APICORP ENERGY RESEARCH

Vol. 03 No. 04 | January 2018

Electricity trading in MENA – huge potential but far behind

As electricity demand in the region maintains its strong growth, governments are continuing to invest heavily in adding power-generation capacity. At the same time, the region is trying to provide impetus to intra-regional electricity trading. While there are several benefits to increasing cooperation and trade, the region lags substantially behind more mature markets in other parts of the world. Despite an increase in intra-GCC trade, several barriers stand in the way and governments will need to support trading initiatives and demonstrate strong willingness to explore this untapped potential.

Electricity demand continues to grow rapidly in the Arab world where consumption has increase 10-fold since 1980. This surge can be attributed to several factors including: population growth, urbanisation, industrialisation and electricity prices made artificially low through government subsidies. Although growth rates have slowed in the last few years owing to weaker economic activity and increases in electricity prices as those subsidies are reduced, we still estimate that the MENA region will need to add capacity at 7.4% annually until 2021, which corresponds to additions of more than 130GW, and investments of approximately $180bn (See Vol. 2 No. 6 – MENA power investment: finance and reform challenges persist). Governments continue to meet this challenge by expediting new projects and upgrading their infrastructure while also encouraging the private sector to join as partners and financiers.

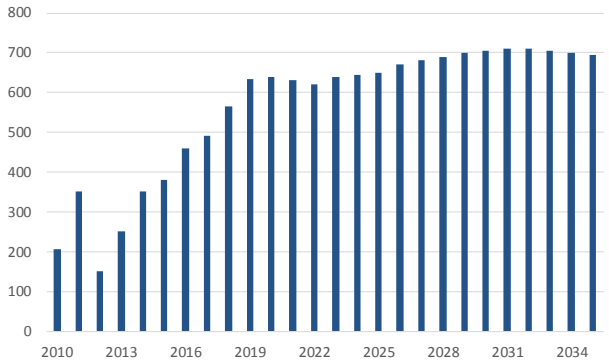
Most Arab countries are struggling to meet increasing electricity demand and thus experience frequent blackouts. Looking forward, governments will continue to invest heavily and increase the role of the private sector in power generation. But another option is also available to them: they can cooperate with their neighbours and explore further the potential of electricity trade as a supplement to their capacity additions. The region has several interconnections, yet trade remains minimal and often only takes place in response to emergencies and outages. The GCC countries are connected via the Gulf Cooperation Council Interconnection Authority (GCCIA) since 2011 while Egypt is connected to the Levant, albeit through small transmission lines. North Africa is also connected with lines linking Algeria, Morocco, and Tunisia. The benefits of regional electricity trading include enhanced energy security, economic benefits due to higher efficiencies and reduced investments in new capacities, as well as more institutional cooperation. According to the World Bank, electricity trade could save the Arab world $17-25bn and reduce required capacity by 33GW through better mutual utilization of existing capacity – while the GCCIA estimates that GCC trade could achieve savings of up to $24bn by 2038. At the same time, chronic technical, institutional and political barriers are major impediments to trading in the region, whose networks are expected to remain amongst the most under-utilized in the world for this purpose.

The rationale for electricity trading is strong

To increase supply of electricity, governments have been investing heavily in power-generating capacities. Absent, however, has been a coherent strategy to improve regional cooperation and stimulate intra-regional trade despite the many obvious potential benefits for the region.

First, electricity trading can provide significant economic gains. At times when GCC governments' revenues have been falling, and other governments in the region are struggling to invest in new infrastructure and provide key public services, there is significant pressure to make substantial investments for capacity additions. Trading could relieve some of this pressure by importing electricity and avoiding substantial investment costs in power generation. According to the GCCIA, the interconnector's economic benefits surpassed $400m in 2016, with the majority of benefits deriving from installed capacity savings. Governments could have access to cheaper electricity given that cost of generating electricity differs from one country to another. At the same time, it will facilitate more efficient utilisation of existing capacity – where the World Bank estimates that the region's utilization rate of generating capacity (capacity factor) stands at only 42% while that of the existing interconnection capacity is around 10%. If governments continue their drive to liberalise electricity prices, electricity demand might fall, resulting in larger unutilised capacity, which could be absorbed by trading with neighbouring countries.

