

# MENA Solar and Renewable Energy Report

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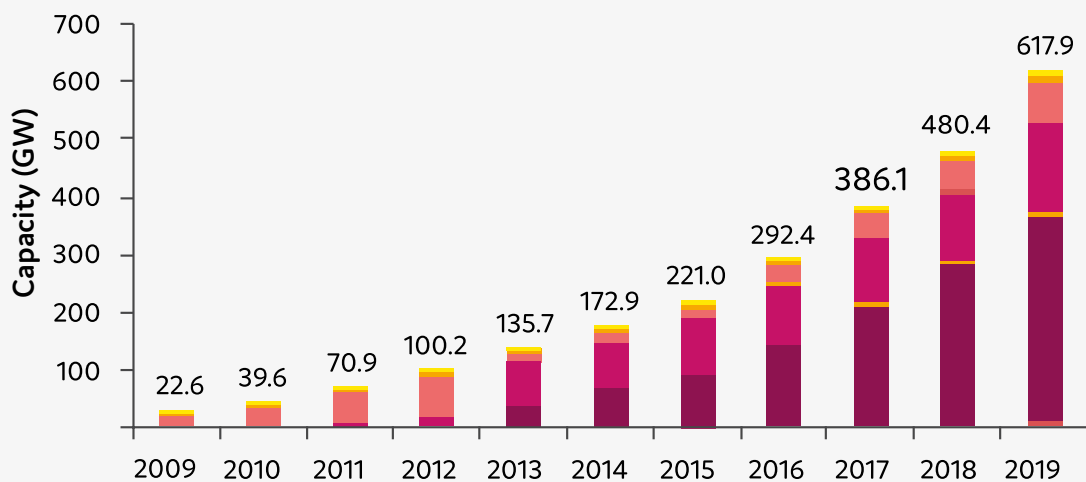
The Middle East and North Africa saw 2019 again confirm the growth and importance of commissioning large projects and launching additional phases of their renewable energy and solar programs (Morocco, Egypt and the UAE) and other countries of the region are coming on board. Projects in the pipeline are now tendered in Oman, Kuwait, Tunisia and countries including Pakistan and Iraq are engaging their first large utility size projects.



# Introduction

Renewable energy usage has been growing significantly over the past 12 months. This trend will continue to increase as solar power prices reach grid parity. In 2019, the global estimated additions of solar photovoltaic (PV) reached almost 138 GW (Figure 1). Within the Middle East and North Africa (MENA) region, the increased industrial activity and drive towards renewables is reflected in each country's strategy. Continuous population growth and economic development have placed pressure on existing power assets and in some cases, created a significant gap between electricity production and demand. Affordable renewable energies in the region – mainly solar – have become an obvious solution.

## Global Solar PV Capacity, 2009 - 2019



Estimates based on data obtained through multiple sources\*

(Figure 1: Global Solar PV Capacity (Source: IRENA, IEA, PowerWeb, Frost & Sullivan))



