

# **Electricity Market Integration in the GCC and MENA: Imperatives and Challenges**

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The King Abdullah Petroleum Studies and Research Center (KAPSARC) is a non-profit global institution dedicated to independent research into energy economics, policy, technology and the environment, across all types of energy. KAPSARC's mandate is to advance the understanding of energy challenges and opportunities facing the world today and tomorrow, through unbiased, independent, and high-caliber research for the benefit of society. KAPSARC is located in Riyadh, Saudi Arabia.

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# Key Points

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**R**ising electricity demand and growing fiscal constraints have encouraged governments in the Gulf Cooperation Council (GCC) and Middle East and North Africa (MENA) regions to consider more cooperative approaches to delivering reliable and affordable electricity services. The development of an effective, integrated electricity market is expected to help achieve these objectives efficiently and sustainably. KAPSARC's workshop on this subject yielded the following insights:

Removing price distortions in supply side – that is, wholesale level – decisions through effective price reform measures is crucial to addressing the concern of 'implicit wealth transfer' in cross-border electricity trading and developing an effective and viable regional electricity market in the GCC and MENA regions.

Non-discriminatory open access to the grid and third-party sales are both essential for improving competitiveness and market liquidity at national and transnational levels.

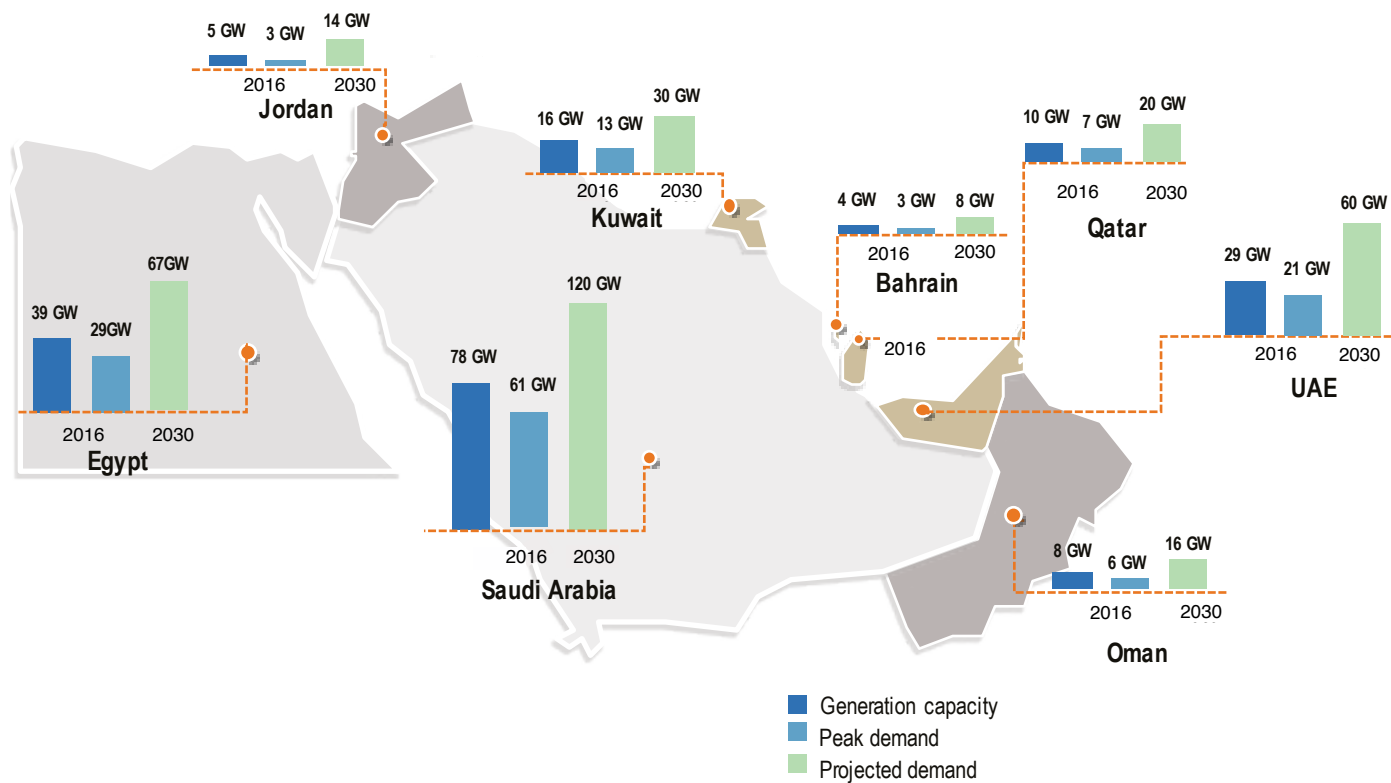
Market integration is a long process that requires continuous political support. Liberalization of national electricity markets is desirable but not a prerequisite. As a way forward, the building of an integrated market could follow a 'national control and regional cooperation' approach.

As the existing trading regime in the region focuses more on long-term bilateral transactions, effective utilization of resources will require the development of a short-term market to deal with load and time differences, but without undermining long-term objectives.

