, enforcement has been a key challenge. The JREEEF and Jordan Chamber of Industry have targeted financing programmes for energy audits; however, the penetration has been very low due to lack of enforcement and awareness. Industry-specific expertise is also lacking to conduct energy audits and draw meaningful lessons to develop tools such as a sector-specific energy-use index.

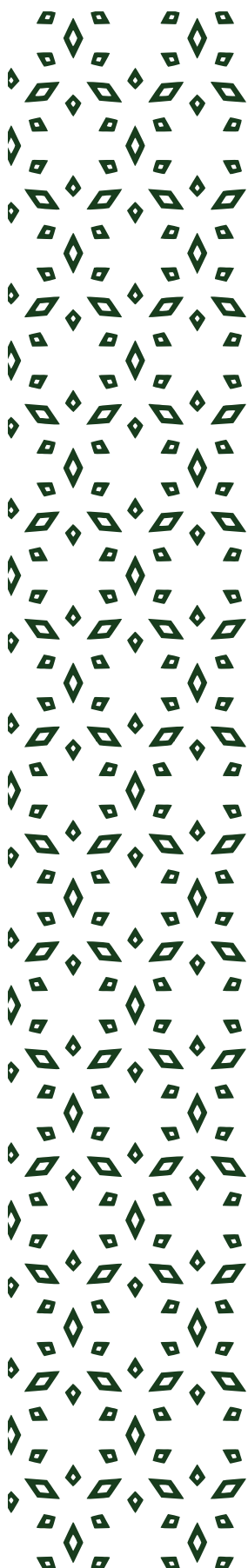
With lack of awareness and end-users' hesitance to spend on energy audits, improving the regulatory environment for energy efficiency service companies (EESCOs) and developing the capacity of industry-

specific audit specialists should be pursued. With regard to the energy efficiency of industry equipment, incentives can play an important role in ensuring that certain standards are followed (e.g., import exemptions for equipment meeting set energy efficiency standards) without compromising the competitiveness of the industry.

In buildings, the Jordan National Building Council is responsible for the development of the building codes. The JGBG was issued in 2013, and an incentive programme for the adoption of green buildings was approved in 2015. The building guide has four levels (A to D), each offering a specific incentive in terms of increase in floor area ratio. Meeting Level D under the JGBG also ensures compliance with all other mandatory codes, such as the Jordan Thermal Insulation Code and Jordan Energy Efficiency Building Codes. In 2019, MEMR and JREEEF launched a programme to replace 150 000 units of lighting in homes (Khaberni, 2019). Energy labels have also been introduced for large household appliances since 2017. Despite a comprehensive set of codes and incentives, enforcement has been a key challenge that requires putting in place enforcement mechanisms and capacity for ensuring compliance, awareness and stronger incentives.

Energy efficiency programmes have already been rolled out by several ministries covering public buildings. The Ministry of Industry and Trade and Supply conducted audits for 17 institutions to identify energy efficiency interventions. The Ministry of Public Works and Housing, which manages all government buildings, has rolled out energy audits and efficiency measures across more than 500 buildings. Recommendations have been for energy audits and efficiency measures to be succeeded by renewable energy installations to reduce system sizing and costs. Light-emitting diode (LED) labs have been established at the Jordanian Institution for Standards and Metrology (JISM) and RSS to regulate the quality of LED lights imported into Jordan.





KEY CHALLENGES AND RECOMMENDATIONS

Diversification of Jordan's energy mix and reductions in the cost of energy are fundamental to ensure long-term industrial and socio-economic development. The Master Strategy for the Energy Sector 2020-2030 targets a share of 48.5% of primary energy from domestic sources, up from about 15% in 2019 (MEMR, 2020). Further, it sets a target of reaching a 31% share of renewables in the electricity generation mix by 2030 (MEMR, 2019a). With increasing cost-competitiveness and abundantly available resources, renewable energy solutions will be instrumental in achieving the objectives of improving energy security, reducing the cost of energy supply for consumers and advancing environmental preservation. The transition to low-cost renewable energy will also strengthen Jordan's recovery from the Covid-19 crisis (Box 9).

Box 9. Contextualising Jordan's energy transition within Covid-19 recovery

The Covid-19 pandemic is compelling governments to simultaneously manage a health crisis of unprecedented proportions and the subsequent economic and social fallout. As governments deliberate on recovery plans amid significant public financing constraints, especially in emerging economies, strategic investment choices need to be made that yield long-term socio-economic dividends. In particular, the plans must foster economic development and job creation, promote social equity and welfare, as well as advance resilience to future shocks.

Due to a significant decrease in energy consumption as a result of the Covid-19 pandemic, the renewable energy sector has been negatively impacted. Following the lockdown, the network has been exposed to technical challenges which were the result of a decrease in electricity consumption at a time when there was an increase in electricity supply from renewables. This greatly affected the network and led to increased volatility and threatened the stability of the network. In addition, NEPCO reduced electricity consumption from government-owned renewable energy projects during the first period of Covid-19 to alleviate impact on the grid. Faced with this situation, renewable energy systems have been disconnected from all the sectors, including the health, tourism and communication sectors, which has resulted in great economic and financial losses for renewable energy companies.

To mitigate these effects, MEMR is working with all relevant stakeholders to reconnect renewable energy projects. The wheeling-based renewable energy systems were progressively reconnected and became fully operational over the period of March to May 2020, as the country eased Covid-19 restrictions and energy demand increased.

As the economy gradually reopens, Jordan is continuing to pursue its efforts to achieve a needed energy transition and reap its socio-economic benefits (EDAMA, 2020).

