Arab Petroleum Investments Corporation
الشـــركـة العـربية الاســتثمـارات البـترولـية

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MENA Power Investment Outlook

Complement to APICORP's MENA ANNUAL Energy Investment Outlook 2019

Contents

Key Points

- The MENA region will need to install 88GW of generation capacity over the period 2019-23. This is expected to translate into USD 142 billion for generation, and approximately USD 68 billion for transmission & distribution (T&D).

- Close to 87GW of generation capacity is currently under execution, of which 74GW are due for commisioning within the next five years. This is driven by the UAE (19%), followed by Saudi Arabia (17%) and Egypt (16%) respectively. Gas-fired capacity accounts for more than three-quarters of all projects under execution in Saudi Arabia, Egypt and Iraq.

- Investments in renewable energy continue to grow throughout MENA (34% of total power investments), benefitting from tailored, flexible funding mechanisms. However, many countries are likely to fall below expected targets for technical and regulatory reasons.

- Highly leveraged power projects in the region continue to be largely financed based on non-recourse or limited recourse structure, with debt-equity ratios 85:15 for lower risk profile projects backed by strong government payment guarantees.

- The private sector, critical for risk management (performance, technology, cost efficiency) and for financing, is still largely dependent on sector reforms, as the share of government investments remain high at 78%. Demand slowdown and the ensuing overbuilding are anticipated to continue in countries such as Saudi Arabia, even as the Kingdom embarks on transforming its power sector.

- More restructuring is clearly needed, but rather than full deregulation, we see more of adapting traditional business models to allow for private sector involvement in distributed or fully-owned generation and a continuation of the Single-Buyer Model for conventional centralised generation where it already exists.

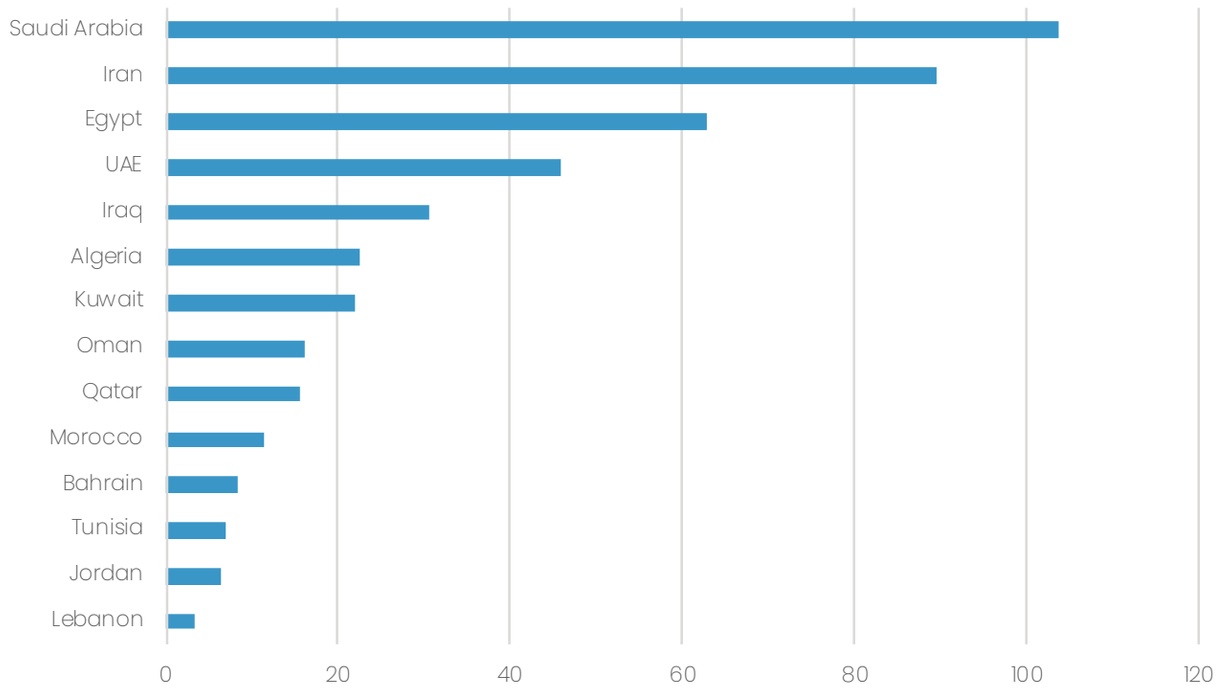
- The capital intensity of the electricity sector, even for renewables given the large scale of the projects in the region and the relatively large upfront capex, calls for the maintaining of mechanisms to increase investors' confidence with the government as the backbone.

MENA

Capacity still needed to meet healthy consumption and pent-up demand

Required Capacity 2023 (GW)

Source: APICORP



The power sector continues to evolve throughout the MENA region, driven by the need for countries to reduce demand growth, diversify their economies and create efficiencies.

Electricity consumption continues to grow rapidly despite various reform efforts. The International Monetary Fund (IMF) recently revised down its outlook for MENA GDP growth, but the latter is still expected to increase from 1.3% in 2019 to 2.8% in 2023. Over the same period, population growth rates are expected to remain healthy, averaging 1.8%.

To meet rising consumption and some pent-up demand, APICORP estimates that MENA power capacity will need to expand by an average of 4% each year between 2019 and 2023, which corresponds to additional capacity of 88GW. This would require USD 142 billion of investment in generation capacity and a further USD 68 billion for transmission and distribution (T&D). Governments have been accelerating their investment plans and APICORP estimates that 74GW of capacity is set for commissioning by 2023.

Between 2019 and 2023, APICORP estimates that investments in the MENA energy sector could reach USD 1 trillion. The power sector accounts for the largest share at 36%, spurred by growing electricity demand and greater momentum for renewable energy.