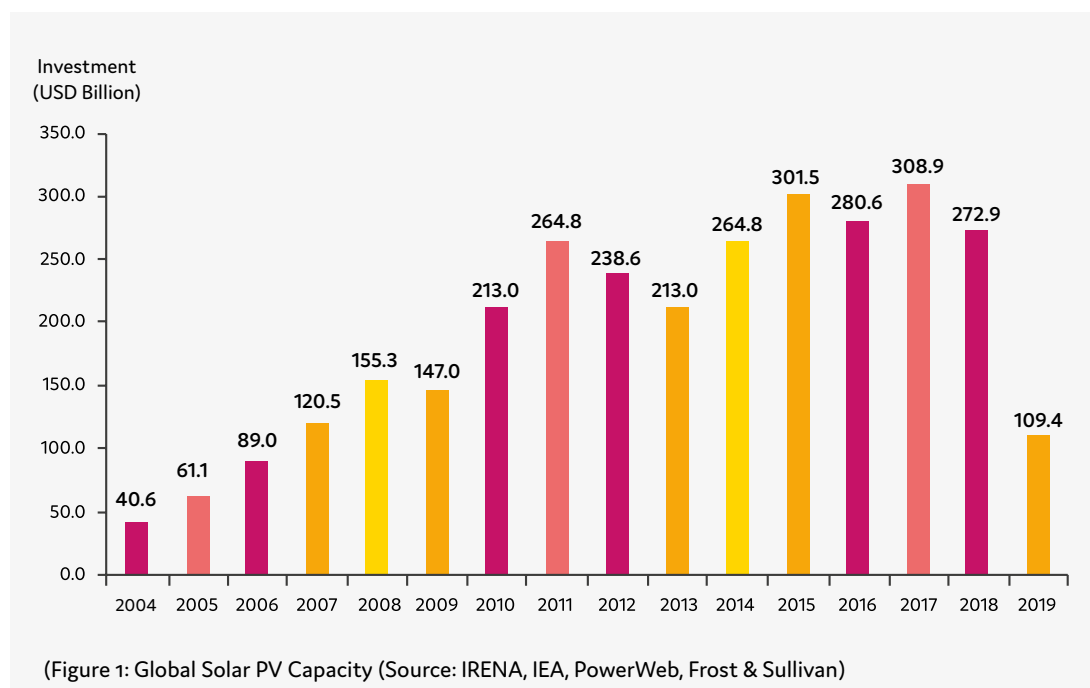
# 1. Investment in Renewable Energy

The total corporate funding in the global solar sector saw an 11% increase year-on-year at \$109.4 billion in the first half of 2019. More than \$2.6 trillion has been invested in renewable energy over the past decade.

Global solar power capacity increased by more than 25 times in this decade, from almost 23 GW at the beginning of 2010 to 617.9 GW anticipated by the end of 2020. Overall investment in the MENA energy sector could reach \$1 trillion by 2023, with the power sector accounting for the largest share of the spending at 36%.

As the unit rate for solar energy investment is reducing year-on-year, a decrease in capital does not represent a slowdown in the industry (Figure 2). Instead, this indicates the price decline in renewable energy technologies as the amount of gigawatts installed remain high.

## Global Investment in Renewable Energy (USD Billion)



Investments in storage solutions, grid Interconnectivities and CSP, considered to have greater priorities recently. It is expected that stationary battery storage market size will surpass \$170 billion by 2030, according to Global Market Insights. Furthermore, The GCC countries' grid interconnectivity is expected to generate US\$ 33 billion in investments, economic and energy savings over the next 25 years. In CSP, more cost-effective technologies and project bankability will play an important role to further CSP investment; however, the takeoff may take some time.



## 2. Solar Trends 2019-2021

### 2.1. Decrease in Solar Prices

Most recently, Dubai's 900 MW solar tender hit another low-price record with \$0.0169 per kWh. The continuous drop in costs for solar panels is one of the factors that have contributed to reducing CAPEX of utility-scale projects. It is important to note that the reference prices for solar electricity usually refer to utility-scale ground-mounted solar; however, the decrease of panel prices has also contributed to make rooftop solar a more viable option for businesses.

### 2.2 Growth in Energy Storage Solutions

Many MENA countries are looking to energy storage. The niche market of storage solutions evolved, and its competitiveness has evolved. Ongoing R&D is looking at reducing levelized cost of electricity (LCOE) through the use of a thermal storage medium that is capable of a wider temperature range than molten salts – the current state-of-the-art storage fluid used in tower CSP. Moreover, hydrogen as a storage solution is also an up and coming technology.

### 2.3 Cells and Modules

Many technologies are emerging to improve performance and reliability of solar modules such as high-efficiency bi-facial modules, half-cut cells, perovskite solar cells and heterojunction cells. Other modules currently under development include shingling, N-type and multi-busbar (MBB) modules.

### 2.4 New Fields of Action

With the development of solar in the world, the deployment of such technology is spreading rapidly. Floating Solar, Building Integrated Photovoltaics (BIPV) and Organic thin-film Photovoltaics are emerging in the industry, bringing in several advantages. However, many challenges are emerging to implement those technologies.