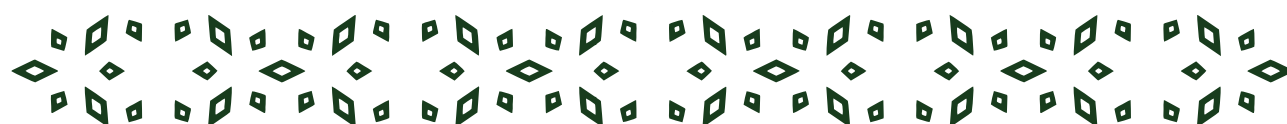
The acceleration of a renewables-based energy transition in Jordan is in alignment with its economic recovery plan, which centres on building up the manufacturing, transport, construction and agriculture sectors. A low-cost, secure and less-volatile renewable energy supply will also catalyse domestic industries, improve their competitiveness and support job creation throughout the economy. Savings from displaced imported fuels and a lower risk of supply disruption over the long-term can also be significant. With the impressive gains made over the past decade, the building blocks of such a transition are already in place in Jordan. The country is well positioned to leverage the transition and serve as a lighthouse for emerging economies globally.

With the necessary policies and regulations to support renewable energy development now in place, Jordan has experienced an impressive increase in the share of electricity from renewables, jumping from 0.7% in 2014 to over 13% in 2019. The Kingdom has in fact become one of the most attractive markets for renewable energy globally (Bloomberg NEF, 2019b). However, increasing the share of domestic resources

in the energy mix in line with the targets and reducing the cost of supply will require continuing efforts to deploy and integrate renewables in the power sector, as well as in other end-use sectors (heating/cooling and transport), which account for over 75% of Jordan’s energy consumption.

Building on an assessment of the country’s renewable energy landscape and extensive stakeholder engagements, the RRA presents the key recommendations for Jordan to realise the full economic, social and environmental opportunity that renewable energy presents. It offers recommendations under seven thematic areas that address renewables applications in the power sector, for heating/cooling in buildings and industry, and transport. Renewable energy investments, local industry development and job creation are also addressed, as illustrated in Figure 17. The actions and recommendations presented under each thematic area are seen to be mutually reinforcing – the collective outcome of which is for renewables to reach a much higher share of Jordan’s energy mix while improving energy security and reducing the cost of supply.

Figure 17. Overview of key thematic areas of recommendations



5.1 Provide the conditions for renewables grow in the power sector

The Master Strategy for the Energy Sector provides a long-term vision for the evolution of the energy sector in Jordan. It identifies the key objectives for the energy sector; sets targets; and defines priorities for different domains of the energy sector, including oil and gas, renewable energy, energy efficiency, and transmission and distribution infrastructure. The update of the Master Strategy provides an outlook for the sector to 2030 and 2050 while also setting intermediate targets.

Action 1: Clarify the trajectory for renewables in Jordan's energy mix

The release of the updated Master Strategy provides stakeholders in the sector with clarity on the trajectory of renewable energy in the short-, medium- and long-term. The indefinite suspension of new projects over 1 MW since January 2019 has added to the uncertainty in the sector.

On the one hand, renewables are key to meeting the government's objective of increasing the share of domestic energy sources in the energy mix and reducing the cost of the energy supply. However, the renewable energy sector also faces several challenges to further expansion due to a confluence of factors at the level of the energy sector: sluggish electricity demand growth, high capacity margin and limited capacity on the grid.

The likelihood that renewable energy will reach much higher shares of Jordan's primary energy mix is closely intertwined with the trajectory of the broader energy sector. The Master Strategy addresses critical holistic issues, including the trajectory towards long-term viability of the power sector enabled by regulations that ensure cost-of-service recovery at all stages; electricity demand stimulation (e.g., through electrification of end-use sectors, elimination of energy poverty, cross-sector integration in water, agriculture, transport); rapid roll-out of storage and demand side management for smooth grid integration; as well as the incorporation of future fuels such as green hydrogen.

Recommended actions:

- Provide a vision for renewable energy sector development with medium- and long-term targets for renewables in the overall energy mix and end-use sectors (power, heating/cooling and transport). The long-term vision for renewables must include a just transition. Therefore, employment, economic welfare and land-use models should be integrated within the Master Strategy for the Energy Sector.
- Formulate disaggregated renewable energy targets for the industry, building, residential and transport sectors and integrate these within the NREAP for the implementation of the Master Strategy.
- Devise a plan for electricity demand stimulation through the electrification of end-uses, especially in industry, residential and transport, improving cross-sector applications (e.g., in water, agriculture) and addressing energy poverty.
- Strengthen multi-stakeholder consultation, especially with the private sector, civil society and cross-sector entities, during the formulation of the action plans, implementation bylaws and instructions. For example, Chile's Ministry of Energy incorporates citizen participation in every step of the long-term energy scenario (LTES) development. Meanwhile, in the United Kingdom, a co-ordinated process is in place for both energy and climate (IRENA, 2019b).
- Pursue integrated plans and policies between ministries to reach the objectives of having high shares of renewables in the energy mix and a low cost of energy. Examples include partnerships between MEMR and the Ministry of Public Works and Housing to address enforcement challenges; MEMR and the Ministry of Water and Irrigation to develop pumped-hydro storage and replace diesel pumps with renewable energy; MEMR, distribution companies and the Ministry of Transport to develop a roadmap to strengthen distribution grid infrastructure to support electric vehicle charging stations; and with municipalities to advance urban planning that promotes the electrification of mobility and mass transport.
- Study the long-term potential of energy carriers, such as green hydrogen, and its use in industry and transport, where direct electrification and other renewable applications may not be feasible.