

Energy Security and Sustainability in the Middle East- Challenges and Opportunities

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Introduction

Renewable energy, energy security and the importance of planning for a sustainable future have for years been ongoing themes for governments across the globe, forming a key part of nations' respective national energy strategies.

Middle Eastern countries have been at the vanguard of developments in highlighting the important role that renewable energy can play not only in protecting the environment, but also in diversifying economies and providing opportunities for fiscal growth.

In this article we provide a snapshot of some of the recent developments in two countries widely considered to be at the forefront of renewable energy developments in the Middle East - Jordan and Egypt, and in doing so examine some of the key challenges and opportunities faced.

Jordan

Background

Jordan has, in recent years, made great strides in developing its renewable energy capabilities. The Jordanian government has long recognised the valuable renewable resources it has at its disposal (namely solar and wind), and the importance of leveraging these resources to help to develop the country's renewable energy infrastructure. Moreover and more broadly it will help strengthen the local economy, primarily through facilitating opportunities for foreign investment, reducing Jordan's energy costs, decreasing its reliance on imported energy, improving energy security through diversification of its energy mix, as well as enhancing opportunities for job creation- all with a view to protecting the Jordanian ecosystem.

Jordan has a well-established regulatory framework in place which should, in part, help facilitate some of its objectives. Indeed in 2012, it became the first country in the region to introduce a regulatory framework for the renewable energy sector. This came about through the enactment of the Renewable Energy and Efficiency Law No. 13 of 2012 and its amendments (the **REEL**), a law which has become a key pillar in the development of the renewable energy sector in the Kingdom.

The Jordanian Ministry of Energy and Mineral Resources (**MEMR**) and the National Electric Power Company (**NEPCO**) are the main government entities responsible for overseeing the country's renewable energy strategy. The Jordanian government's vision for an energy secure and sustainable future has become more pronounced and focussed in recent times. COVID-19 has exacerbated the country's economic woes. The Kingdom is contending with various internal and external political, social and economic challenges which have increased the burden being placed on the local economy. To take but a few examples, its rapid population growth (in part as a result of the influx of refugees across its borders from war-torn countries

such as Iraq, Syria and Yemen) has placed additional pressure on its domestic energy supplies, with electricity demand increasing by 7% annually. Jordan is also heavily reliant on imported energy (namely natural gas from Egypt which itself has intermittently been disrupted as a result of attacks on the Sinai pipeline). This is both costly and a vulnerability with respect to energy security, in a world that has become increasingly politically volatile and where the Jordanian government has long recognised that energy may be used to undermine its national security and further exploit geopolitical tensions.

In 2020, approximately 93% of Jordan's total energy supplies came from abroad. This was imported at a cost of USD 3.5 billion (equivalent to 8% of its GDP). In addition, the country has long suffered from comparatively high rates of unemployment, in particular amongst its relatively youthful population. In 2020, approximately 14.61% of the population were unemployed. Together, these are just some of the factors underpinning the country's renewable energy strategy and the pressing need for the continued development of its renewable energy sector.

Recent developments

Between 2014 and 2019 the contribution of renewable energy to Jordan's electricity mix rose from just 0.7% to an impressive 13% and as of 2020 is thought to have accounted for nearly 20% of Jordan's overall electricity capacity. Various key projects have helped the country achieve such significant growth, within what is a relatively short period of time. Notably, extensive efforts have been made to develop a clear legislative and regulatory framework within which the sector can operate. Furthermore, the Kingdom's partnership with the private sector, which has invested heavily in the industry, contributing hundreds of millions of dollars, has been key in helping it realise its renewable energy ambitions. Now more than ever however, with the negative impact that COVID-19 is having on the Jordanian economy, there is increased resolve within government to further increase and accelerate the level of investment in the renewable energy sector with a view to further strengthening Jordan's post-COVID recovery.

Wind energy projects comprise a significant share of Jordan's existing renewable energy capacity. At a cost of USD 287 million, and with an installed capacity of 117MW, the Tafilah Wind Farm, developed by the Jordan Wind Project Company through a co-development partnership with Masdar, entered operation in September 2015, as the first wind power project developed under the REEL and the first commercial utility-scale power project in the region. It has increased the country's total power generation capacity by 3% and is estimated to have helped reduce the country's carbon dioxide emissions by 235,000 tonnes annually. In addition, a further wind farm in the governorate of Ma'an, which was connected to the grid in 2016, produces 66MW. Together, these wind farms are estimated to contribute 20% of Jordan's energy mix.

There are plans for a further four wind farms with a total combined capacity of 230MW. This will include, amongst others, Al Rajef Wind Farm with a capacity of 82MW, Al-Fujeij Wind Farm with a capacity of 89 MW and Shobak Wind Farm with a capacity of 45MW.