### 2.5 Other Recent Trends

Recently, solar applications are evolving especially by fostering end-use through renewable energy. The dramatic drop in the price of solar energy coupled with increasing competitiveness of storage solutions will allow solar energy for a number of usages that have traditionally been large consumers of fossil fuels and are a major source of GHG such as transport, desalination, cooling and heating. Also, green hydrogen could play a key role in a clean, secure and affordable energy future; however, it is still in the development stage. Solar, on the other hand, is on the rise and will play a growing role in the future in the optimization of the new energy mix. As a result, the C&I sector is visibly growing.



# 3. Energy Storage

Intermittency has been one of the main issues for a wider adoption of solar energy. Increased competitive storage solutions are, however, quickly changing the landscape. Storage solutions supplying a demand for 24 hours seems to be within reach. CSP projects are anticipated to reach 16 hours of energy storage in the upcoming projects in the UAE and Morocco.

Today the total global energy storage capacity stands at 187.8 GW with over 181 GW of this capacity being attributed to pumped hydro storage systems. So far, pumped hydro storage has been the most commonly used storage solution. However, PV-plus-storage, as well as CSP solutions, are paving the road towards a different future.

## 3.1 PV-plus-storage

Solar projects combined with storage solutions will be necessary to allow more extensive growth of competitive solar energy. With the dramatic of the price solar energy, such combination is tending to reach grid parity. Solar plus storage solutions are evolving from a niche market to a large market. Growing exponentially, 25 GW of battery storage projects exist presently with roughly 77% under development. According to a study made by Bloomberg New Energy Finance (BNEF) in 2018, almost 4 GW of battery storage systems went online, and by 2020 this number could double, as market research experts predict.

Lithium-ion batteries dominate the PV-plus-storage market. They are so far the most commonly used in the market with 87% of the storage capacity installed, under construction and announced (leaving out pumped hydro). In the future, other technologies based on flow batteries and hydrogen storage could also develop. Recent developments in PV-plus-storage are scene in Jordan, Lebanon, Oman and the UAE.

## 3.2 Concentrated Solar Power -CSP-

CSP is still marginal and considered to be expensive; however, in 2018, the MENA region's CSP capacity had doubled compared to the previous year reaching 725 MW of installed capacity. It is expected that CSP projects will become even more competitive in the future.

CSP has the ability to be dispatchable, providing consistent power throughout the day and night. Such characteristics will foster solar energy in countries that have a high direct normal irradiance (DNI). Yet CSP development, due to high DNI requirements, will be limited to some countries only, while PV will benefit from a wider market. In addition, CSP has a longer cycle of development and execution compared to other renewable technologies given the land size required, detailed studies and design, complex financing and longer construction periods. The UAE and Morocco are the top countries in CSP projects in the MENA region.



## 4. Highlights in MENA's Leading Solar PV Markets

In this section, each country profile briefly summarizes the ongoing efforts taken to achieve each country's renewable energy targets in addition to ongoing and upcoming projects.



### A. Algeria

Demand for electricity has grown by average 6.91% annually, fed by a yearly increase in population around 1 million (one of the highest rates in the world). Algeria primarily uses oil and gas to meet domestic demand. However, the share of renewable energy in Algeria's generation mix is growing slowly. In 2018 according to IEA, installed renewable energy capacity was of 670 MW out of which solar energy represented 343 MW (2.5% of the total energy capacity).

In Q4 2019, the country updated its Renewable Energy and Energy Efficiency Development Plan, putting greater focus on the deployment of utility-scale PV and onshore wind. By 2030, the updated version of the programme aims to install:

- Solar PV: 5.6 GW
- CSP: 1 GW
- Wind: 2 GW
- Biomass: TBD

### Projects

A new auction system introduced in 2016/2017 was followed by the approval, in June 2018, of several projects having a total capacity of 200 MW of PV. The new tenders, which will be open to both domestic and international players, will select grid-connected IPP projects totaling 150 MW and off-grid hybrid projects using gas or diesel coupled with solar for a combined capacity of 50 MW. The grid-connected projects, from 10-50MW, will be developed on a build, own and operate (BOO) basis under a 20-year PPA.