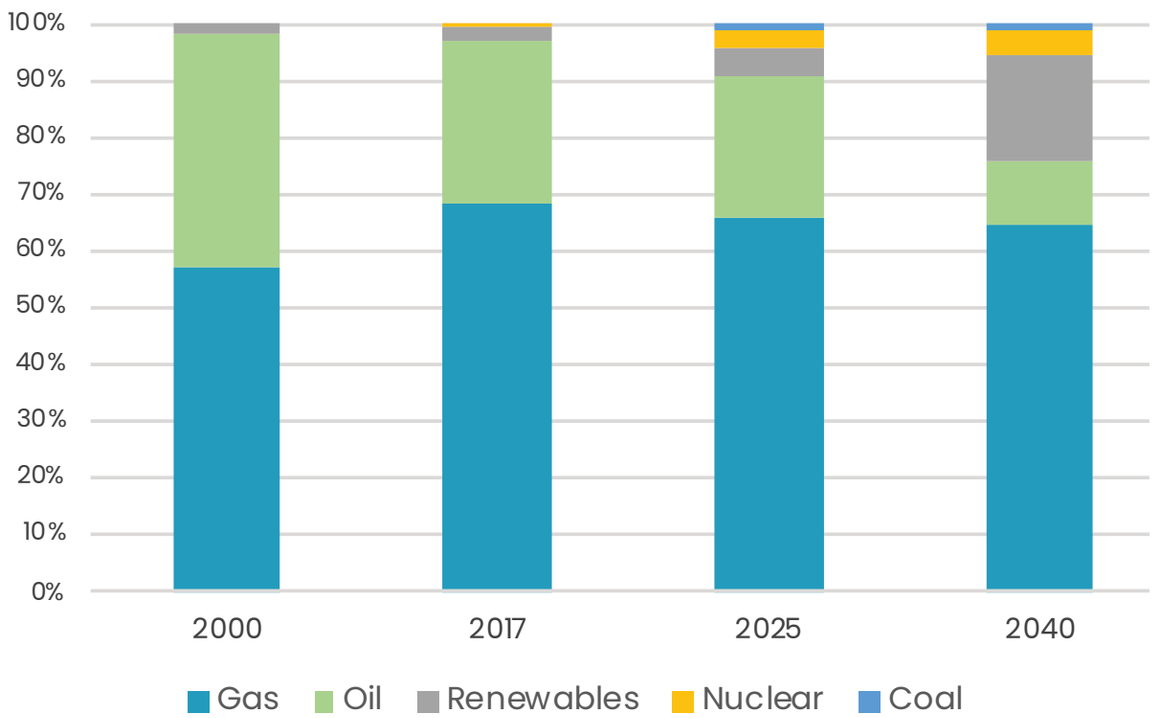
Planned projects account for more than a quarter of the total energy investment USD 257 billion as countries in the region undergo various forms of energy transitions (renewables and nuclear introduction, demand-side measures, smart grids and efficiency standards and price reforms). In response to depressed oil prices and constrained government budgets, countries are prioritising their energy diversification agendas.

Renewable energy targets feature heavily in the visions of not only GCC countries, but the region at large, from as early as 2020 in Morocco and stretching as far as 2050 in the UAE. Energy reforms feature heavily in addressing runaway demand and reducing inefficiencies, with the hope that the phasing out of subsidies will reduce unproductive or unneeded consumption, alleviate fiscal pressures and promote economically-based transactions in the energy sector, including from renewables.

The issue of climate change has been gaining momentum, with global environmental and local air quality concerns being tackled through higher deployment of non-fossil fuel capacities, increased switching from oil to gas in generation and stricter efficiency standards in industry, buildings and electrical appliances.

Electricity Generation in MENA (TWh)

Source: IEA, WEO 2018



Projects currently underway stand at a little over USD 90 billion, adding roughly 87GW of capacity, of which 74GW is expected to come online within the next five years. Saudi Arabia, Egypt and the UAE alone account for half the expected investments in the power sector. Renewable energy accounts for 34% of total planned and committed investments in power, compared with 22% in our 2017 outlook and 31% in 2018.

Although the increase on last year is not as significant, these levels of investment are expected to reinforce the commitment of countries to increase the share of renewable energy in their generation mix. However, the policy signals and investments required in grids and storage to accompany renewables introduction are yet to be seen.

Electricity demand growth to slow over the medium term leading to some overbuilding

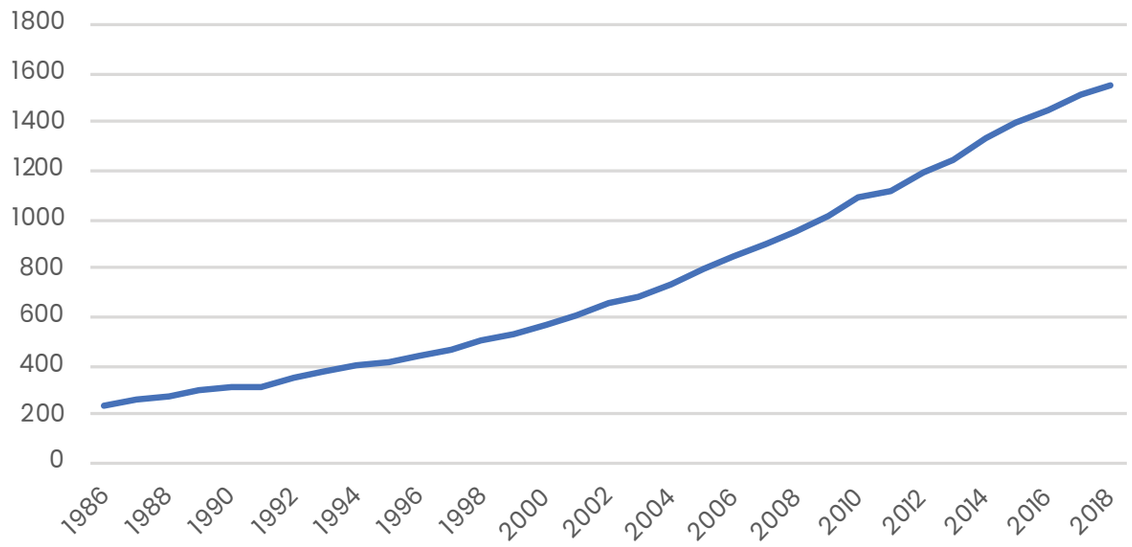
Between 2007 and 2017, electricity consumption in the MENA region increased by 5.6% CAGR. This was driven by rapid economic growth, industrialisation, rising income levels, high population growth rates and urbanisation; coupled with low electricity prices. The GCC was able to match this growth with proportionate capacity additions. Outside the GCC however countries have been struggling to keep up with growing demand. In both cases, the trajectory of demand growth meant that the model was unsustainable for governments, and created, in a few cases, suboptimal electricity systems.

These trends are not expected to continue and efforts to manage demand are underway. Although population growth will remain high by global standards, lower economic growth compared with historical trends will place downward pressure on demand. More efforts to reduce subsidies on electricity coupled with energy efficiency measures should slow demand growth and alleviate inefficient consumption, whilst reducing the fiscal pressure on governments.

The provision of reliable and affordable electricity remains important for governments and vital for the stability of countries. Efforts to promote energy efficiency and support the public with smarter and more responsible consumption, whilst tackling infrastructural and regulatory hurdles are equally important. Consequently APICORP expects that over the next five years, electricity demand growth will slow to around 3.8% CAGR.

MENA Historical Production (TWh)

Source: BP Outlook



To meet the growing demand, the MENA region will require the addition of 88GW by the end of 2023. Countries in the GCC have invested in capacity additions to keep pace with summer peak demand. Even in the case of Egypt, which only five years ago experienced blackouts due to electricity shortages, is now facing overbuild. To meet these additions, the MENA region will need to invest close to USD 209 billion over the next five years, of which 32% will be in transmission and distribution.

This 20% decline on last year's APICORP outlook is driven by several factors, including lower medium-term growth forecasts, lower population growth rates and higher electricity prices. Some of the region's largest demand centres (e.g. Saudi Arabia, Iran) are anticipated to experience notable slowdowns in demand growth, while major projects due for commissioning, such as the 5.6GW Baraka nuclear plant in the UAE, will add significant capacity.