Savings from interconnector for GCC members ($mn)



Source: GCCIA

Second, governments are putting energy security at the forefront of their agendas. While this has meant efforts to diversify the energy mix away from fossil fuels and towards renewable energy, it has also driven countries to diversify the sources of their energy imports. This is mainly the case for countries that rely on gas imported via pipeline. In principle, electricity trading should thus improve the region's energy security, especially in countries that suffer recurring power outages. Currently, most electricity exchanges take place on an emergency basis to cover either unexpected outages or scheduled ones due to maintenance. Given the almost identical peak demand patterns (both days and hours) in the GCC and

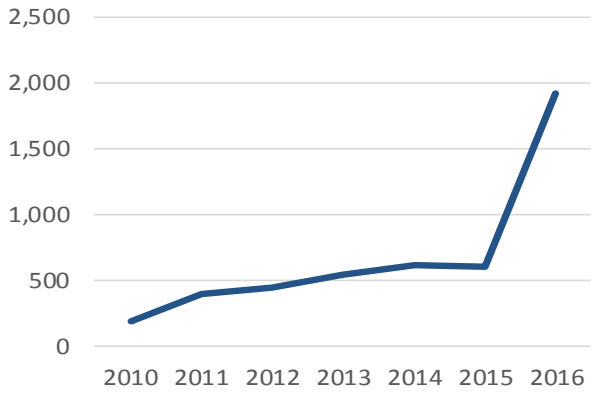
regulatory and institutional barriers, trading within the region will likely remain on an emergency basis. This means that the most effective electricity trading will be with Egypt and the Levant, where demand patterns differ.

GCC trading is very limited

The GCCIA was established in 2001 by the six Gulf States to foster cooperation and interconnect their respective grids. Saudi Arabia and Kuwait are linked with 1.2GW of transmission capacity while the UAE and Qatar have 900MW and 750MW connected to the system. The remaining two countries, Bahrain and Oman, can deliver up to 600MW and 400MW respectively.

The objective of the established authority was to use the interconnector to facilitate spot market trading. The Oman Power and Water Procurement Company (OPWP) has advocated for pilot spot trading with other members to start towards the end of the decade – where it will operate in parallel to long term power purchase agreements. The country was the last to connect to the GCCIA and sees trading as a good option and a more viable alternative to short-term capacity generation from diesel. At the same time, the country's push for trading comes at a similar time to expiration of some long-term power purchase agreements. Nonetheless, electricity trading in the GCC remains negligible – despite a surge in commercial trading in 2016. The main intra-regional transfers have occurred on an emergency basis only covering unscheduled outages. Electricity trading falls under two categories: scheduled and unscheduled exchanges. Scheduled exchanges occur rarely and are based on bilateral agreements between members, after which members make transmission arrangements with GCCIA. More prevalent, however, are the unscheduled exchanges whereby member countries require urgent power imports from other countries through the system to cover unexpected contingencies and ensure system reliability. Unscheduled transfers from one country to another are returned in kind – i.e. unscheduled import during peak demand will be returned as exports during peak demand.

Energy exchange on GCCIA interconnector (GWh)



Source: GCCIA

Initial plans to link GCC with neighbouring countries

For many years, there have been ambitious plans to expand the GCC grid to non-GCC countries, including Egypt, Jordan, and Yemen, which have all been struggling with inadequate capacity and financial constraints. Connecting the grid to non-GCC countries will solve one of the main challenges hindering electricity trading in the GCC: the fact that peak demand in the GCC is uniform. By contrast, North Africa and the Levant have different demand patterns.

Plans for a Saudi-Egyptian transmission line are expected to be signed in 2018, having been repeatedly delayed for many years during times of political uncertainty in Egypt. The line will be able to transmit 3GW early next decade. The expected cost of the project is around $1.5bn with the Saudi side covering the majority of financing and regional development institutions expecting to contribute to financing. If achieved, this line will play a critical role in improving energy security in Egypt and fostering regional electricity trade, given that Egypt is also connected to Jordan and Libya.

Linking the GCC with Iraq also offers huge potential. Having suffered massive infrastructure damage over the past years, Iraq is in dire need to upgrade and invest in its ailing power infrastructure, with power outages common through the country. The recent revival of Saudi-Iraqi relations has included discussions on wider cooperation in the energy sector, with the plans for a technical and economic feasibility study of an electricity link project. Additionally, a memorandum of understanding was recently signed between Jordan and Saudi Arabia to conduct technical and economic studies for an electricity interconnection between the two countries, with Jordan keen to diversify electricity sources and reduce pressure on the government to invest in new power generation.