With a daily average of solar irradiance on a horizontal surface, ranging between 5 and 7 kilowatt-hours/m² (considered one of the highest globally) and on average ten months of sunshine per year, Jordan has sought to capitalise on its strong solar energy potential. In October 2016, Masdar entered into a power purchase agreement with NEPCO to build Jordan's largest single solar energy plant called Bayouna, with a capacity of 200MW. The plant was expected to be completed in the first quarter of 2020 although it is understood to still be under development. The completed 52.5MW Shams Ma'an PV Solar Plant coupled with an additional hybrid solar plant comprising CSP and PV technology, with a capacity of 300 to 600MW due to be completed in Aqaba, will help further drive forward the country's renewable energy strategy. In addition, and as a further indication of renewable energy's remarkable penetration within Jordanian society, the Azraq refugee camp is the first in the world to be powered with renewable energy from a 2MW solar photovoltaic plant.

MEMR, in its latest Master Strategy for the Energy Sector for 2020-2030 (an update to the previously issued 2007-2020 Master Energy Strategy), recognised that there is still more that must be done in order to achieve Jordan's renewable energy potential. It is targeting 31% of the country's total power generation capacity and 14% of the total energy mix being derived from renewable energy by the year 2030.

The International Renewable Energy Agency (in close cooperation with MEMR) recently published a report in February of this year, entitled "The Hashemite Kingdom of Jordan – Renewables Readiness Assessment" (the **IRENA Report**). As well as highlighting both the challenges and opportunities the country now faces, it has recommended a number of key actions in order to increase the rate of uptake of renewable energy and to help the country achieve its ambitious renewable energy targets, namely:

1. Providing the conditions for renewables to grow in the power sector. The IRENA Report recommends that in order "to achieve high shares of renewables in the energy mix and low energy costs" the government must pursue "integrated plans and policies for electricity demand stimulation through the electrification of end uses" which should be done by ministries in partnership with distribution companies and local municipalities;
2. Fostering continued growth of renewable power generation by shortening "approval processes and project timelines that add to risks and transaction costs". The IRENA Report recommends that this can be undertaken by taking steps to achieve a fixed milestone-based timeframe for projects, standardising land acquisition processes by pre-developing sites which (amongst other steps) includes the development of grid interconnection infrastructure;
3. Planning for the integration of higher shares of renewable power by enhancing capacity to handle higher shares of renewable energy in the transmission and distribution infrastructure, including the introduction of a storage code which provides the regulatory framework for the development of battery storage infrastructure;
4. Incentivising the use of renewables for heating and cooling by developing a "clear, long-term solar water heater penetration strategy for the residential, commercial and industry sectors" coupled with the "annual reporting of the data collected from the sales of such systems";
5. Supporting renewables options for transport and mobility. The transport sector is Jordan's largest consumer of non-renewable sources of energy (mainly diesel and gasoline). Government efforts to decrease such energy use will be dependant in part on diversifying energy use in the transport sector and "incentivising the use of high-efficiency vehicles";
6. Catalysing renewable energy investment by building "the capacity of local financing institutions and project developers"; and
7. Strengthening local industries and creating jobs in renewables. The IRENA Report provides that "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". It highlights the importance of building adequate skills in order to "meet the needs of a rapidly growing renewables sector", through partnership between training institutes, universities and industry in a manner that ensures "a gender-equal workforce".

It is not surprising that the continued development of the renewables sector in the Kingdom comes with many potential economic rewards for a country that has long been plagued by economic challenges. As a result, Jordan is arguably the one country, relative to its Middle Eastern neighbours, with the most to potentially gain and arguably the most to lose, if it does not continue to invest in and build on the notable successes that have been achieved in developing the sector in recent years.

Egypt

Background

With a population of over 100 million people, Egypt is one of the most populous countries in the Middle East and North Africa. This figure is set to increase with the country having one of the highest rates of population growth in the world. With a growing population there comes an increased demand for energy. This has historically increased the strain on Egypt's domestic energy supplies resulting in chronic power outages throughout the country. Gradually however Egypt has it seems managed to meet its energy needs and as we will come on to discuss further below, may be experiencing a surplus in energy supply.

Egypt has the luxury of benefiting from a geography with a variety of natural resources, including vast areas of land, sunny weather and high winds. It is therefore considered a prime location for renewable energy projects.

The Ministry of Electricity and Renewable Energy (**MOERE**), the New & Renewable Energy Authority (**NREA**) (which falls under the authority of the MOERE) and the Egyptian Electric Utility and Consumer Protection Regulatory Agency (**EgyptERA**) are the main government entities responsible for advancing the country's renewable energy strategy and ensuring that there is sufficient supply to meet its energy needs.

The Egyptian government has long recognised the important role which renewable energy can play in supporting the economy and securing its energy needs. As part of this process it has developed a comprehensive regulatory framework, through the enactment of various laws including Law No. 203/2014 for the Production of Electricity from Renewable Energy Resources, which amongst other things, sought to encourage private sector investment in the sector through the introduction of a feed-in tariff program, build-own-operate projects, and independent power production through third party access. The Electricity Law No. 87 of 2015 paved the way for a more open market with respect to electricity generation and distribution, introducing significant reforms including ending the single buyer model for electricity and allowing private generation companies to sell the electricity they produce to end users.