According to APICORP's estimates, close to 87GW of capacity additions are currently under execution, of which 74GW are due for commissioning within the next five years. At the same time, 36GW worth of capacity is at the planning phase, and should these materialise, it could meet the required capacity over the next five years. However, while some countries are investing in capacity to ensure reasonable reserve margins to meet peak demand; others – such as Iraq - are playing catch-up and attempting quick fixes to meet both short-term peak demand and to cater for rapidly rising demand over the medium to long term.

Saudi Arabia

Capacity additions will outstrip growth

At the end of 2018, Saudi Arabia's installed generation capacity stood at 88.5GW, equivalent to roughly a quarter of the MENA total. Gross peak demand in 2017 was 70GW putting the country's reserve margin at a healthy 21%. Demand growth has slowed substantially following decades of rapid growth. Slowing population growth has been a major contributing factor and lower than anticipated economic growth also created downward pressure on demand for electricity.

However, the most influential factors slowing domestic demand have arguably been policy driven. Since 2016, via the Saudi Energy Efficiency Programme (SEEP), the government implemented stricter efficiency standards for building shells, space cooling and heating in electrical appliances, in addition to introducing energy intensity standards for industry.

The wider price and utility sector reforms were designed with two objectives in mind: First, to tackle demand by improving efficiency and increasing electricity prices gradually, and the second to adopt a market-oriented structure. The first wave of explicit subsidy removals had a marginal impact on demand given the already very low electricity prices. The second round of Saudi subsidy reforms announced in late 2017 did significantly increase domestic energy prices. *(See APICORP Research Vol 3. No 5 -Saudi Energy Price Reforms Getting Serious).*

Households were grouped into two consumption brackets. For residential consumption below 6,000kWh, prices were uniformed to SAR0.18/kWh, which means a substantial increase of 260% for households formerly in the 1-2000kWh consumption bracket. Unlike the first round of reforms, these increases were accompanied by a cash transfer programme under the Citizen's Account scheme to help protect the most vulnerable consumers. Residential consumption levels above 6,000kWh/month remained at SAR0.30/kWh. The substantial effect on consumer household bills thus warranted a higher demand response.

Going forward, the government communicated in the 2019 Fiscal Balance Plan an official timeline for electricity tariffs to be "reflective of supply costs based on consumed fuel prices assuming ideal efficiency". This aims to address the implicit subsidies in the utilities sector given the changes in fuel prices.

To adopt a more market-oriented structure that aims to enhance efficiency and allow for greater private sector participation, the Saudi Electricity Company (SEC), the Kingdom's largest power generator, will be broken up into four power-generating companies, one transmission company and one distribution company. This move towards a Principal-Buyer Model (PBM) represents the first step towards market liberalisation, although long overdue, there remains considerable uncertainty on the timing of these reforms.

Saudi Electricity Tariffs (SR/kWh)

Source: KAPSARC

	2014		2016		2018
kWh/month	(SR/kWh)	%	(SR/kWh)	%	(SR/kWh)
1 - 2000	0.05	0%	0.05	260%	0.18
2001 - 4000	0.1	0%	0.1	80%	0.18
4001 - 6000	0.12	67%	0.2	-10%	0.18
6001 - 7000	0.15	100%	0.3	0%	0.3
7001 - 8000	0.2	50%	0.3	0%	0.3
8001 - 9000	0.22	36%	0.3	0%	0.3
9001 - 10000	0.24	25%	0.3	0%	0.3
> 10000	0.26	15%	0.3	0%	0.3
Industry			0.18	0%	0.18
Governmemt			0.32	0%	0.32

Despite the lower demand growth relative to historical trends, the Kingdom is expected to add 26GW by 2023. At present 13GW of capacity is under execution, of which 90% is gas-fired capacity. Saudi Arabia has ambitious plans to diversify its electricity generation mix with considerable renewable and nuclear capacity. The Kingdom is targeting 27.3GW of renewable energy by 2023 and 58.7GW by 2030, with 17GW of nuclear by 2040. There is uncertainty regarding the full execution of these nuclear plans due to institutional, regulatory, technical and industrial constraints.

As part of the Kingdom's efforts to increase efficiency in the power sector, the addition of 12GW of gas-fired plants should increase the share of gas in the generation mix, which in 2017 stood at 32%.

At present, combined cycle gas turbines (CCGT) makeup 27GW of installed capacity, second only to steam turbines. Saudi Arabia has ambitious plans to increase its gas production from 12.4 billion cubic feet per day (bcf/d) in 2017 to 23bcf/d by 2026, thus boosting sales gas output to 16.1bcf/d from 8.7bcf/d. The case for switching from oil to gas is strong, given the sizeable reserves and the higher share of liquids in generation.

Major Power Projects 2019-23

Source: MEED Projects, Apicorp

Project (Operator)	Capactiy	Fuel	Start-up
	(MW)		
Sakaka	300	Solar	2020
Yanbu 3 (SWCC)	3100	Oil	2020
Jizan (Aramco)	4000	Oil	2020
Duba-1 (SEC IPP)	550	Gas/Solar	2019
Fadhili IPP (SEC/Aramco)	1500	Gas	2019
PP14(SEC)	1640	Gas	2019
Waad Al-Shamal (SEC)	1390	Gas/Solar	2019
Total	12480		

UAE

Nuclear set to boost capacity in medium term

The UAE launched its Energy Strategy 2050 back in 2017, aiming to double the contribution of clean energy in the total mix to 50% by 2050. Solar power features heavily in its plans and is expected to account for 25% of the generation mix once its USD 13.7 billion (5GW) solar park is fully commissioned in 2030. The UAE needs to invest at least USD 16.2 billion to meet the expected additional 8GW capacity requirement over the medium term. The country is pushing strongly to diversify its energy sources in the power mix; we estimate that nearly 14GW of capacity additions are already in execution.

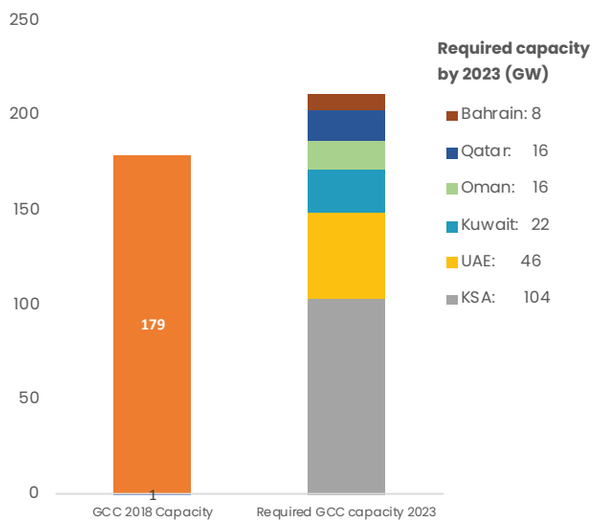
As the only GCC state with nuclear plants under construction, the UAE nuclear programme has been dubbed a model for nuclear newcomers. Cooperation with the likes of the International Atomic Energy Agency (IAEA), and the signing of the 123 agreement or the section 123 of the U.S. Atomic Energy Act: provided the UAE with detailed guidance for developing the infrastructure needed for a nuclear power programme.