Future market designs will need to be adapted to provide greater flexibility and trading opportunities closer to the point of dispatch.

A certain degree of compatibility in regulatory frameworks is required for integrated electricity markets to function effectively. To progressively align and implement regulatory approaches requires an independent institution at the regional level.

## Key Points



**Figure 1.** Electricity demand continues to rise in the GCC and MENA regions.

Source: Collated from multiple sources based on information available in the public domain. Figures may not tally precisely with the updated information available from the utilities.

# Executive Summary

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**A** number of power systems around the world have combined to form regionally integrated electricity markets in order to achieve efficiency, reliability and environmental objectives. Beyond the physical interlinking of national grids, the concept has gained little traction in the Gulf Cooperation Council and Middle East and North Africa regions to date. However, a renewed political commitment to regional integration has revived interest among the countries in these regions. With rising power demand and growing financial pressure, the development of a regional electricity market has the potential to offer many benefits to the participating countries, both in the short run and long run. The design and development of an integrated electricity market in these regions will require an understanding of a range of economic, regulatory and policy challenges. The key highlights follow.

For decades, resource-rich countries in these regions have been providing energy subsidies with the aim of social protection and redistribution of the hydrocarbon wealth among their citizens. While subsidized retail tariffs have their own implications for the sector's performance, subsidized fuel for power generation has made the task of integrating electricity markets especially difficult because of concerns about implicit wealth transfer in cross-border electricity trading. Removing supply-side price distortions through effective price reform measures will be necessary for the development of an effective and viable regional electricity market. Until such time, the option of facilitating electricity trading at market-determined prices could be explored in the short run by developing an acceptable regulatory approach. However, benchmarking and transparency of fuel prices will remain contentious issues.

Promoting competition in wholesale and retail electricity markets through open access is an essential element of the market liberalization

process. However, due to the single/principal buyer model predominating in the electricity industry in the regions, open access and third-party sales are either not allowed or are only loosely defined. The following measures would be required to improve market liquidity, both within and across borders, and develop a competitive marketplace, reaping the benefits of load and time differences: the implementation of open access together with fully-supported, fair, transparent and common regulatory rules for access to and pricing of grid services in the region. Major barriers to the implementation of open access exist in exclusive long-term power purchase contracts and the fear of losing the revenue base to cross-subsidize other low paying customers.

Liberalization of the electricity market is underway in a number of countries in the region, but local priorities have shaped its pace and design rather than regional objectives. International experience suggests that electricity market integration is a dynamic transition process which takes time to mature, but where both 'liberal' and 'nationalistic' approaches can however co-exist. Thus, initiating structural reforms may be desirable but not a prerequisite to market integration. A market design that facilitates the development of a regional market while at the same time allowing countries to undertake reforms at their own pace is required. Experience shows that making liberalization a precondition for developing a regional electricity market has not succeeded in the past.

While electricity as a product can be differentiated over time, the existing trading portfolio of the Gulf Cooperation Council Interconnection Authority is largely characterized by long-term transactions. By contrast, the day-ahead market accounts for the majority of traded volume in a number of power pools in Europe, Australia and the United States. Development of the short-term market needs to be encouraged to take advantage of regional load

## Executive Summary

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diversity. Inducing competition, reflecting the value of electricity at shorter operational timescales and rewarding flexibility can be the guiding principles for future market design. Restrictions and/or delays in achieving electricity price and volume approvals from multiple agencies have discouraged the emergence of a short-term market for cross-border electricity trading.

Institutional arrangements for cooperation and coordination in formulating and aligning necessary

regulatory frameworks should be explored. Both top-down strategies, such as the European Union's vision of creating a pan-European integrated market, and bottom-up strategies like aligning or creating common market rules/regulations, will be required to integrate markets. Moreover, effective integration will also require coherent system operation practices and coordination at two levels: horizontal, between system operators, and vertical, as with a system operator dealing with both market participants and governments.

# Background to the Workshop

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Efforts to integrate power systems and markets in both the Gulf Cooperation Council (GCC) and the wider Middle East and North Africa (MENA) region are gaining momentum. With rapidly growing electricity consumption in the overall region, the development of an effective, integrated electricity market can offer many benefits. These include the efficient utilization of local resources, more cost-effective integration of variable renewable generation. It also opens up the possibility of larger-scale deployment of renewables to the participating countries.

However, realizing these potential benefits requires a deeper understanding of a wider set of economic, legal, technical and political factors in order to address the challenges. In this context, a roundtable dialogue focusing on Electricity Market Integration in the GCC and MENA regions: Imperatives and Challenges was organized, with the following objectives:

- Gaining a better appreciation of the key issues – policy and political, market design and structure, regulation and system operation – affecting the efficient integration of the electricity markets and cross-border electricity trade in the region.

- Understanding the experiences of other integrated markets and their potential relevance for this region.

- Identifying and suggesting good practices for creating an efficient and interconnected market.