- The Algerian Electricity and Gas Regulation Commission (CREG) tendered 150 MW in the southwestern region but received only eight proposals for a total of 90 MW. It declared only one successful bidder who was awarded 50 MW in the form of 5 projects of 10MW each.
- Sonelgaz tendered 50 MW for off-grid hybrid gas/diesel and solar projects in December 2018.





## B. Bahrain

Bahrain's 2030 Economic Vision aims to transform and shift from an oil dependent economy to a more diversified and competitive landscape. The National Determined Contribution of Bahrain is mainly based on small scale utility-based renewable energy projects and increased energy efficiency in transport, buildings and industry.

The Kingdom's plans evolved with the introduction of the National Renewable Energy Action Plan (NREAP) and the National Energy Efficiency Action Plan (NEEAP) in 2017. The NREAP plans policies, targets and initiatives to implement renewable energy options. It aims at 5% of renewable energy by 2025 and 10% by 2035. On the other hand, the NEEAP includes 22 initiatives across all economic sectors that target a national energy efficiency increase of up to 6% by 2025.

### Projects

**Askar solar IPP** is the first 100 MW PV Park project that was issued by the Electricity and Water Authority (EWA) and it will be built under a BOOT model on a landfill site, taking into consideration the limited space to develop large scale solar parks in Bahrain.

**Rooftop PV**, due to the scarcity of available land, the country is also focusing on rooftop and private projects with an aim to install 255 MW by 2025 using net metering. So far, a 3MW solar array rooftop project was launched at eight locations in 2019. The project is split into three phases of 1.25 MW, 1 MW and 750 kW. The electricity generated from the 3 MW solar plant will be sold to the off-taker at a fixed price for a period of 20 years under a PPA.





## C. Egypt

With the electricity demand reaching up to 27.6 GW in 2019 and a forecast, by Frost and Sullivan, of 67 GW in 2030, Egypt is in need of substantial additional power capacity.

As specified by the Integrated Sustainable Energy Strategy (ISES) to 2035, the Egyptian government has set renewable energy targets of 20% of the electricity mix by 2022 and 42% by 2035. The ISES includes 52 GW of both large-scale and distributed on grid renewable energy by 2035. To foster the development of renewables, Egypt uses different frameworks, Net Metering, REFIT Program and IPP Model Projects.

### Projects

**The Benban Solar Park**, under the FIT model, has an estimated investment up to \$4 billion and is currently under construction with a planned total capacity of 1.8 GW. In May 2019, 19 projects of the Benban Solar Park were reportedly connected to the grid. In Q4 of 2019, a total of 32 plants with a capacity of 1,465 MW were completed and started commercial operation. Currently, the construction of four additional new solar power plants with a capacity of 200 MW is engaged on site.

**Kom Ombo PV Solar Project**, In October 2019, the EETC signed a solar PPA with a developer for a 200 MW plant at a price of \$0.0275 per kWh that is expected to be completed in Q1 2021.

**West Nile Solar Plant**, with a capacity of 600 MW, the EETC and the International Finance Corporation (IFC) signed in April 2019 an agreement to fund projects selected under an auction system. The project was tendered and it was reported that 18 offers had been received. However, EETC indicated that bids would only be accepted for a maximum of \$0.025 per kWh after seeing the price of solar power fall below the \$0.03. Details on the implementation conditions of West Nile Solar project are expected to be released soon.

### C&I and Storage

The lifting of subsidies on fuel and electricity tariffs by the government that started in 2016 as well as the development of energy storage solutions will play a major role in the increase of decentralized solar projects. The first tender for a 20 MW PV solar plant with battery storage, located in the Red Sea area of Hurghada, was announced by NREA for end 2019. The PV-storage project will be funded by an \$85M facilitated loan from Japan International Cooperation Agency (JICA).





## D. Jordan

Jordan is seeking to reduce its high level of dependency on fossil fuels (which are mostly imported) that reached 92% in 2018, with a total cost of \$2.82 billion equal to 10% of its GDP. Jordan is also facing a 0.2% annual growth in electricity demand.