Section 123 of the U.S. Atomic Energy Act: In order for the United States to engage in significant civilian nuclear cooperation with other countries, including the export of reactors, critical parts of reactors, and reactor fuel, it must conclude a framework agreement that meets specific requirements under Section 123 of the Atomic Energy Act (AEA).

Korea Electric Power Corporation is building four 1.4GW nuclear power plants at Barakah at an initial cost of USD 20 billion, with an additional USD 20 billion for the operation of the plants during their anticipated 60-year lifetime. While the expectation was for the plant to begin production immediately, licensing delayed the launch and training hold-ups have pushed the launch back. The UAE's Federal Authority for Nuclear Regulation (FANR) is reluctant to award the operating license to Nawah Energy Company – formed by ENEC and KEPCO to operate the plants - due its limited operational experience. The cost of the project has since surpassed USD 24 billion.

Required Capacity by 2023 (GW)

Source: APICORP



Egypt

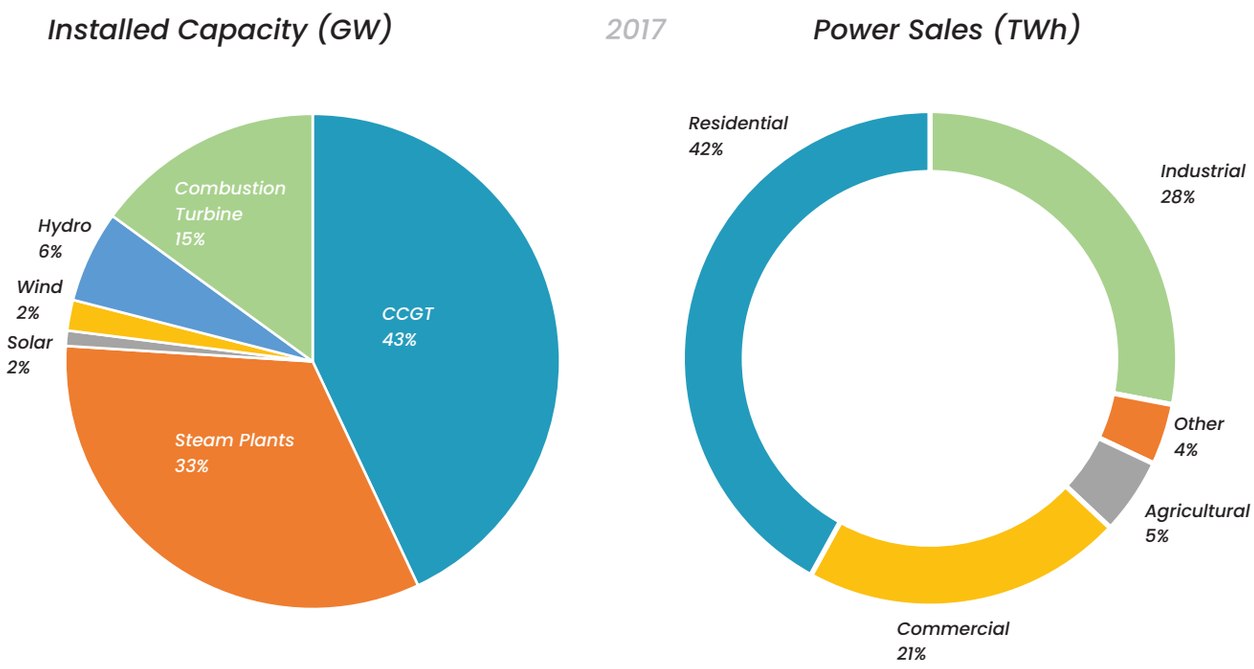
A power sector in transition

Demand for electricity grew at a rate of 4.6% CAGR between 2015 and 2017 and is expected to rise to 5.1% by 2023. In the residential sector, this is driven primarily by urbanisation and higher levels of cooling requirements. The sector faced several blackouts leading up to 2015 and has since invested heavily in additional capacity. Rapid additions meant that capacity doubled in 2017 compared with 2010 and exceeded 45GW. Whilst the installation of 20GW of thermal capacity between 2016 and 2018 led to overcapacity in the country, Egypt was able to exchange 770MW of electricity with Jordan and Libya in 2017 and announced earlier this year that it plans to deliver up to 40MW to Sudan.

We believe Egypt will need to invest USD 20 billion in power generation and a further USD 10 billion in T&D. This would increase capacity in MENA's most populous country to 63GW by 2023. According to APICORP's most recent outlook on energy investment, total planned and committed investment in Egypt's power sector dwarfed what is needed, standing at USD 59 billion, of which USD 24 billion is for projects currently under execution. Last year, Siemens and its consortium announced the completion of the world's largest combined cycle power plants in Egypt with a combined capacity of 14.4GW. APICORP estimates 12GW of generation capacity is set for commissioning by the end of 2023 with a further 11GW already in the planning phase.

Installed Capacity and Power Sales Breakdown in Egypt

Source: IHS



Approximately two-thirds of the projects in the pipeline are being developed by independent power producers (IPP), helping bolster investments in the power sector and accounting for half of the energy sector's medium-term total investments.

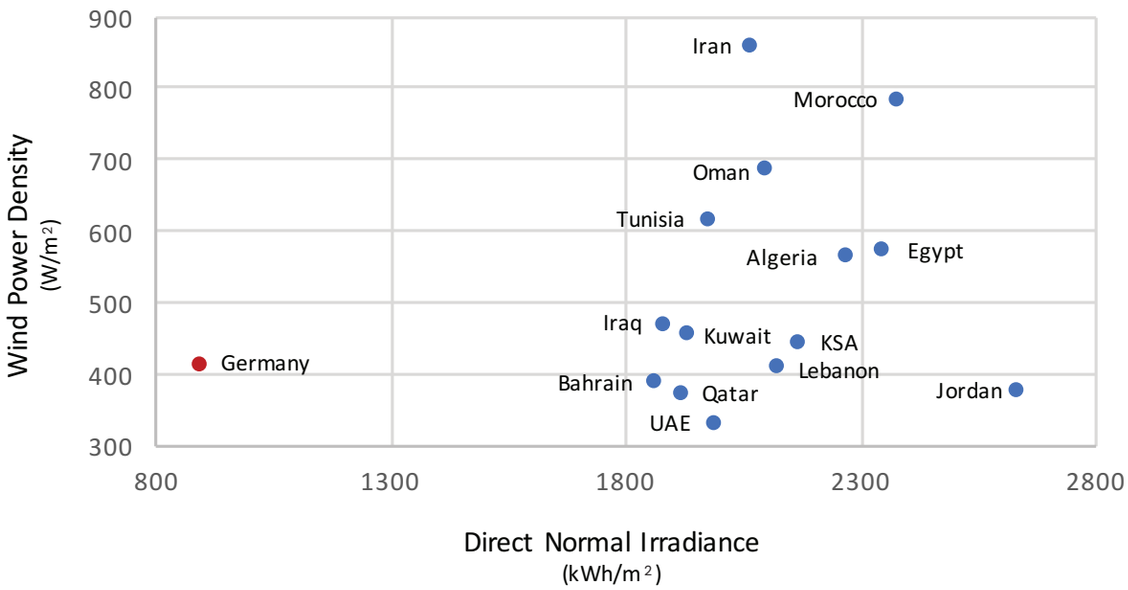
Subsidy reforms for cost-reflective prices for power and fuel are anticipated to strengthen financial sustainability and encourage greater energy efficiency. By 2021, the government hopes to have eliminated all electricity price subsidies.