Limited trading in the rest of the region

One of the major interconnections in the Arab world started in 1988 and linked Egypt, Iraq, Jordan, Syria and Turkey. It later expanded to include Libya, Lebanon and Palestine. The objective was to cooperate and share reserves in emergencies, as well as surplus power. However, trade amongst these countries has been marginal, with many impediments including limited generation capacity and different regulatory frameworks. Moreover, interconnections between these countries have relatively small capacities: the Egypt-Jordan link is the largest, but it is only 450MW. Further trade in the future is highly unlikely as each country struggles to meet its own demand.

Existing link capacities (MW)

Interconnection	Export	Import
Algeria-Tunisia	150	150
Morocco-Algeria	400	400
Morocco-Spain	700	700
Syria-Jordan	200	350
Syria-Lebanon	50	160
Jordan-West Bank	20	-
Egypt-Gaza	17	-
Turkey-Syria	250	-
Libya-Egypt	180	180
Jordan-Egypt	200	450
Saudi Arabia-GCCIA	1200	1200
Kuwait-GCCIA	1200	1200
Qatar-GCCIA	750	750
Bahrain-GCCIA	600	600
UAE-GCCIA	900	900

Sources: World Bank

In North Africa, the Maghreb interconnection began in the 1950s and connected Algeria, Morocco and Tunisia. The region has long stated its ambition to establish a liberalised market. The Algiers Declaration in 2010 stipulates that the three countries will aim to bring their laws and frameworks into line with each other, to create a competitive electricity market and potentially integrate with the EU. The plan includes transparent network access for cross-border electricity trading. However, progress has been slow and intra-regional trade is limited. Nonetheless, Morocco imports nearly 20% of its electricity from Spain where the two countries have been connected through a 1.4GW link since the late 1990s. Plans to link Algeria and Tunisia with other Mediterranean countries have also taken place, with no notable progress.

Several challenges in the long term

Despite the desire to foster greater cooperation and improve regional electricity trade, many challenges have impeded progress.

First, energy security is a key national priority for all countries in the region, and the escalating geopolitical tensions are likely to reduce governments' willingness to rely on each other, despite the apparent economic benefits. Gas trade in the region is also one of the lowest in the world despite the region's vast and uneven distribution of gas reserves. In addition, debilitating security conditions will mean that transmission lines could potentially be sabotaged. This was particularly the case in Yemen, when tribal disputes with the government resulted in the repetitive sabotage of transmission infrastructure.

Second, strong institutional capacity and a clear regulatory framework are still missing. Despite establishing the GCCIA to foster cooperation and interconnect the grids, there is a lack of transparency concerning the regulatory framework, as well as limited information around the legal, commercial, and pricing structure.

Third, limited spare capacity – especially during peak demand – will mean that more capacity needs to be added. The region will need to continue to invest heavily in generating capacity as well as transmission infrastructure to meet rising demand. These investments need to take place despite weaker economic activities and lower government revenues – while a more active role from the private sector will also be pivotal.

In addition, the existing capacity of the current interconnector is small and is suitable for limited electricity trading. The Saudi and Kuwaiti links, for example, are amongst the largest in the region despite capacity of only 1.2GW.

Fourth, subsidy reform and diversification of fuel mix are issues in the region that have yet to be fully resolved. In the case of subsidy reform, electricity prices need to reflect actual costs to enable trade of more efficiently produced electricity, since electricity imports will almost certainly cost more than domestically produced and subsidised electricity. At the same time, diversification of fuel away from liquids to gas is essential since the cost of the electricity is determined by the fuel used in power plants. For instance, electricity exports sourced from oil-fired plants will always be uneconomical, whereas there is an arbitrage between direct gas export and power sourced from gas -fired plants – depending on gas prices. Additional capacity particularly from renewables will make trading more attractive.

MENA electricity trading thus lags significantly behind other regions. Although there has been some progress, there is still a long way to go before intra-regional trading represents a substantial part of electricity consumption. GCC electricity exchange has grown over the past year, but this is driven mainly by unscheduled outages and not due to commercial trading. The Saudi-Egyptian link is the largest planned project for the region and is expected to become operational early next decade. Several plans and studies to link the GCC with Iraq, Jordan, and Yemen could translate into projects, but are unlikely in the short and even medium term. While economic benefits to trading exist, several barriers – mainly geopolitical - are proving to be hefty impediments. Although in principle trading should improve energy security, the deteriorating geopolitical situation will be one of the key concerns for all Arab governments, which will continue to focus on meeting their own demand through investing in their local power generation.

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