To achieve these goals, Jordan has used a combination of utility-scale IPP projects with a smaller solar rooftop initiative.

**Renewable Energy Program Projects** Round 1 projects located in Ma'an, Aqaba and Irbid as well as Round 2 projects in Mafraq Development Zone and Safawi are currently under operation. Round 3 projects consisting of 150 MW of solar and 50 MW of wind power, including a storage option, are being carried out in Ma'an and are planned to be completed in 2020.

**Baynouna Project** is the largest single solar energy project developed under the PPA scheme with 200 MW. It is expected to be fully operational in the first quarter of 2020.

**Energy Storage Projects** are pivotal to Jordan's solar capacity development. In 2019, the country tendered a feasibility study for a 30 MW pump storage system to be installed on dams.

**Net Metering and Wheeling** 300 MW were attained through net metering and wheeling in 2018. Those schemes have attracted the C&I sector seeking to reduce their electricity bills. A dedicated regulatory framework has made the adoption of distributed solar more widespread.

**Solar Heating** The Jordan Renewable Energy & Energy Efficiency Fund (JREEEF) has launched a project to bring hot water to all parts of Jordan using solar. Awarded in 2017, 20,000 solar water heaters are expected to be installed in the residential sector between 2013 and 2019.

### Integration into the grid, a challenge

In early 2019, the government had suspended the development of new renewable energy generation projects until the completion of technical studies to assess the capacity of the electrical grid to handle additional capacity. However, the continuation of the following projects was authorized under certain conditions:

- Round 3 projects are now required to demonstrate a reduction of energy costs, though the amount of the reduction has not been specified.
- Wheeling or net metering projects with a capacity under 1 MW.





## E. Kuwait

Much like its neighbours, Kuwait's demand for electricity and power has been rising sharply over the past few years. The country's population grew by 2% from 2016 to 2017 while demand for electricity increased by 3%.

Kuwait had set an objective of integration of 5.7 GW of CSP, 4.6 GW of PV and 0.7 GW of wind into the energy mix and targets 10% of renewables in 2020. Moreover, in December 2017 the new Minister of Electricity and Water indicated the country's determination to reach 15% by 2030.

### Projects

**KNPC Project** Prequalification for a first phase of a 1.5 GW PV facility renewable energy complex has been engaged in 2017 and in September 2018, the tender launched for a 25-year EPC contract. The submission deadline was 16 December 2018 and the contract is yet to be awarded.

**Shagaya Complex** The project has 3 components totaling more than 4,000 MW capacity. The first phase of 50 MW CSP plant, a 10 MW wind farm and a first 10 MW PV that started commercial operations in December 2018. The second phase includes the KNPC project of Al Dibdibah and several projects of KISR. It is expected to start commercial operation in Q1 2022. The third component of the project, Al Abrag, consisting of several packages is targeting at least 200 MW of CSP, 1.2 GW of PV and 100 MW of wind is expected to be tendered around March 2020.

### Integration into the grid, a challenge

The integration of rooftop solar became more widespread in the recent years with many initiatives within the country. The upcoming tenders include installations on roofs of existing and new parking areas at:

- Emergency Department - Main Workshops - Installed Capacity 2.7 MW
- Power Stations' Spaces - Installed Capacity 5 MW (expected Q2 2020).
- 10 MEW's buildings 3.64 MW (expected in 2022).





## F. Morocco

In 2019, the demand for electricity increased by around 2.4% while the production grew with the connection to the grid of a few projects by 25.1%. The country is still focusing its efforts to increase its share of renewable energy. Strategie Energetique Nationale Horizon 2030 includes an objective of 2 GW of renewables including hydropower, solar and wind making up 42% of the country's energy mix by 2020 and 52% by 2030. The investment cost for meeting the 52% target is estimated at \$30 billion by 2030.

### Projects

Lead by MASEN, Noor and Midelt, once completed, will provide 38% of Morocco's annual electricity generation.