Medium-term demand is expected to grow at a faster rate than before, reflecting a rebound in the economy, though we expect this will be dampened over the long run as energy efficiency measures are introduced.

The power sector is expected to witness a higher share of renewables, coal and even nuclear in the long run, but gas remains the dominant fuel. Egypt is endowed with abundant wind energy resources and enjoys favourable radiation intensity - annual direct intensity of 2340 kWh/m^2 and closer to 3000 kWh/m^2 in the southern regions. In comparison, countries such as Germany receive an average of 900 kWh/m^2 and even less so in UK where it is around 700kWh/m^2. The share of renewable energy in the generation mix is expected to increase with targets set by the government to meet 20% of its electricity demand from renewable energy by 2022 and 42% by 2035. Renewable power capacity is projected to grow the fastest, with 2.8GW (65% solar and 35% wind) of capacity currently under execution and a further 3.8GW in the planning phase.

Solar and Wind capacities in selected countries

Source: WBG, Global Solar Atlas, Global Wind Atlas



Egypt's New and Renewable Energy Authority (NREA) is currently running two rounds of its renewable energy programme. Under round one, the aim was to construct 4.3GW at a total cost of USD 7.5 billion. To date, several projects in the south have been completed totalling 215MW and a further 150MW are under execution, including the Benban solar park. However, over 1GW has been cancelled, and delays in implementation will mean the country is likely to achieve only half of its 2023 renewable energy targets.

IRAQ

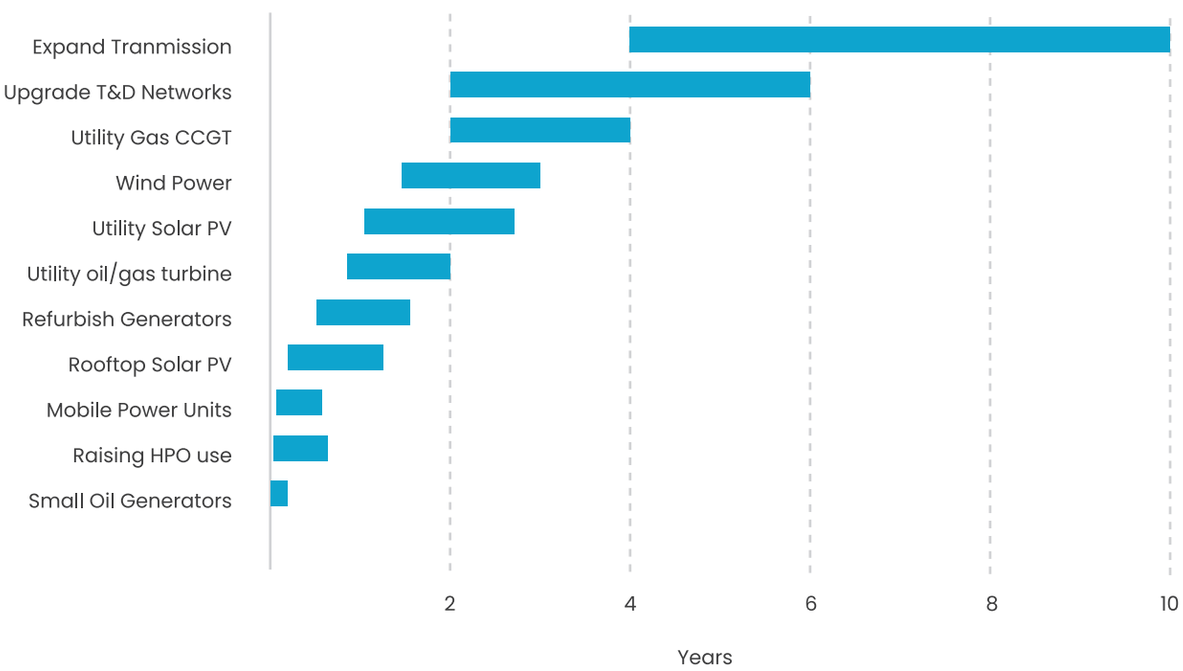
Post-war catch up: Infrastructure rehabilitation as important as capacity additions

Iraq continues to face a widening gap between demand growth and available generating capacity. Reducing power outages – a regular occurrence in the country – and providing reliable electricity is at the heart of the government's plans, especially following the loss of generation and T&D during the war against ISIS. And even more so, to ensure stability following a wave of protests which occured primarily in the summer periods due to the lack of adequate public services, including water and electricity. As a result, the Ministry of Electricity, ahead of the summer months, is prioritising short-term solutions to address immediate demand concerns. These include mobile power units, small oil generators and increasing the use of High Sulphur Fuel Oil (HSFO).

The exact generating capacity of the country is difficult to assess. The IEA estimates that Iraq's existing available capacity is 16.4GW, only half of the installed nameplate capacity. The investment requirements in the country therefore need to focus as much on fuel provision and rehabilitation of T&D as on installing greenfield generation capacity. Although 4GW were installed between 2014 and 2018 - a more than 30% increase - peak demand has continued to outpace supply. Without significant investment, it is unlikely the country will match peak demand over the next five years, but efforts are underway to close the gap.

