



# RENEWABLES READINESS ASSESSMENT:

## THE HASHEMITE KINGDOM OF **JORDAN**

### EXECUTIVE SUMMARY

The report recommends seven **key action areas** to accelerate the country's uptake of renewables:

- 1. Provide the conditions for renewables to grow in the power sector**
- 2. Foster continued growth of renewable power generation**
- 3. Plan for the integration of higher shares of renewable power**
- 4. Incentivise the use of renewables for heating and cooling**
- 5. Support renewable options for transport and mobility**
- 6. Catalyse renewable energy investment**
- 7. Strengthen local industries and create jobs in renewables**

**Investments in renewable power, heat and transport would build climate resilience and strengthen Jordan's post-COVID recovery**

## EXECUTIVE SUMMARY

Rapid population growth is bringing the economy under immense pressure in the Hashemite Kingdom of Jordan. New engines of economic development must be found, along with long-term spill-over benefits for the current population of 10.6 million as well as future generations. While Jordan's economic challenges are further compounded by the COVID-19 health crisis, the country is resolved to advance the use of domestic energy resources.

Indeed, energy is central to the growth of the Jordanian economy, which relies on imports to meet energy needs. This reliance strains the economy and poses energy supply security risks. These vulnerabilities drove the development of the Master Energy Strategy 2007-2020, which called for greater utilisation of domestic resources, including renewable energy.

The share of electricity from renewables in Jordan grew from 0.7% in 2014 to over 13% in 2019, making Jordan a regional front-runner in renewable energy. The country has established the necessary policies and regulations to support renewables, including solar photovoltaic (PV) and onshore wind development.

The updated Master Strategy for the Energy Sector 2020-2030, developed by the Ministry of Energy and Mineral Resources (MEMR), calls for a sustainable future energy supply, diversification of the national energy mix, increased dependency on the share of domestic energy resources, enhanced energy security, and reduced energy dependence and cost of electricity supply. The strategy targets a 31% share for renewables in total power generation capacity and 14% of the total energy mix by 2030.

The **Renewables Readiness Assessment** report prepared by, prepared by the International Renewable Energy Agency (IRENA) in close co-operation with MEMR highlights existing challenges and key opportunities as the country aims for greater energy security, supply diversity and sustainability. Recovery plans amid the COVID-19 crisis could also align closely with clean energy and other sustainability goals.

The strategy for 2030 aims to establish a sustainable energy supply.

## Renewable energy in Jordan: Drivers and status

Jordan's most abundantly available renewable energy resources are solar and wind, with smaller potentials for bioenergy, hydropower and geothermal.

The Renewable Energy and Energy Efficiency Law No. 13 of 2012 and its amendments form the backbone of Jordan's policy landscape for renewable energy and energy efficiency. Bylaw (79) year 2019 for Climate Change set requirements for stakeholders to report greenhouse gas emissions.

Jordan's nationally determined contribution (NDC) commits to a 14% reduction in greenhouse gas emissions by 2030. The NDC's actions include developing and utilising renewable energy sources while encouraging investments in renewable energy.

Purely from a cost perspective, substantial reductions in the cost of renewable energy technologies over the past decade offer a compelling case for the government to pursue a greater role for renewables in the future energy mix. In Jordan, the results of the latest (third) round of direct proposal submissions in 2018 yielded bids as low as USD 0.03 (US dollars)/kWh (kilowatt-hour). In comparison, the average cost of electricity purchased by National Electric Power Company (NEPCO) in 2018 was (USD 0.114/kWh).

Jordan's record shows that decarbonisation of the energy mix can be achieved while securing a reliable energy supply. In 2018, electricity generated from solar PV and wind avoided nearly 1.5 million tonnes of carbon emissions. Renewable energy use for heating/cooling applications has been limited – and based mostly on solar water heaters – the launch of the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) has catalysed the market for these heaters. In addition, the government supports the adoption of electric vehicles, even while expansion of the charging infrastructure is needed.

## Advancing renewable energy in Jordan

Renewable energy solutions will be instrumental in improving energy security, reducing the cost of energy supply, advancing environmental preservation and strengthening Jordan's recovery from the COVID-19 crisis. To support the next phase of renewables growth, a broader policy mix focusing on deployment, integration and enabling conditions at the sector level is needed. Demand creation and electrification of end-uses will also be crucial.

The report gives key recommendations for Jordan to realise the full economic, social and environmental potential of renewables in seven key areas, with applications spanning power, transport, and heating/cooling for buildings and industry. Renewable energy investments and local industry development and job creation are also addressed, as illustrated in Figure ES1. The outcome is for renewables to comprise a much higher share of Jordan's energy mix while improving energy security and reducing the cost of supply.

### Accelerating Jordan's energy transition: Recommended action areas



#### 1. Provide the conditions for renewables to grow in the power sector

**Clarify the trajectory for renewables in Jordan's energy mix.** The Master Strategy for the Energy Sector provides a long-term vision for the evolution of the country's energy sector. However, the indefinite suspension of new projects over 1 megawatt (MW) since January 2019 has introduced uncertainty to the sector.

To achieve high shares of renewables in the energy mix and low energy costs, integrated plans and policies for electricity demand stimulation through the electrification of end-uses should be pursued between ministries, cross-sector applications improved, and energy poverty alleviated. Partnerships among ministries, distribution companies and municipalities can help to achieve this.