Noor Ouarzazate Project- Phase 1 to 3 with a total capacity of 2000 MW, PV and CSP. Phase 1 consisted of 160 MW (CSP) and 3 hours of energy storage capability, online since 2016. Noor Ouarzazate 2 with 200 MW (CSP) and Noor -Ouarzazate III with 150 MW (CSP) were grid connected in 2018.

Noor phase 4 - PV Project: This phase, which became operational in Q1 2018, consisted of three sections having capacities of 72 MW, 85 MW and 20 MW, respectively. The project has been awarded with under a 20-year BOOT.

Noor Midelt 1 has a total installed capacity of 800 MW. It is the world's first advanced hybrid-station of CSP and PV technologies. On completion, it will provide dispatchable solar energy during the day and until five hours after sunset. The project is expected to be connected to the grid by 2022.

Noor Midelt 2 – July 2019, MASEN launched prequalification for a hybrid power plant using PV and thermodynamic solar energy (SPC), combined with various thermal or battery storage technologies for 190 MW during peak hours (evening) and 230 MW during the day. MASEN has extended the deadline for the entries by developers to October 2019.

Other Projects: ONE's Solar Projects are calling for the development of 500 MW of PV capacity by 2020. The Noor Atlas, on the other hand will deploy 200 MW solar PV in seven plots.





## G. Oman

The country has a significant potential for renewable energy with one of the world's highest solar energy densities. The sultanate reviewed its targets to forecast an increase in peak power demand of 53%, reaching 9.96 GW by 2023. Of this total, 11% of electricity generated will come from renewable energy sources. By 2030, renewable energy should account for over 30% of the energy mix.

### Project

- The 500 MW Ibri II Solar Independent Solar Project was awarded in early-2019 and is expected to be commercially operational in June 2021.
- Petroleum Development Oman (PDO) signed a 23-year PPA agreement for the 105 MW Amin Solar PV project in early 2019. Commercial operation is scheduled for May 2020.
- In the second phase of its solar program, Oman Power and Water Procurement Company (OPWP) is currently working to finalize the request for proposals (RFP) for the Manah Solar I IPP solar facility and the Manah Solar II IPP with a combined output of more than 1GW. Contracts are expected to be awarded in Q3 2020 with the commercial operation planned in Q4 2022.
- Several distributed generation power projects from 10 MW to 40 MW in Sohar Port are planned to replace natural gas to power local businesses.
- OPWP is planning to install a CSP plant with a capacity of up to 600 MW plus battery storage systems. The project is anticipated to proceed only if Oman's plan to deploy a Clean Coal Independent Project is not pursued.

**Off-grid and Mini-grid** - The Rural Areas Electricity Company (RAECO) is looking to add 90 MW of renewable energy capacity by 2020. The projects shall be developed and operated by the private sector under a BOOT basis under a 15-year PPA deploying 48 MW of solar PV capacity, 70 MW of diesel generation capacity and 28 MW of battery energy storage systems.

### Solar Rooftop

**Sahim II** - In mid 2019, Oman was consulting for a second phase of Sahim that aims to deploy a wider scale of small grid-connected PV systems for around 10% to 30% of residential premises. However, the cost of procuring, installing and operating PV roof systems will not be met by the consumer but by private developers, selected on a competitive base.





## H. Pakistan

While the total power generation capacity of Pakistan has reached 25,374 MW, population growth and industrial and economic development have resulted in a growing gap between demand and supply of electricity. As a result, the Renewable Energy Policy 2019 draft was produced:

- NEPRA has switched from a FIT model to auction-based bidding in 2019
- The government has announced in Q3 of 2019 a target of 60% of renewable energy in its energy mix by 2030, out of which 30% from hydropower.

So far, AEDB launched, in November 2019 a tendering process under IFC funding of 11 wind IPP projects totaling 560 MW. Solar projects are expected to follow. According to AEDB, up to 28

### Projects

Sindh Solar Energy Program (SSEP), a framework that aims to support solar deployment in the province across utility-scale, distributed generation and residential segments. It includes up to 400 MW of solar park capacity (50-200 MW per park). A pilot of a 50 MW site near Manjhand, Jamshoro District totaling \$40 million, was launched. The project will be operational by 2020 and private sector developers are encouraged through risk reduction, secured land permits and power offtake.