As a further sign of the government's commitment to the sector, between 2012 and 2016, it invested USD 1.06 billion in the clean energy industry. Under the 2035 Integrated Energy Strategy (which has now been extended to 2040) it intends to increase electricity supplied from renewable sources to 20% by 2022 and 42% by 2035, derived from a combination of CSP and PV solar, wind, and hydro-electric power.

With the energy sector contributing approximately 13% to Egypt's GDP, a significant part of its ability to advance its socio-economic development objectives is contingent on ensuring the stability and security of a cost effective and efficient energy supply model.

Recent developments

The Sustainable Development Strategy: Egypt Vision 2030, underlines the emphasis being placed on the importance of renewable energy. The Egyptian government has made clear its focus on diversifying the economy in order to secure sustainable development. A number of ambitious renewable energy penetration targets have therefore been set, including the need for renewable energy to contribute 32.5% in electricity production by 2030 and 12% in primary energy.

In 2012 the Egyptian government approved the Egyptian Solar Plan which envisaged adding 3.5GW (comprising 700MW of PV and 2.8GW of CSP) by 2027, with the MOERE entering into multiple memoranda of understanding worth USD 500 million, in order to help achieve this target.

The Benban Solar Park, located in the south of Egypt, completed in 2019, is widely considered as the Egyptian government's most prized renewable energy project. Spanning 37 square kilometres and at a cost of nearly USD 4 billion it falls under Egypt's feed-in tariff program. Financed by the European Bank for Reconstruction and Development (EBRD), the International Finance Corporation as well as other financial

institutions, it generates 1.5GW of power from 39 individual plants each separately owned, which each produce 20MW to 50MW of energy. Its success has resulted in the project widely being hailed as a blue print for future renewable energy projects in the country.

One such project currently under development, located less than 20km from the Benban Solar Park, is the Kom Ombo Solar PV Plant, which will add 200MW of energy capacity to Egypt's energy mix. Significantly the project recently secured a USD 114 million financing package from the EBRD, the OPEC Fund for International Development, the African Development bank, the Green Climate Fund and Arab Bank. It is due to enter commercial operation in the second quarter of 2022. Once operational, it will become the largest private solar plant in Egypt.

Egypt is estimated to currently possess approximately 500MW of wind power plant capacity with a further 1349MW under development. The country's capacity is expected to reach 7GW by 2022 and therefore wind energy is set to gradually comprise an increasing proportion of its total energy mix. The winds of the Gulf of Suez have resulted in this being the main target location for the development of Egypt's wind power capabilities. The 262.5MW Ras Ghareb wind farm entered operation in December 2019. The Egyptian government has also allocated over 7,800 more square kilometres for wind energy projects in this region alone. A 540MW wind project is currently under development in the region with a further 580MW project at the financing stage, and feasibility studies under way for a further 800MW in additional wind projects.

It has been suggested by commentators in the industry that the private sector has, for a number of years, approached renewable energy investment in the country with a degree of caution. This has primarily been for two reasons. Firstly, the 2016 currency crisis, the devaluation of the Egyptian Pound against the US Dollar and the resultant lack of foreign currency domestically available, subjected investors to increased currency volatility and coupled with a requirement for foreign investors to obtain 15% of financing from local banks, is thought to have negatively impacted the bankability of renewable energy projects in the country. Furthermore, the Egyptian government's requirement that disputes connected to the Benban Solar Park projects be resolved locally through the Cairo Regional Center for International Commercial Arbitration rather than by an institution outside of Egypt, was met with trepidation from investors, worried that such recourse might prejudice their ability to secure a fair and speedy resolution of their disputes.

In addition, despite the various developments in the sector, there has been increased commentary in recent months both at government and industry level of an oversupply of energy in the Egyptian market. Supply has slowly outstripped demand, which has been compounded by the reduced consumption that has come about as a result of COVID-19 and the resultant widespread closures and lockdowns that intermittently ensued throughout the country. Therefore, Egypt is understood to increasingly be looking at ways of potentially exporting its surplus energy supply. Although the situation may change as the economic impact of COVID-19 begins to wane, and with energy exports pending, it is thought that policy makers are seeking to place a limit on renewable energy projects, with EgyptERA imposing caps on the amount of energy private sector participants may generate. Although government officials have been quick to point out that this is being applied mainly to small scale projects, it does nevertheless risk further undermining investor confidence in the country's renewable energy sector.

Egypt has shown the world that it has an enviable geographical foundation upon which to develop and proven track record in successfully completing, large-scale renewable energy projects. It may however need to do more, including being receptive to the concerns of stakeholders (including developers, contractors, operators and financiers in particular), with respect to contractual dispute resolution provisions, currency and financing restrictions, any oversupply issues and the imposition of limitations on the capacity of producers in the sector. In addressing such concerns, it will no doubt help place the country on a stronger footing and ensure that it remains a competitive, investor-friendly market that is able to fully realise its renewable energy potential long into the future.

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