- Drawing lessons for policymakers and other stakeholders in developing an effective and well-functioning integrated market in the region.

The insights gathered from the workshop discussions will help inform the design and development of an integrated electricity market in the region. This workshop summary includes a brief update on the current status of regional market development and highlights key issues around market design and structure, regulation, system operation, and public policy in relation to electricity market integration.

# Current Status of Power Sector Development in the Region (GCC&MENA)

Electricity consumption has increased rapidly over the past two decades – by around 6 to 12 percent annually – due to rising populations, urbanization, industrialization and increasing prosperity in the region. With the economic outlook positive, this trend is expected to continue. Key characteristics of the electricity industry in the region, and progress on power system and electricity market integration, are summarized below.

## Capacity planning focuses on ensuring internal self-sufficiency

As countries in the GCC are major oil and gas producers, their electricity production has typically

relied on oil and gas. However, they are now slowly diversifying away from increased reliance on oil and gas. Self-sufficiency was previously seen as the best way of ensuring electricity security. Moreover, reliance on neighbors to meet domestic energy needs may have been viewed as a sign of weakness in the Gulf countries. The comfortable financial position of many of the countries in the region had allowed them to over-invest in generation capacity in the past. However, growing fiscal constraints and rising demand have encouraged governments in the region to consider more cooperative approaches to delivering reliable and affordable electricity services. The findings of a KAPSARC study into the political economy of a regional electricity market indicate a moderately to strongly positive consensus on the need for a common electricity market (Figure 2).

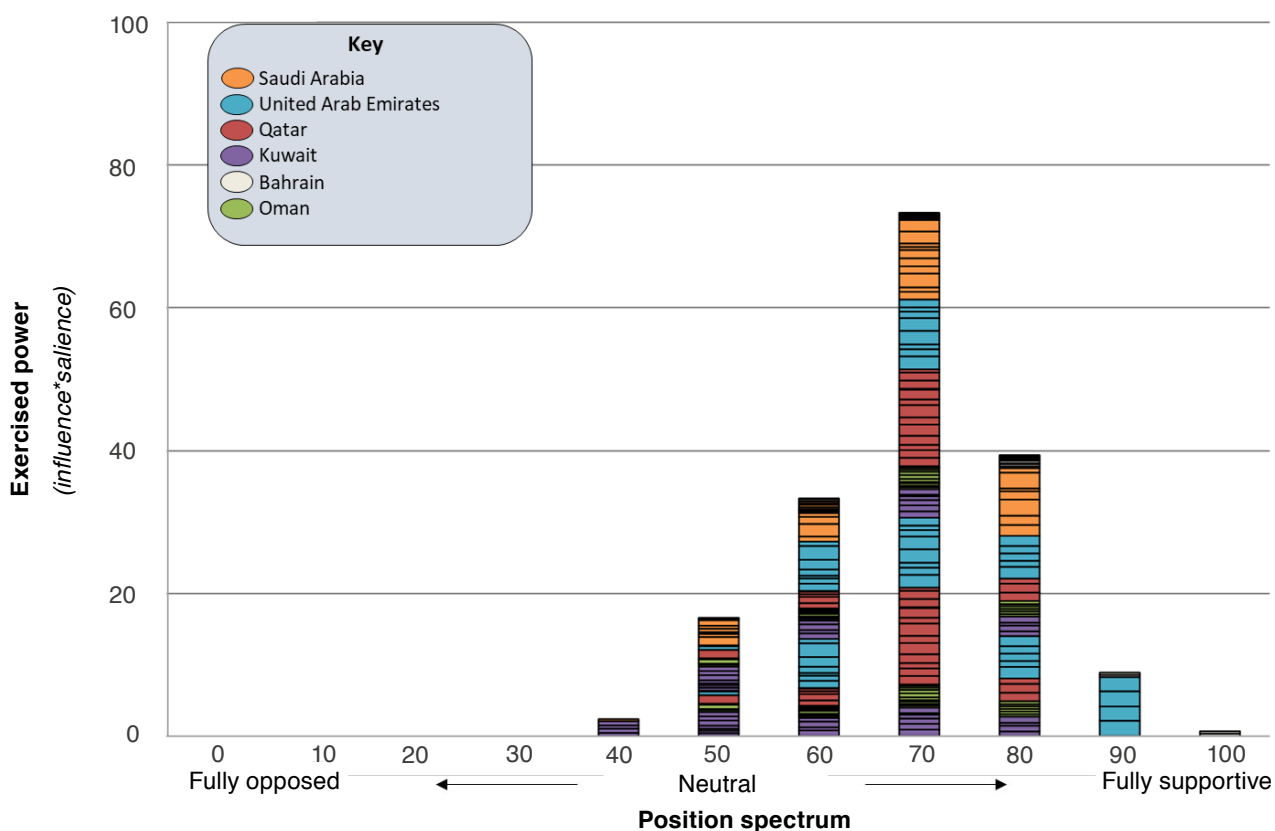


Figure 2. The political context of a GCC electricity market.