Technology options to improve electricity supply by time to complete project type

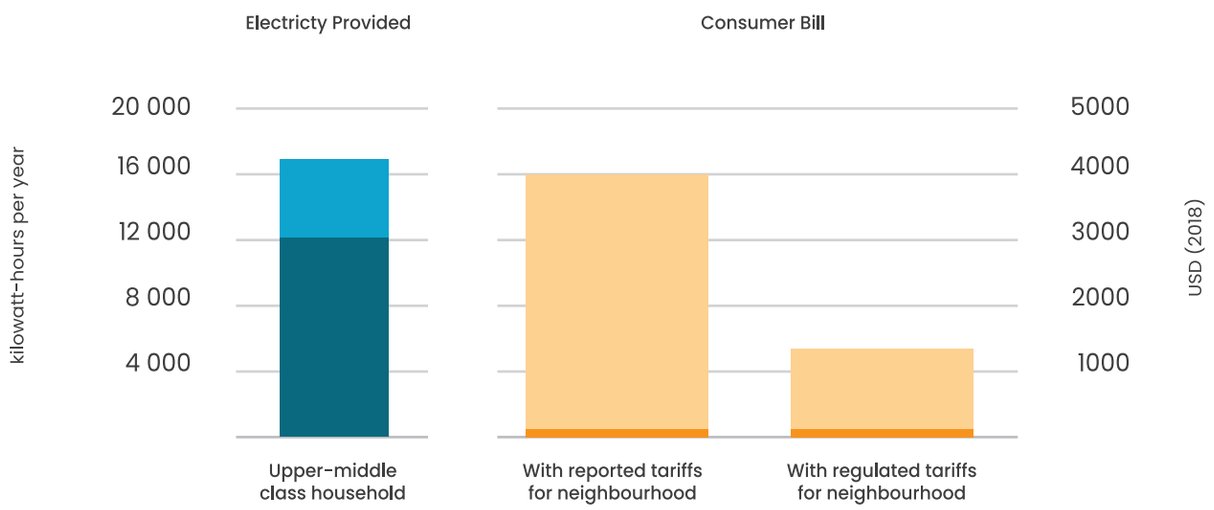
Source: IEA, Iraq energy outlook 2019



Notes: T&D = Transmission and distribution. CCGT= combined-cycle gas turbines. PV= photovoltaics. HFO= heavy fuel oil.

Consumer bills and electricity provided from the grid and neighbourhood generation for an upper-middle class household, 2018.

Source: IEA, Iraq energy outlook 2019



For a given household in Iraq, the grid provides the majority of electricity, but more than 90% of the consumer's electricity bill goes to expensive neighbourhood generation.

APICORP estimates that Iraq will need to invest USD 21 billion in generation over the next five years to take capacity up to 30GW.

Many projects are underway with 11GW currently under execution, much of which are gas-fired power plants. A further 3GW is at the planning phase, including 2.3GW of solar, wind and hydroelectric capacity. Iraq, like many countries in the region, benefits from favourable wind and solar radiation intensity. The case to deploy renewable energy will not only diversify the existing generation mix and enhance resilience, but more importantly provide distributed generation in remote areas.

Transmission and distribution investments are perhaps even more important, particularly in providing short-term fixes. Technical losses in the country are estimated at 40%, meaning that targeting the infrastructure would ensure that electricity from existing capacity is more efficiently utilised. At the same time, non-technical losses accounted for 20 terawatt hours (TWh), or just under 20% of demand in 2018, an issue that can only be addressed with better metering systems and more information on demand and consumption.

A roadmap drawn in 2018 included the addition of 11GW of capacity, a USD 14 billion project. The roadmap is designed to meet the reconstruction goals of Iraq and support the country's economic development. The awardee of the contract is expected to support Iraq in arranging the financing of the projects. The first phase has already been signed for; contracts totalling USD 700 million for the construction of a 500MW gas-fired plant, the upgrade of 40 gas turbines and installation of 13 substations and 34 transformers across Iraq. The long-term plan aims to increase capacity by 50%, provide highly efficient power generation plants, upgrade and rehabilitate the existing fleet and expanding and modernising the T&D network.

Lastly, on the supply side, the provision of adequate fuel for powerplants has been a primary reason behind the gap between installed and available capacity. However, this is changing with a wave of gas-fired plants coming online. Efforts have been made to increase gas output, particularly on capturing flared gas. The Basrah Gas Company (BGC) has been working on reducing flared gas for several years, and Shell – a major shareholder in BGC – recently announced a final investment decision to increase BGC's current capacity by 40%. Having recently achieved a new production level of 1bcf/d, the programme aims to capture flared gas from three major oil fields, Rumaila, West Qurna 1 and Zubair, to use for power generation and the domestic market *(more details will be available in APICORP's upcoming gas investment outlook).*

Iraq is one of the few countries in the world still burning high volumes of oil in the power sector, averaging over 150kb/d between 2015-2017, second only to Saudi Arabia. The plan is to reduce burning high-value oil in generation and substitute with more efficient and less carbon-emitting sources such as gas. The implementation of global regulations such as IMO 2020 will hamper the country's efforts to export high-sulphur fuel oil (HSFO), which accounts for the majority of the 320kb/d of fuel oil it produced in 2018. Thus, the case to continue burning HSFO to increase output might become important again.

To meet these challenges, financing will be critical. However, Iraq's credit rating is rated junk by all the major agencies, the lowest being Caa1 by Moody's in 2017, making it very difficult and expensive to raise funds. The government signed off on a USD 112 billion budget which signalled the highest budget deficit since the fall of Saddam in 2003, and at 50% of GDP, compounding the impact on the country's existing debt. Moreover, the fragile political environment, coupled with risks of instability and a lack of a robust regulatory framework for independent generation, are keeping investors at bay. Without their support, the burden of reconstruction and rehabilitation of the power sector may fall solely on the Iraqi government.

One of the steps the government can undertake is to address the issue of tariff collection. Another concern is to address energy efficiency, smarter consumption and energy conservation. Unless the country introduces carefully planned energy reform policies, demand will continue to rise rapidly over the medium to long term. Last but not least, Baghdad recently invited expressions of interest to develop 7 solar IPPs with a total capacity of 755 MW *(see more details in the next section on private sector).*

Private Sector in MENA

The role of the private sector and financing still largely dependent on sector reforms and government guarantees

A large share of the funding needs in MENA's energy sector will go to the power sector, of which renewables account for a substantial share (34%). Having benefitted from low interest rates, the scale of renewable projects in MENA is relatively large, including for solar PV (e.g. 200 MW phase 2 of Mohammed bin Rashid al Maktoum Solar Park, 1177 MW Noor Abu Dhabi Solar PV, Kahrama's 900 MW PV project in Qatar), even if "small scale solar PV projects could achieve costs that are comparable or lower than large-scale projects" (IRENA, 2019).

Typically, highly-leveraged power projects in the region continue to be largely financed based on non-recourse or limited recourse structure, with typical debt-equity ratios in the 60:40 to 80:20 range and even up to 85:15 (very specific cases) for lower risk profile projects backed by strong government payment guarantees.

Consequently, the renewables industry was able to benefit from tailored funding mechanisms. There are several regional examples of this, such as soft mini-perms in Noor Abu Dhabi, green bonds used by Masen in Morocco, and the standardisation and aggregation for seven solar projects in Jordan. These flexible financing mechanisms are a positive and have partly contributed, in addition to auctions and other factors, to the spectacular decrease in generation costs witnessed for solar PV.