#### 2. Foster continued growth of renewable power generation

**Shorten approval processes and project timelines that add to risks and transaction costs.** While utility- and small-projects are affected differently, the time needed between expressing interest and project commissioning can be several years. Steps are needed to establish a fixed milestone-based timeframe.

Standardising land acquisition processes by pre-developing sites – including the development of grid interconnection infrastructure, conduct of sector-specific environmental and social impact assessments (e.g., bird migration studies in the case of wind) and completion of land acquisition – can level the playing field for private participation in future tender processes.

Government programmes have also been launched to deploy rooftop solar PV systems for small residential consumers currently under national welfare schemes. Such programmes should be scaled up to increase social impact, reduce consumer energy expenditure and limit government subsidy costs. The electricity tariff design and charges (e.g., wheeling rates) for renewable energy projects should accurately reflect the true cost of the services delivered by the network.

**Strengthen linkages to energy efficiency.** Despite numerous bylaws enacted to advance energy efficiency measures – as well as the JREEEF and the Jordan Chamber of Industry's targeted financing programmes for energy audits – renewable energy penetration has been limited. Therefore, the industrial sector's capacity could be developed to implement energy efficiency (and renewable energy) measures and institute industry-specific benchmarks and best practices.

In power generation, for instance, combined heat and power applications can dramatically improve efficiencies and can offer cost-effective energy alternatives, especially in industries where both electric and thermal energy are consumed. Pilot projects already exist, such as in Wadi Shalala in Irbid; therefore, dedicated regulations are needed to scale up the adoption of such solutions.

#### 3. Plan for the integration of higher shares of renewable power

**Strengthen national transmission and distribution infrastructure.** The lack of capacity to handle higher shares of renewables in the transmission and distribution infrastructure is a key hurdle for further growth. Tools – such as the IRENA FlexTool – are available to analyse a power system's flexibility needs, determine least-cost solutions and integrate them into the strategy. Liaising with other ministries related to industry, agriculture, transport and water is crucial for identifying regions with existing and upcoming power demand potential.

In the short-term, Jordan should identify priorities for the distribution network, mobilise investments to strengthen infrastructure and unlock network capacity to integrate renewables and other loads, such as those from electric vehicle charging stations.

**Introduce a storage code for grid management at the transmission and distribution level.** Storage brings substantial value for grid management, whether as a stand-alone asset or when integrated with a renewable power supply. Therefore, the formulation of a dedicated storage code provides regulatory guidance for the development of battery storage infrastructure at the generation, transmission, distribution and end user levels, as well as instructions to connect to the grid. These actions must be taken at the ministerial level in consultation with the system operator, distribution companies and other stakeholders.

**Improve load management through demand-side solutions.** The increasing share of variable renewable power in Jordan's electricity mix will require active measures to match demand and supply in a manner that reduces overall system costs and incremental integration infrastructure investment. A renewable energy peak-load strategy must be developed and implemented to address peak demand in buildings and industry through solar PV and storage, when this is competitive with expensive peaking plants. In parallel, the feasibility of time-of-use tariffs must be assessed to facilitate demand shifting towards low-load periods.

#### 4. Incentivise the use of renewables for heating and cooling

**Support greater adoption of renewable solutions in buildings and industry.** Solar water heating applications remain the most mature forms of renewable usage in heating/cooling, but deficiencies in targets for deployment, enforcement of mandates and codes, and a long-term financial incentive programme addressing end users' present challenges. The development of a clear, long-term solar water heater penetration strategy for the residential, commercial and industry sectors is recommended, as is annual reporting of the data collected from the sales of such systems.

#### 5. Support renewable options for transport and mobility

**Start to diversify energy use in the transport sector.** The transport sector – Jordan's largest energy consumer – relies mainly on diesel and gasoline. Government efforts to decrease energy use in the sector rely on incentivising high-efficiency vehicles. However, the development of charging infrastructure has lagged.

An improved business case for the private sector's participation in charging infrastructure development is needed urgently. Time-of-use pricing should also be enacted to avoid additional burden on the grid.

#### 6. Catalyse renewable energy investment

**Build the capacity of local financing institutions and project developers.** Local financial institutions have low involvement with utility-scale renewable energy financing. On lending and risk mitigation facilities by international financing institutions can increase local banks' experience and mobilise larger shares of domestic capital for renewable energy development. Moreover, developing the capacity of green lending units in local commercial banks will improve the implementation of programmes from JREEF and the Central Bank of Jordan, as well as widen access to additional international financing. These actions can be undertaken in collaboration with the Association of Banks.

#### 7. Strengthen local industries and create jobs in renewables

**Leverage capacity from other sectors and maximise renewable energy job creation.** Achieving the benefits of a renewable energy-based energy transition requires a broad mix of policies beyond those that focus on deployment alone. These include industrial policies, skills development, and research and development.

Beyond the manufacturing of renewable energy technologies, new opportunities for value creation range from operation and maintenance, design, engineering and financial services to innovative solutions such as industrial automation, smart metering and hydrogen infrastructure. The sector must build adequate skills to meet the needs of a rapidly growing renewable energy sector by partnering with training institutes, universities and industry in a manner that ensures a gender-equal workforce.

Finally, abrupt policy changes – such as the suspension of new projects over 1 MW – negatively impact the market growth potential of local enterprises. While a local content regulation is in place, its definition, effectiveness, and influence on cost and quality need to be closely assessed.

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