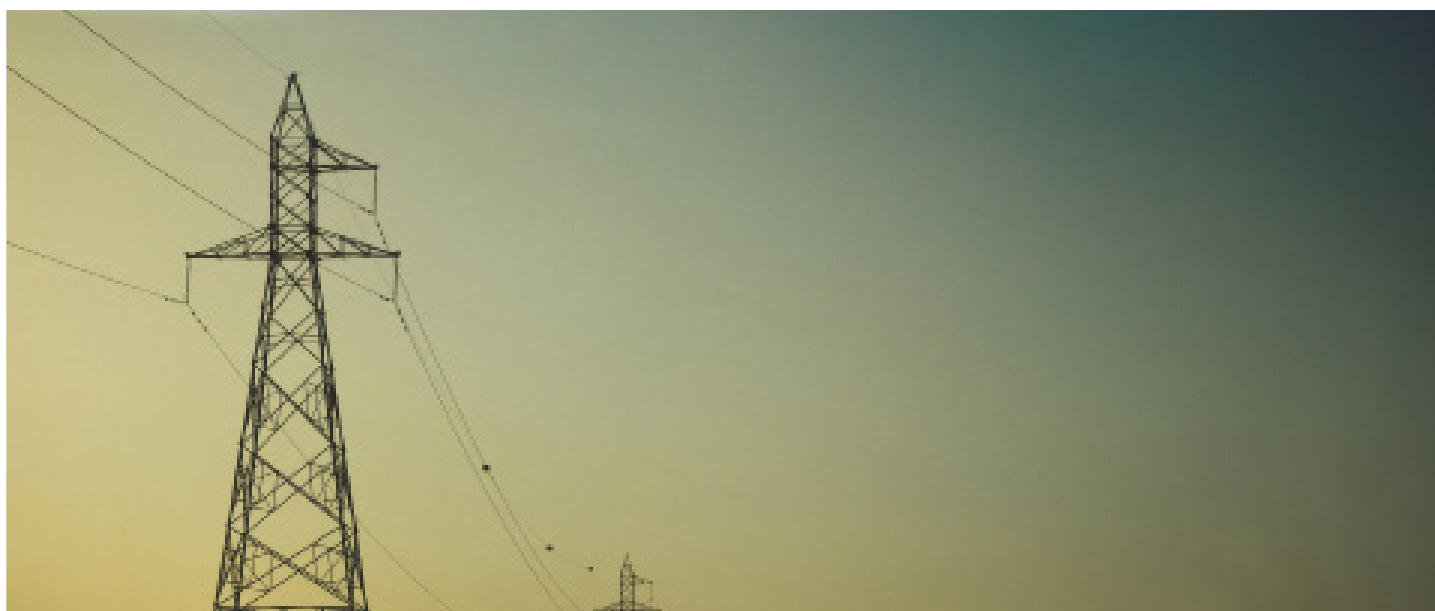




A Pathway to Security in the MENA: Integrating Subregional Electricity Markets

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Brief Summary

Despite being among the richest regions in energy, the Middle East and North Africa (MENA) is facing security and electricity crises. Grids are beset with technical challenges and gas dependence, and energy poverty is high amidst conflict.

Integrated cross-border electricity markets can alleviate power shortages through trade. Yet MENA's three subregional power markets are underutilized, trading 2% of electricity generated.

This policy brief argues that governments must integrate each of the three MENA subregional grids into electricity markets, expanding to Iran and Türkiye. This is the most practical pathway and the first phase towards a MENA-wide integrated electricity market. States must undertake technical, institutional, and market reforms to transform MENA's subregional grids into resilient, efficient and low-carbon integrated grids that offer short-term stability and long-term security.

Despite being one of the richest regions in energy, the Middle East and North Africa (MENA) is facing security and electricity crises.