Selected large-scale UAE solar project financing details

Source: APICORP

Project	Capacity, Technology	Power Purchase Agreement (PPA)	Investment (USD Million)	Conditions
Shams 1	100 MW, CSP	25 years		22 years, 80% debt
MBRAMSP II	200 MW, PV	25 years	326	27 years, 86% debt, avg 180bps over libor
MBRAMSP IV	700 MW CSP 250 MW PV	35 years	4360	70% debt
Noor Abu Dhabi	117 MW PV	25 years	870	26 years, 75% debt, +120 bps over libor

While the government remains involved at different phases of the project, even in PPPs, via the feasibility (project development fund), the land acquisition, the guarantees and government support, and through equity subordinated loans, the private sector is critical for risk management (performance, technology, cost efficiency) and for financing.

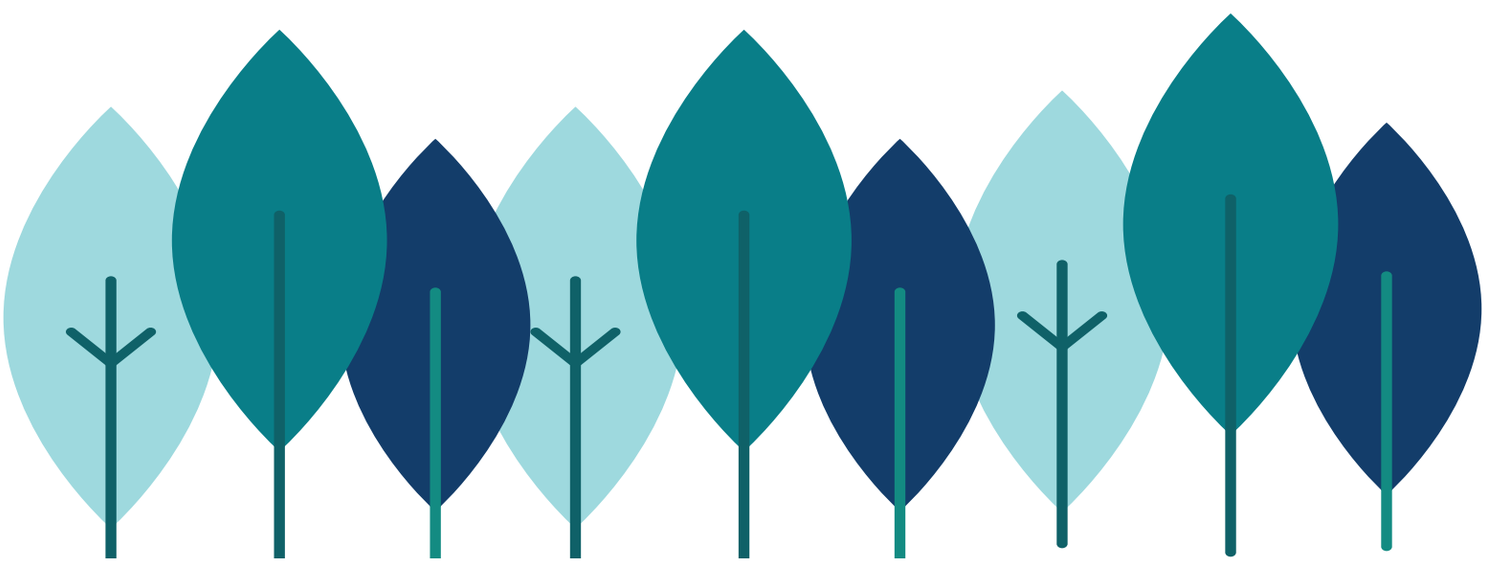
In all cases, offtake contracts are a key area of lender due diligence, and the fact that MENA countries are at various stages of electricity sector reform, deregulation and unbundling means that offtake risks are widely different. When they want to introduce IPPs, most countries in MENA move towards a Single-Buyer Model (SBM) with the single-buying entity bearing the offtake risk. For the last ones which were hitherto closed to IPPs, solar might be the vehicle to revive shelved IPP programs.

Iraq is one example where two consecutive IPP programs were shelved, and a handful of IPP contracts were awarded through direct negotiations (limited or no competition). Baghdad has recently invited expressions of interest to develop 7 solar IPPs with a total capacity of 755 MW, under a BOO model - Build, own, Operate - with a Special Purpose Vehicle (SPV) that will sell the power to the Ministry of Electricity (offtaker).

Even if we expect governments and central authorities to continue to remain involved, particularly in central generation and transmission, we notice some forays of private sector into distributed power, through aggregating sites or clusters and leasing (e.g. Yellow Door Energy, in which APICORP is a shareholder, built its business around solar lease performance-based long-term contracts, on Build-Own-Transfer structure).

The capital intensity of the electricity sector, even for renewables given the large scale of the projects undertaken in the region and the relatively large upfront capex, calls for the maintaining of mechanisms to increase investors' confidence (sovereign guarantees, long-term commitments, take-or-pay clauses) with the government as the backbone of these mechanisms.

Even if more restructuring is clearly needed, Instead, APICORP sees the traditional business model being adapted to allow for more private sector involvement in distributed or own generation and a continuation of the Single-Buyer Model for conventional centralised generation where it already exists.



Renewable Energy

Support for mechanisms and financing but grid investment and storage yet to be seen

Renewable energy developments in the Arab world have gained momentum in recent years. The main driver behind these developments is the strong support from governments that recognise the urgency of tackling rising demand for energy and are attracted by the declining costs of solar PV. In addition, multilateral development banks (MDBs) and development agencies have played a critical role in financing projects in Egypt, Jordan, and Morocco at a time when international banks were reluctant to invest.

Gas shortages, an increasing reliance on high-value liquids and environmental concerns have also added to the urgency of energy diversification. Equally important, renewables continue to rapidly improve their cost competitiveness against other sources of power generation (Phase IV of the Dubai solar park achieved a record bid of USD 0.073/kWh for 700MW of CSP whilst Abu Dhabi's Sweihan PV project broke the world record with a price of USD 0.024/kWh, having received the lowest bids from Japan's Marubeni and China's JinkoSolar).

To support their renewable sectors, countries have introduced several supporting mechanisms including competitive bidding, feed in tariffs (FiTs), tax exemptions, and power-purchase agreements (PPA), in addition to land and financial incentives.

APICORP estimates that in the next five years, close to USD 350 billion could be invested in the MENA's power sector with renewable energy accounting for 34% of power investment, or 12% of total energy investment. Jordan and certainly Morocco have so far led the region with their renewable initiatives. Morocco's target for renewable energy as a share of total generation is amongst the most ambitious in the world, standing at 42% by 2020. The Noor-Ouarzazate project is the largest Concentrated Solar Power (CSP) complex in the world. With an estimated capacity of 580MW, the project has already helped the country achieve 35% of its energy requirements through renewables.