Source: Presentation titled The Political Economy of a Regional Electricity Market, Workshop on Regional Electricity Sector Integration in the GCC and MENA: Imperatives and challenges.



## Countries are at different stages of market reform, with different levels of commitment

The electricity sector is not yet run on a sound commercial footing. Electricity tariffs are regulated but have been kept artificially low in the past. Utilities/independent power producers (IPPs) are also provided with subsidized fuel for power generation, which further distorts price formation. Electricity market liberalization and reforms are underway in a number of countries, though these are at different stages of implementation. Generation, transmission and distribution functions

have been unbundled in some of the countries, but the full separation of monopoly transmission businesses is yet to be achieved. The electricity markets are largely characterized by a single buyer model, with limited scope for competition in the wholesale market (Figure 3). Though several countries in the region have initiated electricity market reforms, none have identified the development of an effective and integrated regional electricity market as one of their objectives. Further, specific laws/policies are either missing or do not clearly define and promote cross-border electricity trade. Several countries in the region, including Saudi Arabia, Oman, Abu Dhabi, Dubai, Egypt and Jordan, have established electricity regulators who face the daunting challenge of

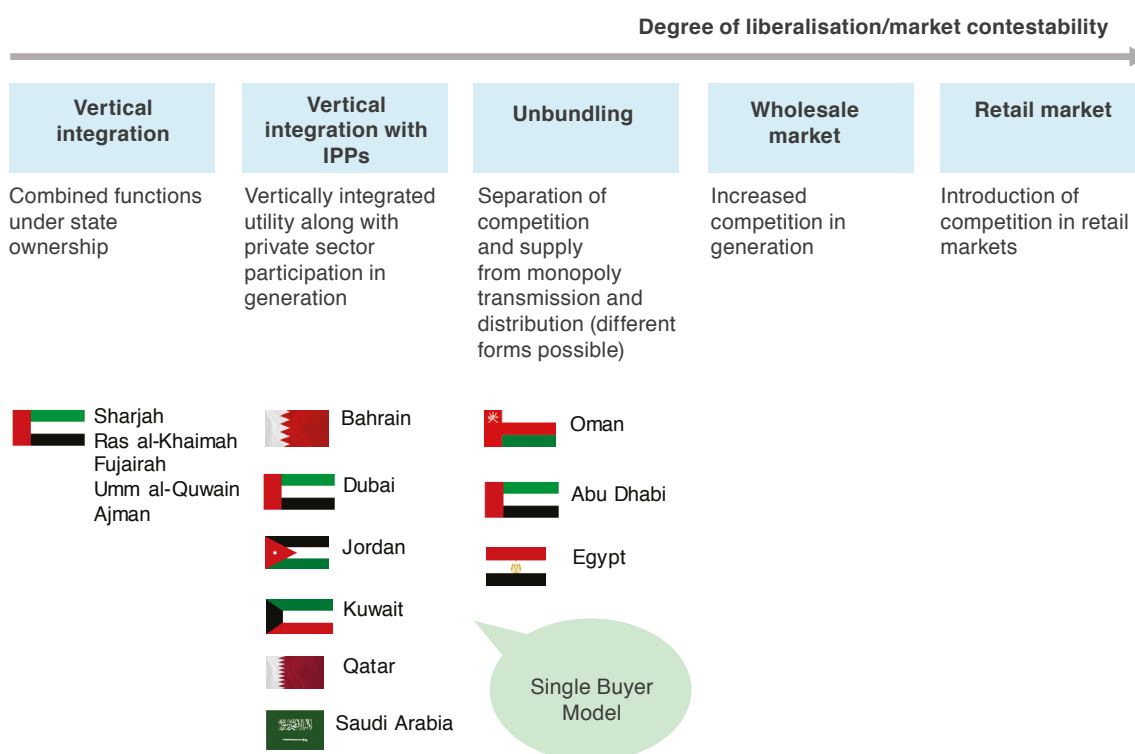


Figure 3. Electricity market structure in GCC and neighboring countries.