The program also aims to integrate 20 MW of solar power through PV rooftop projects such as in Karachi. Solar is targeted to be placed on public sector buildings as well as home systems in the country.

### Rooftop PV

There has been a strong surge in domestic installation of rooftop photovoltaic panels in larger cities. For projects under 1 MW, net metering regulations came into effect in September 2015. The government is targeting at least 1 million customers and adding approximately 3,000 MW of solar power through net metering.





## I. Saudi Arabia

Based on vision 2030, the Kingdom of Saudi Arabia is aiming to reduce its dependency on oil revenues, diversifying its energy mix and developing its significant potential for renewable energy. To achieve those targets, a dedicated structure within the Ministry of Energy, the Renewable Energy Project Development Office (REPDO) was established.

In 2018, the ambitions of Saudi Arabia's National Renewable Energy Program (NREP) were substantially increased with a 5-year target of 27.3GW and a 12 years target of 58.7 GW, including 40 GW of PV and 2.7 GW of CSP. In total, the government is aiming investments in renewable energy up to \$50 billion until 2023.

### Project

#### Round 1

The initial round of the NREP included the launch in 2017 – 2018 of the two first tenders of REPDO:

- PV project of 300 MW at Sakaka, awarded in 2018
- Wind farm of 400 MW at Dumat al Jandal, awarded in 2019

#### Round 2

Carrying a minimum requirement of 17% local content as calculated by the mechanisms defined by the Local Content & Government Procurement Authority (LCGPA), six projects for a total of solar PV capacity of 1.47 GW, divided into two categories were tendered. In January 2020, REPDO received four proposals for four projects under category B and two bids for category A projects.

#### Round 3

Developers have submitted prequalification documents for the third round of Saudi Arabia's National Renewable Energy Program (NREP). It comprises of four photovoltaic (PV) solar projects with a planned total combined capacity of 1.2GW that were also divided into two categories.

### C&I and Energy Storage in Saudi

With the engagement of electricity price reform, interest for solar C&I is growing. Authorities, in particular ECRA, are currently working on devising a clear regulatory framework for such projects. It is anticipated to be launched in mid-2020. On the other hand, even though storage is not explicitly mentioned in the energy mix or among REPDO-targeted technologies, storage solutions are not out of the picture as a 2.4 GW capacity of CSP is expected to be released in the near future.





## J. Tunisia

The national consumption of electricity in Tunisia has slightly increased between 2017 and 2018, from almost 15.6 GWh to 15.8 GWh. At the end of 2018, renewable energy represented 5.7% of the national energy production capacity (240 MW Wind, 10 MW Solar, 60 MW Hydro).

The new regulatory framework that was introduced in 2015/2016 by the Ministry of Industry and Small and Medium Enterprises is leading the country to a major transition. Moreover, the 2030 Renewable Energy Action Plan aims to have 30% of the total energy production come from renewables.

Tunisia is following three different regimes for renewable energy project development. The auto consumption regime is the process followed to grant small scale projects. The local consumption regime is categorised into - authorisation regime -small projects between 10 to 30MW and - concession regime -large projects above 30MW. Lastly, the exportation regime for electricity production for exportation purposes with no capacity limit.

## Project

Auto consumption regime projects on a small-scale have been approved (total of 16 MW).

Local consumption regime Authorisation Regime Projects, the first two rounds totalled 134 MW PV were mostly dominated by international developers and are currently under construction and development. A third-round for the development of six 10 MW and ten 1 MW projects was kicked off in July 2019. Similarly, under the Concession Regime, the launch of a 500 MW PV project resulted, in December 2019, in the allocation to three consortiums respectively of 300 MW, 100 MW and 100 MW.





## K. United Arab Emirates

The UAE has been and is still a front-runner in the energy transition in the GCC with the highest portfolio of renewables in the region. The UAE Vision 2021, UAE Green Growth Strategy, UAE Future Strategy and the UAE Centennial Plan (2071) With the electricity demand reaching up to 27.6 GW in 2019 and a forecast, by Frost and Sullivan, of 67 GW in 2030, Egypt is in need of substantial additional power capacity.