Supply is unsustainable while demand is growing. MENA power grids are beset with unreliability, limited capacity, inefficiency and under-investment. The region has renewable energy (RE) ambitions and a comparative advantage: 20-25% of global solar irradiation (192 GW capacity), excellent wind and solar resources and very low production costs (\$0.04/kilowatt hour in Saudi Arabia). Yet RE supplies 6-7% of electricity (the global average is 39%) in markets designed for oil- and gas-based power. Thus, the region is exposed to volatile gas prices, uncertain supply chains, and climate degradation. MENA's geopolitical instability with asymmetrical powers and conflict further threaten energy systems.

Meanwhile, demand is unmet and growing for power and energy-intensive water desalination in the most water-stressed region. It is the only region where poverty rose over the last decade. Urbanization, economic visions' mega projects, rising populations (including refugees and guest workers) pressure grids,

exacerbated by climate change as the MENA warms at double the global average.

If unresolved, this shortage deepens socioeconomic challenges, political fragility, and geopolitical instability.

Integrated cross-border electricity markets can alleviate shortages through trade. The MENA has three subregional power markets: the Maghreb, Mashreq and Gulf Cooperation Council (GCC). The League of Arab States' Arab Ministerial Councils for Electricity adopted the Pan-Arab Electricity Market (PAEM) in 2017, with governance agreements signed in December 2024 for PAEM by 2038.

Yet the MENA is the least integrated globally. Despite a relatively high interconnection capacity (~7.7 GW), trade averages 2% of electricity generated, hindered by competition and energy driven conflict.

How can MENA states advance energy security while enhancing political, economic, climate, and regional security amid geopolitical tensions?

This policy brief argues that governments must transform each of the three MENA subregional grids into integrated electricity markets, expanding to Iran and Türkiye. This is the only pathway to improve infrastructure and market design to accelerate trade and RE, while enhancing local development, regional stability and peace.

This brief includes input from discussions among high-level MENA individuals who took part in regional dialogue in their personal capacity, offering insights on priorities and political appetite in their respective states.

MENA Interconnections

Beyond bilateral exchanges between neighbors, MENA states trade electricity via three power pools:

- **The Maghreb grid:** Operating since the 1950s for Algeria, Morocco and Tunisia. Morocco's RE connects to the European Network of Transmission System Operators (ENTSO-E) via Spain and the Tunisia-Italy Interconnector by 2028.
- **The Mashreq (EIJLLPST) grid:** Established in 1988, linking Egypt, Iraq, Jordan, Syria, Türkiye, Libya, Lebanon and Palestine. It connects to Iran through Iraq and with ENTSO-E via Türkiye.
- **The GCC grid:** The most institutionally advanced, established in 2011 by the GCC Interconnection Authority with a fully-owned grid, regional Transmission System Operator, and interest in short-term markets.

Yet these grids are underutilized: trade is on average 2% of generated electricity.

New routes include:

- GCC-Iraq Electrical Interconnection of the Jeddah

Security Conference (2022).

- Iraq-Saudi Arabia agreement for electrical connectivity (2022).
- Iraq-Qatar Grid Interconnection Agreement (2022).
- India-Middle East-Europe Corridor (2023).

EuroAfrica (Egypt-Crete-Greece-Europe) and EuroAsia (Israel-Cyprus-Europe) interconnections can potentially integrate the Eastern Mediterranean with Europe.

States have adopted RE projects for economic motives. Aiming to boost hydrocarbons and clean energy exports, GCC states target 15% (Kuwait) to 50% (Saudi Arabia) of generated electricity from RE by 2030, but have an average 3% share. Burdened by gas import bills and volatile supply, importers transitioned early; RE generates 19% (Morocco) to 25% (Jordan) of power, compared with 40-50% targets by 2035.

Electricity Landscape

Energy poverty

Despite decades of progress, energy poverty and disparity are widespread. In 2021, electricity reached 91% of MENA's population; 83% in rural compared to 98% in urban areas. Conflict and utility sector mismanagement left 42 million people without electricity and 52 million without clean cooking.