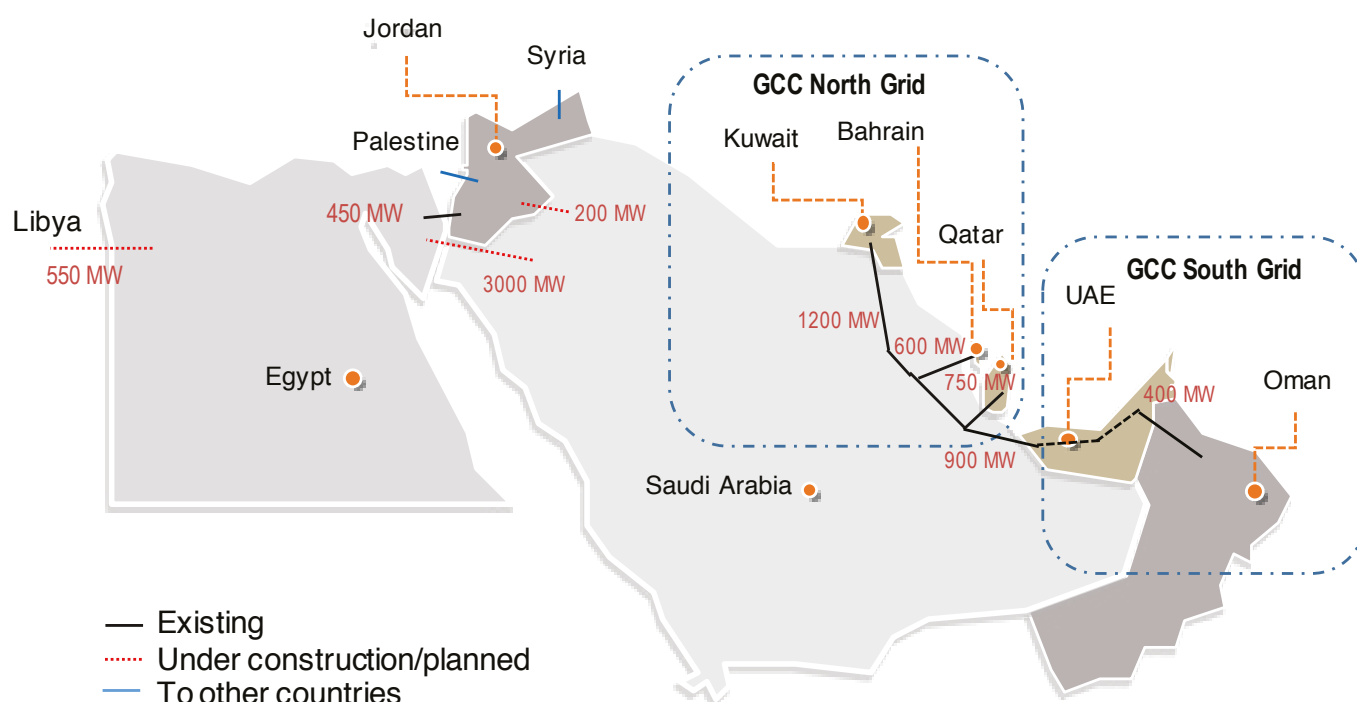
Source: Presentation titled Electricity Market Structure and Regional Integration, Workshop on Regional Electricity Sector Integration in the GCC and MENA: Imperatives and challenges.

balancing the interests of consumers, companies and governments. While regulatory frameworks are still evolving, they do not yet adequately address the issues associated with cross-border electricity trade.

### Cross-border transmission infrastructure is widely underutilized

The Gulf Cooperation Council Interconnection Authority (GCCIA) was formed in 2001 to link the power systems of the GCC countries over three separate phases. With the completion of the UAE-Saudi Arabia interconnection in 2011, the electricity grids of all the Gulf countries were

interconnected to form the GCC grid. Outside the GCC, Egypt and Jordan are the two major electricity markets contiguous with Saudi Arabia. While the Jordan-Egypt interconnection has a 450 megawatt (MW) capacity, the Egypt-Saudi Arabia interconnection is under development, with a total designed capacity of 3,000 MW, and is expected to be fully operational by 2025. A 200 MW Jordan-Saudi Arabia interconnection is also planned to be operational by 2025. Despite significant transfer capacity (Figure 4), effective utilization of GCC interconnections has been around 5-6 percent, compared with around 50 percent on average in Europe (EFET 2017). This low utilization level is due to the fact that interconnections were originally planned to share reserve capacity and