### Project

#### Dubai:

**Mohammad Bin Rashid Al Maktoum Solar Park**, the largest single-site solar park in the world, will have a capacity of 5GW by 2030. The current total production capacity of the solar park reaches 713 MW and the fifth phase totaling 900 MW, was allocated in November 2019. Shams Dubai achieved a 125 MW of installed capacity in residential, commercial and industrial buildings in 2019.

**Floating PV** DEWA has issued an RFP appointing consultants to study, develop and construct floating solar PV plants in the Arabian Gulf.

#### Abu Dhabi:

The emirate is engaged in a new cycle of tenders to grow its solar energy capacity:

- The so-far world's biggest solar park, Noor in Sweihan entered commercial operation in mid-2019 with a capacity of 1.78 GW.
- In early-2019, Abu Dhabi's Emirates Water & Electricity Company called for an EOI to develop a 2 GW solar project in Al Dafrah. The 24 shortlisted local and international companies submitted their proposals in November 2019. The project is expected to be completed in Q1 2022.

**Northern Emirates** Up to 300 MW of solar are planned in the Northern Emirates. Ras Al Khaimah Municipality announced its new renewable energy and energy efficiency program, including a target of 25-30% clean energy capacity by 2040. Also, FEWA and the emirate of Umm Al-Quwain signed an agreement for the development of a 200 MW solar park. Similarly, Bee'ah in the emirate of Sharjah is planning to construct solar PV over its landfill. Sharjah Investment and Development Authority (Shurooq) and Diamond Developers announced in March 2019 the construction of a sustainable city in Sharjah entirely powered by solar PV energy.





## I. Iraq

About 90% of the energy consumption of Iraq is based on fuel; the rest is supplied by natural gas. According to IEA, the electricity demand in Iraq, will increase with a 6% annual growth rate by 2030 and is expected to double to around 17.5 GW average per year.

Iraq is now seeking to diversify its energy mix, the development of renewable energy power generation technologies of 21 GW of solar and 5 GW of wind by 2030 could improve the sustainability and reliability of electricity in the country. The share of renewables in the energy mix could possibly reach up to 30% by 2030.

### Project

In May 2019, the Ministry of Electricity launched a first round of tender for a 755 MW of solar PV. The ministry invited companies to participate in the projects that will be located across the five provinces, Babel, Wasit, Karbala, Al-Muthanna and Diwaniyah. The capacities for each project:

- 50 MW and 30 MW Al-Muthanna (South)
- 2 x 50 MW Wasit (East)
- 225 MW Babel (Central)
- 300 MW Karbala (Central)
- 50 MW Diwaniyah (Central)

The projects will be developed on BOO basis. They were tendered in 2019 and are expected to be completed in 2020.

**Rooftop PV** installations had increased significantly in Iraq over the past two years. Solar capacities are installed in refugee camps with a plan for having a combination of PV and energy storage to be implemented in the Mam Rasha camp. A 5 MW solar project has also been supported by the UNDP to develop solar of households in Najaf, in central-south Iraq.





## 5. Conclusion

The trend in the MENA region has so far been towards the development of large utility-scale projects. Combination of decreasing LCOE and the latest technology have been enabled through competitive bidding. Solar PV is expected to remain the preferred option with growing contributions from CSP and storage projects.

Energy storage is set to emerge as a vital component for further renewable energy developments in the region. Large scale hybrid PV combined with CSP and storage projects may increasingly prove beneficial, as has been the case with projects developed.

Globally, the classic utility business models are undergoing profound changes. The end use of solar energy is increasing steadily. There is a significant demand for distributed generation projects throughout the region, even more changes in regulatory policy to incentivise self-generation along with excess energy sale back to the utility grid are necessary for this market to take off. In the long run, it is a new distribution of role between utilities and decentralised production, between electricity producers and consumers that is coming up.





# Middle East Energy Dubai

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