Renewable Energy Targets Across MENA

Source: APICORP

	Short - Term Targets	Year	Long-term Targets	Year
Algeria	4.5GW	2020	22GW	2030
Bahrain	5%	2025	10%	2035
Egypt	20%	2022	42%	2035
Iran	5%	2020		
Iraq			10%	2028
Jordan	8%	2020	9%	2025
Kuwait			15%	2030
Lebanon	12%	2020	30%	2030
Morocco	42%	2020	52%	2030
Oman	16%	2025	30%	2030
Qatar	200-500MW	2020		
Saudi Arabia	10%	2023	58.7GW	2030
Tunisia			30%	2030
UAE			44%	2030

In Tunisia, renewable energy is expected to play a bigger role in the country's generation capacity, where it could account for 12% by 2020, and 30% by 2030. The country has recently granted licenses to four European firms (ABO WIND AG, UPC Tunisia Renewables, LUCIA HOLDING and VSB Energies Nouvelles) worth $134m for the production of 120MW from wind.

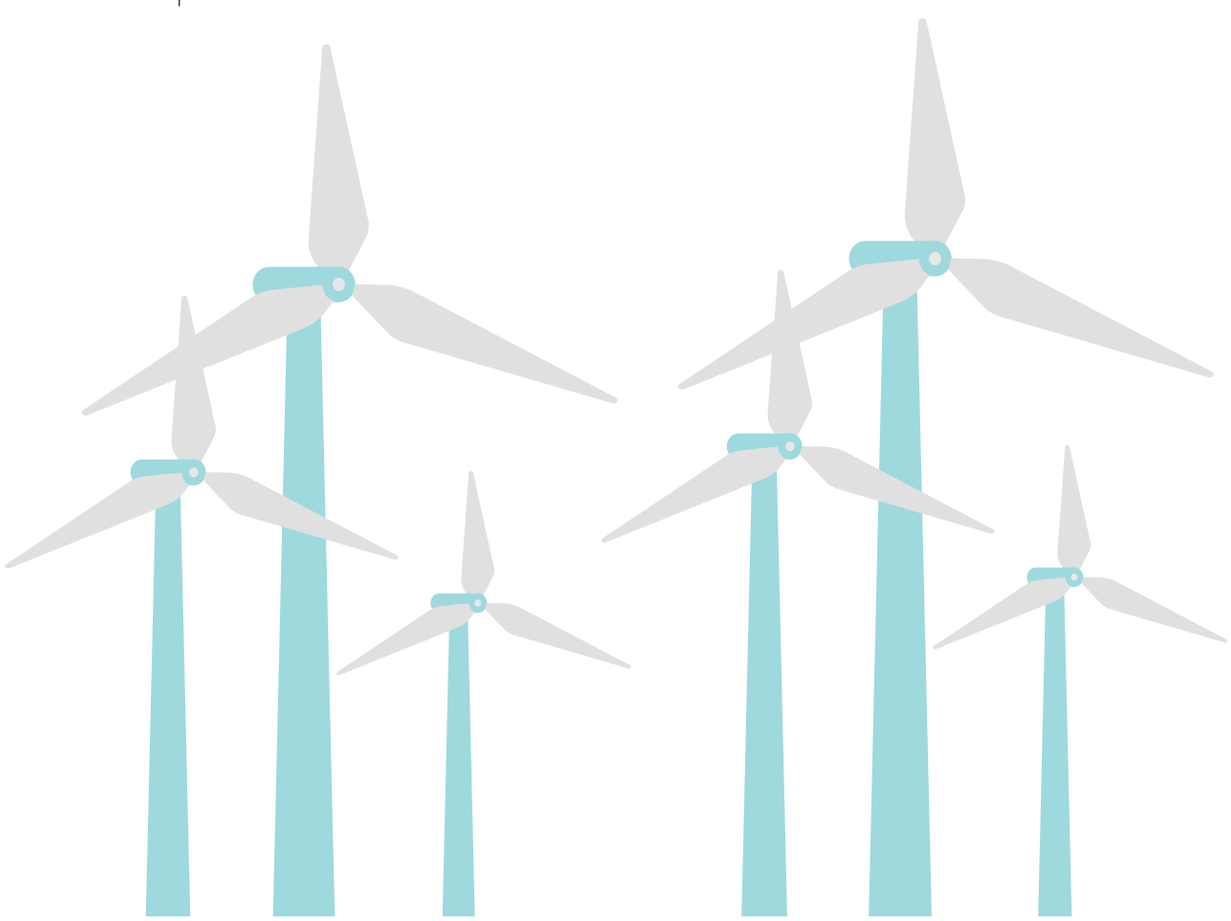
For countries facing challenging fiscal conditions, financing has had to be sourced from the private sector or the international community. MDBs and development institutions have played a critical role in the financing of renewable projects in these countries at a time when international banks have been reluctant to enter riskier markets.

The European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC) committed USD 1.6 billion for 27 solar projects in Egypt, having reached financial closure for a 400MW project to be developed by Norway's Scatec Solar.

In Morocco, the 850MW of wind projects currently under construction are being financed by the European Investment Bank and KfW.

In Jordan, in addition to providing financing solutions, the IFC helped the government address regulatory and sector risks to improve the business environment and attract more investment.

Whilst this has attracted other private sector investment, the role of MDBs and development institutions are likely to remain key in the future. The next phase will be to facilitate funding for grid reinforcement and storage technologies required for massive penetration of renewables.



Conclusion: USD 209 billion needed but success will be mixed

While countries in MENA are pushing for investments in the power sector, several challenges and constraints will prove pivotal in the medium term.

Firstly, oil-exporting countries – mainly in the GCC – are reducing expenditure but have also announced that they would go ahead with their power investment plans. Meanwhile, other countries with lower fiscal buffers and competing pressures on their revenues will continue to face political and economic challenges in executing their capacity expansion programmes.

Secondly, the financing of projects continues to be challenging despite some recently successful efforts to attract foreign investment. Political and economic concerns mean investors will be cautious. However, this type of an environment also creates opportunities for private finance and FDI, as regional players are forced to seek external finance.

Thirdly, many countries are accelerating their price reform plans. While these programmes aim to reduce the fiscal burden on governments, they will also put downward pressure on power demand. Already, electricity demand growth in Saudi Arabia has been dramatically revised downwards to 2% in the next five years, following years of growth rates of over 6%. We expect this trend to continue as tariffs potentially increase.

Arab governments are continuing to prioritise critical investments in their power sectors. We estimate that in the period 2019-23, the MENA region will need to invest USD 209 billion in the power sector. But success in implementing key power projects and attracting the necessary investment will vary across the region.

GCC governments are expected to continue to cope well with rising demand, and energy price reform will help temper demand rises. Although GCC governments are running budget deficits and have indicated that government expenditures will be tightened in response to lower oil prices, investment in the power sector remains a priority.

In other countries, the challenge to meet electricity demand is more serious. Countries like Iraq, Yemen, Libya, Lebanon and Syria, exhibit political instability and inadequate investments-despite some recently successful efforts to attract investments. On the positive side, despite some recently successful efforts to attract in the Maghreb region, renewable energy projects will continue to be at the forefront of long-term government plans to diversify generation capacity.

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