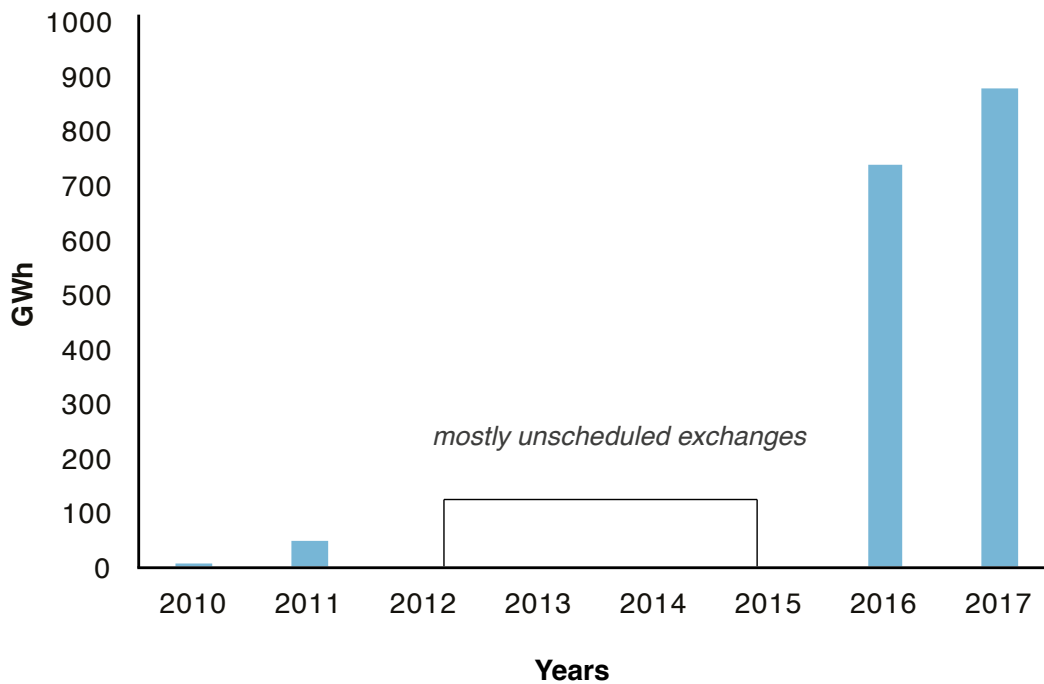


**Figure 4.** Cross-border interconnections in GCC and neighboring countries.

Source: GCCIA, 2018.

provide stability and support to the grid during emergencies, rather than to maximize economic gains through cross-border electricity trading. However, power trading among the GCC

states – which takes place largely through bilateral contracts comprising ‘in-kind’ and ‘in-cash’ models – has shown an upward trend since 2016 (Figure 5).



**Figure 5.** Power trading on GCCIA interconnectors.

Source: GCCIA, 2018.

# Price Distortions and Cross-Border Electricity Trading

**W**hile regulating energy prices has been a common practice around the world, resource-rich countries in the region have been offering significant energy subsidies for social protection reasons and to redistribute hydrocarbon wealth among their citizens. The electricity sector is no exception: subsidies exist at both ends – production and consumption. Retail electricity rates in the region have been kept artificially low for a long time. Electricity generators are also supplied with fossil fuels at a price well below international levels by the respective state-owned oil and gas companies to make electricity more affordable to their consumers. Heavy reliance on subsidized fuel for power generation continues to distort the real cost of electricity production in the region, making the task of integrating electricity markets especially difficult because wholesale price distortions can lead to implicit wealth transfers that are often unacceptable to electricity-exporting countries. Such concerns have been raised in the past and continue to pose a major challenge for the future integration of electricity markets. Thus, to develop an effective and viable regional electricity market, price distortions, particularly at the wholesale level, need to be removed or reduced through effective price reform measures. Underpricing electricity and other forms of input subsidies for power generation remain major stumbling blocks to facilitating cross-border electricity trade in the region. Some of the issues and suggestions that relate to this are highlighted below.

## Electricity trade without removing fuel subsidies: Sharing profits

State-owned companies supplying subsidized fuel to utilities/IPPs for power generation have often

objected to a single/principal buyer selling electricity outside its national boundaries. There have also been instances where fuel suppliers have either forfeited the entire profit, if any, from power trading activities or have demanded a substantial share in the earnings from cross-border electricity trade. While fuel suppliers may be justified in seeking compensation to partially or fully mitigate their loss in revenue through providing subsidized fuel, such decisions do not incentivize single/principal buyers to actively engage in cross-border electricity trading for wider economic gains. In this regard, past experiences in developing regulatory approaches to share the benefits of the Kyoto Protocol's Clean Development Mechanism may offer some useful insights on the effectiveness, efficiency and equity aspects of benefit-sharing mechanisms. As both the production cost of fossil fuels and the price paid by the generators are often not clearly disclosed, aggregating and sharing profit from cross-border electricity trading will remain opaque.

## Implicit wealth transfer: Correcting the wholesale prices

Removing price distortions from supply-side decisions will not only help more accurately identify the unsubsidized cost of electricity production but will also make it easier to target subsidies where these are needed most. The policy of providing subsidized fuel for power generation is clearly one of the major barriers to developing a viable electricity market in the region. To address the concerns of implicit wealth transfer in the cross-border electricity trade, should eligible players be allowed to trade electricity at a market-determined price until fuel subsidies are eliminated or

removed? Can an acceptable regulatory approach be developed that will make it possible to introduce cost-reflective pricing for the electricity meant for cross-border trading, with a certain trade-off?

### **Fuel prices: Benchmarking and transparency**

Benchmarking fuel prices in an effort to estimate the supply-side price distortions raises the question of what constitutes an appropriate reference price. Does this reference price mean:

Prices in international markets, an approach used by the International Energy Agency in quantifying the subsidies?

A reference price linked to the cost of fossil fuel production in resource-rich countries?

A reference price based on the opportunity cost of the economic rent/revenue foregone by failing to sell fossil fuels in the international market?

Regardless of the approach followed, there will be methodological challenges in measuring the level of subsidy, and arguments for and against various options for benchmark fuel prices. Other than adopting a reference price mechanism for fuel prices, a lack of transparency and availability of data will also make the quantification of implicit supply-side price distortions difficult.

# Access to National and Regional Markets

Open access to the transmission network by market participants is an essential element of the electricity market liberalization process, designed to introduce competition in the electricity markets, leading to more efficient sector operation. Integration of internal electricity markets through nondiscriminatory open access to the transmission network, including cross-border interconnections, can potentially result in increasing the size of the wholesale market, thus enhancing the conditions for competition among the players, both within and across borders. However, to achieve this, the concept of open access should ideally include the possibility of third-party sales as well.