Nowhere is this crisis more acute than Gaza. Since the October 7, 2023 war, Gaza's power infrastructure has been obliterated by Israel's fuel blockades, airstrikes and systematic targeting of energy and water systems. 2.2 million Gazans lost access to already-restricted power and clean water, food, and basic services. Health facilities operate partially on pricey dwindling generator fuel, with large-scale blackouts.

Conflict-hit states suffer severe energy poverty. Eight years of war fragmented Yemen's institutions and grids, leaving 70% of Yemenis without reliable power. In Lebanon, once a middle-income country, the insolvent state utility is politically paralyzed, and economic collapse stalls energy reform. In both, national grids supply power for 1–3 hours/day, so informal diesel generator and decentralized solar panel markets supply the rest, only to those who can pay. In Syria, fuel shortages, destroyed infrastructure and low investment after 13 years of civil war left 28% of generation capacity operational. With limited gas imports, many areas have power 2–6 hours/day.

In oil exporters, energy subsidies limit investments. In Libya and Iraq, aging infrastructure and political instability with corruption and fuel theft have paralyzed the power sector and caused blackouts. Iraq's gas flaring causes pollution and cancer. In the GCC, with some of the highest per capita power consumption and emissions, high demand lowers peak-load management and climate resilience. In June 2024, rising demand as temperatures soared to 53°C overwhelmed Kuwait's grid, causing blackouts stabilized only by the GCC grid—a situation likely to increasingly recur.

Challenged grids

Contributing to energy poverty is limited trade in the three grids. This problem stems from a host of reasons: political fragmentation, geopolitical tensions, competition over gas reserves in the Eastern Mediterranean, US sanctions, divergent development priorities, and cybersecurity risks.

The EIJLLPST grid suffers structural, political, and regulatory limitations, with fragmented infrastructure and limited transmission capacity. Prolonged political and security risks—especially Syria, Iraq, Palestine and Lebanon—and fiscal deficits deter investment and cooperation.

The Maghreb grid's infrastructure deficits limit connections, especially with Algeria. Similar consumption patterns reduce power surplus to meet peak demand. Cost asymmetries between gas-rich Algeria and the other states reduce trade incentives.

The GCC grid's state-owned utilities and monopolistic markets inhibit competition and private sector participation. Peak demand planning is difficult, grids are congested, while emissions harm the environment, health, and productivity, both presently and intergenerationally. Subsidized tariffs disincentivize efficiency and cross-border trade.

Absent grid upgrades and market reforms, MENA states cannot secure reliable, equitable, clean, resilient electricity to their population.

MENA Subregional Electricity Market Integration

Electricity market integration offers the regulatory, institutional and commercial platform for electricity trade.

Integrating each of the three subregional MENA grids is the low-hanging, realistic option to integrate power markets while expanding trade, green energy, efficiency and cooperation. Without reinventing the wheel, the pathway leverages existing market structures, political buy-in for PAEM, bilateral agreements, investments, and natural resources.

This pathway is the first phase towards PAEM and ultimately a MENA-wide integrated electricity market. It capitalizes on each subregion's strengths and opportunities: Maghreb's wind resources and Mediterranean access; GCC's hydrocarbon and financial resources; and Mashreq's strategic location linking Africa, Asia and Europe.

Integrating subregional electricity markets has substantial benefits. It can link low-capacity grids, damaged networks (Syria, Gaza and Yemen), Iran, Iraq and Europe. The ensuing cost savings would be significant—PAEM's is estimated to save \$107-196 billion by 2035. It can improve system reliability, efficiency, load factors and demand/cost variations.