In general, the current market designs in the region do not support open access, as only a few countries have allowed market participants to access transmission network services on payment of cost-reflective wheeling charges. In the region, only Egypt has removed the single buyer market restriction so that IPPs are allowed to sell electricity directly to large customers through bilateral contracts using third-party open access provisions. However, as reform initiatives are still in the first stages of implementation, third-party sales through open access have yet to pick up. On the other hand, in Saudi Arabia only those non-utility generators connected to the grid that have a generation license from the Electricity and Co-Generation Regulatory Authority are allowed to use the transmission network to meet their own captive demand at different locations, paying the wheeling charges as set by the regulator. In other countries, open access is either loosely defined or non-existent. The limited and restrictive open access provisions leave the market with one main single buyer/principal buyer that can engage in cross-border electricity trade in each country in the region, resulting in limited liquidity in the transnational electricity markets.

There are two main reasons for the prevailing reluctance to allow open access in the region. The first is the exclusive take-or-pay kind of long-term contracts, through which generators must still be paid as per the contract terms if open access results in loss of load to the incumbent utility. The second is the fear of losing large customers that may be cross-subsidizing other low paying customer groups. The introduction and implementation of open access would require the following:

- Authorizing legislation that mandates open access and supports competition, together with political commitment.
- Regulatory frameworks that provide fair rules for access, including the pricing of grid services.
- Unbundling of transmission and distribution functions from generation to avoid potential conflicts of interest.

As most countries in the region have not yet enacted open access provisions, rules and regulations pertaining to this – including cross-border interconnections – should be introduced and harmonized to enhance cross-border electricity trade. The European Union's (EU's) first Electricity Directive (96/92/EC) incorporated the principles of free electricity trade between member states. It also required national incumbent utilities to offer a choice to consumers and traders by granting third-party network access to facilitate the integration of electricity markets across the EU. The European Network of Transmission System Operators (ENTSO-E) further enabled cooperation and coordination between transmission system operators (TSOs) to ensure effective and transparent access to transmission networks, including the network for cross-border electricity exchanges.

# Market Structure and Design

## Integration of internal electricity markets: Is reform a pre-condition?

A number of countries in the GCC and MENA regions have initiated power sector reforms to liberalize their national electricity markets. Countries are at different stages of market reform, with different levels of commitment. The degree of liberalization/market contestability is still limited (Figure 3). International experience suggests that developing an integrated power market is an evolutionary process which takes time to mature (e.g., Nord Pool) and where both 'liberal' and 'nationalistic' approaches can co-exist (compare the Nordic region with continental Europe). Setting preconditions on GCC member states to liberalize their electricity sector so as to develop a regional electricity market has been unsuccessful in the past. Further, the appetite for and feasibility of developing competition and improving market liquidity may also be minimal for the smaller countries in the region.

## Motivations for market integration: What is in it for me?

Integrating electricity markets can bring about varying degrees of efficiency and social welfare gains to participating countries. Benefiting from potential opportunities requires long-term regional strategic thinking, and countries often tend to focus on their own national priorities. The key challenge for the countries in the region is how to balance the national and regional objectives, set against the background of the following dilemma:

Should member countries first think 'regionally' and then 'discover' the value for each individually in the interconnected market?

Should the member countries focus on pursuing their own 'national interest' first, and then explore how they can 'enhance' such benefits in the context of an interconnected market?

## Gradualism as the way forward for pan-Arab market integration?

Developing a power market that functions well is a continuous process: Europe took more than two decades to become one of the largest and most liquid electricity markets in the world following the adoption of the first EU liberalization directive (First Energy Package) in 1996. Considering the political challenges and feasibility of introducing more comprehensive structural reforms in some countries, a market design which facilitates the development of a regional market while at the same time allowing member countries to liberalize electricity markets at their own pace will be preferable. Member countries should continue taking small steps that will enable them to establish more effective and well-functioning integrated markets in the future. In this regard, formulating a common plan setting out the strategic regional objectives, steps needed for developing short-term and long-term electricity markets, and a mechanism for review and coordinated monitoring will help achieve this vision.

## Market design options: No one-size-fits-all

The existing trading regime followed by the GCCIA focuses more on long-term bilateral transactions. However, the day-ahead (short-term) market accounts for the majority of traded volume in the major power pools in Europe, the United States and Australia. In the GCC region, however, procedural



## 1. Market Structure and Design

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delays in obtaining the necessary approvals on price and quality of electricity from the respective electricity regulators have discouraged electricity trading on short-term operational timescales, such as day-ahead and intraday. As more countries in the region aspire to add renewable energy, encouraging and appropriately valuing the new products and services – such as ancillary services and demand response – will help support the required flexibility in the grid. New arrangements in the form of forward markets (commitment to supply electricity at an agreed price and time in future) and financial markets (e.g., futures, swaps, options) are also gaining popularity in more liberalized markets for future risk management and, therefore, can be explored for their adaptability in the region. The three suggested possible scenarios, without any path dependency, for market integration in the GCC are as follows:

**Scenario 1:** GCCIA to act as a market coupling mechanism. Member states create their own markets. This may postpone the creation of competitive and transparent electricity markets in the member countries.

**Scenario 2:** GCCIA to act as a regional market, technology and know-how provider for local markets that are connected through a market coupling mechanism. Faster and more effective than scenario 1 if member states are committed to creating ‘national’ exchanges; it does deal with the main challenges of the region.

**Scenario 3:** GCCIA as a nucleus for intra-country markets. All GCC markets would be connected as one, providing maximum competition and liquidity. This concept requires the establishment of a regional regulator.

Regional cooperation with national control rules remains the core philosophy behind the suggested market design concepts. As there is no one-size-fits-all solution to the challenge of achieving seamlessly integrated electricity markets, international experience needs to be appropriately customized to suit the local context.



# Regulatory Alignment and Regional Cooperation

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**A**symmetries in national approaches regarding regulation and system operation in cross-border jurisdictions can lead to suboptimal solutions and a non-level playing field for market participants. Thus, to ensure the regional market functions efficiently and delivers the intended objectives, a certain degree of compatibility in regulatory frameworks is crucial. Considering the needs of different countries, a progressive alignment and implementation of regulatory approaches would be more desirable in the following areas:

- The harmonization of relevant aspects of system security in grid operation.
- Regulations on network access conditions, including interconnections.
- Key principles of economic regulation for the electricity industry, which has clear implications for cross-border electricity trade.
- Approaches to long-term regional transmission planning.
- Capacity allocation and pricing for interconnections.

■ Technical standards for interconnection of power systems, such as voltage, frequency tolerance and thermal limits.

An appropriate institutional arrangement will be necessary to facilitate the cooperation and coordination required for aligning the national regulatory frameworks so as to develop an effective and integrated market. This sort of institution must work in close coordination with relevant national level entities and, more importantly, with electricity regulators, transmission companies and system operators. Europe can offer a good example of this: the Agency for the Cooperation of Energy Regulators (ACER) defines the guidelines for transnational electricity networks and markets, but national regulators are empowered to set the rules for system operations in electricity markets within their jurisdictions. ENTSO-E, the European TSOs' representative body, further develops the frameworks – i.e., the grid codes – ensuring overall alignment, and these are then approved and implemented by the TSOs. ACER monitors implementation and enforcement. GCCIA, which in the past has provided its members with substantial experience of power system integration at technical, institutional and regulatory levels, could serve as a good starting point.

# About the Workshop

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**T**his workshop took place in Riyadh on May 10, 2018. It brought together more than 30 regional and international experts to discuss the key issues relating to the formation of an integrated electricity market in the GCC and wider MENA region. It provided an update on the current status of electricity systems and markets in the region and addressed market design and structure, regulation and system operation, policy and political drivers.

## List of participants

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**Hatem Waheed** – Executive Chairman and President, Egyptian Electricity Regulatory Agency, Egypt

**Bertrand Williams Rioux** – Research Fellow, KAPSARC, Saudi Arabia

**Matthew Wittenstein** – Senior Electricity Analyst, International Energy Agency, France

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# Notes

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# Notes

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## About the Team



**Shahid Hasan**

Shahid is a research fellow at KAPSARC working on topics related to the future development of a regional electricity market in the GCC. He previously consulted extensively on policy, regulatory and market design issues for governments, electricity regulators, public utilities and the electricity industry in India and Southeast Asia.



**Douglas Cooke**

Douglas was previously the program director of Energy Transitions and Climate Change at KAPSARC. He is a senior public policy practitioner with three decades of experience in advising governments on energy policy and regulation, focusing on energy market reform, international energy dialogue and energy security. Douglas has also held a variety of senior executive roles at the International Energy Agency.



**Iqbal Adjali**

Iqbal is a senior research fellow at KAPSARC specializing in energy systems modeling, with a focus on electricity sector transitions. He holds a Ph.D. from Oxford University and an MBA from Cranfield University.



**Yagyavalk Bhatt**

Yagyavalk is a senior research analyst at KAPSARC. His research interests include evaluating energy policies, with a focus on renewable energy. He has previously worked as a researcher, providing sustainable development and decentralized renewable energy system solutions to the rural areas of north India.

## About the Project

Mindful of the potential opportunities that could be harnessed by developing a common electricity market in the GCC and wider MENA region, KAPSARC has initiated a regional electricity market integration research project. It examines a range of issues relating to electricity market integration, including experiences of other power pools and their potential application for this region. The project will focus on understanding and examining the policy and legislative, market design and structure, regulatory and system operation dimensions of electricity markets, to identify good practice arrangements and to provide insights into policy and regulatory issues. The various outputs are intended to fill existing knowledge gaps and facilitate the ongoing efforts toward regional electricity market integration. This workshop forms part of this initiative and is the first in a series of workshops aimed at bringing experts and stakeholders together to discuss this topic.



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