Cross-border power trade strengthens systems' resilience to shocks by reducing backup capacity needs, reserves margins and volatile gas imports. Expansion can be phased, with trade underway to expand network capacity and power access, gradually increasing until the full grid potential is reached. This would enhance political cohesion, socioeconomic development and energy-water-climate security. Regional interdependence enhances mutual economic and geopolitical security. Grids can secure managerial and governance gains, investor confidence, private sector engagement and credibility of market rules. Integrating RE is a must to decouple electricity demand from water desalination while decarbonizing energy-intensive exports (aluminum, cement, hydrogen) exposed to carbon taxes, like the EU's CBAM.

The most practical routes involve coupling Türkiye–Iran–Iraq network with the GCCIA grid via Kuwait, enabling interconnection and back trading via Iraq, Syria, and Jordan. Iraq's grid can be stabilized if connected to Saudi Arabia, the UAE, or Iran. Other routes link GCCIA and Maghreb networks through Jordan–Egypt–Saudi connections and possibly extending west via Libya–Tunisia–Algeria–Morocco then north to Europe via Spain and Italy using RE. New RE interconnections—such as between Saudi Arabia and either Jordan or Egypt—can link Palestine, especially Gaza, Syria, Cyprus or Greece onto Europe. Strategic DC coupling points, as those linking Kuwait to Iraq and Iran, can connect EIJLLPST and GCC grids.

Integration Requirements

Non-technical

Driving political willingness and shared regional future visions will be critical to mobilize resources and institutions towards integrating MENA's three power pools.

The EIJLLPST needs an institutional body for regulatory convergence on codes, design and trade rules. Secure, reliable systems need advanced and robust control, protection, and cybersecurity protocols. States need common environmental and social safeguards and, locally, community engagement for environmental and social considerations with transparency for project legitimacy. Subregional grid institutions must ensure infrastructure aligns with national environmental regulations, especially in ecologically sensitive border zones.

Technical

Integrating subregional electricity markets requires technical steps to meet trade potential, national regulations and international standards. Stable interconnections require grid compatibility at interconnection points to overcome differences between different national grid networks. This can be achieved through voltage level harmonization, frequency synchronization and phase alignment. Where systems differ significantly, advanced technologies are needed for phase-shifting transformers and DC-

DC coupling, especially where asynchronous systems meet.

Harmonizing grid codes and technical standards is also essential for seamless interconnection and trade, especially for states not following the International Electrotechnical Commission standards. Strategic infrastructure investments are key; high Voltage Direct Current lines are needed to stabilize long-distance and cross-border electricity flows—especially as existing interconnections rely heavily on AC lines, which limit capacity and efficiency. Flexible AC Transmission Systems are crucial for dynamic power flow control. To integrate RE, grids need supporting inverter technologies, balancing mechanisms and investments in surplus generation capacity.

The Way Forward

Integrating MENA subregional electricity markets requires various steps.

Policymakers must implement the technical steps above to strengthen existing grids towards a subregional grid. Next, they must undertake institutional steps to mobilize resources to build reliable electricity systems, prioritize RE development, and solve barriers to market integration. Each subregion must commission a subregional strategy to determine targets, objectives, routes, milestones and means to mitigate risks and vulnerabilities. A subregional policy framework is needed to govern operations and a long-term vision per the strategy. These steps require collaboration among and input from the grid secretariats, ministries, and advisors.

A cooperation platform could drive subregional strategies. To that end, a Regional Electricity Exchange Forum could be considered, to confidentially convene high-level stakeholders, MENA's three grid secretariats and independent advisors. Such a platform could ensure that each subregional strategy reflects its states' interests and capabilities. It could coordinate grid upgrade investments, demand management,

surplus generation capacity, diversified energy sources, and aligned regulatory and pricing frameworks.

Upon adopting subregional strategies, governments must maximize local benefits. Short- and long-term in-country strategies need to be commissioned (on trade mechanism, pricing, technical specifications, carbon credits) across the value chain (generation, transmission, distribution). Evidence-based and scenario-modeling assessments can support policies, sustainable development plans, regulations, institutional capacities, and priority projects/ funding.

Governments must adopt market reforms and coherent policies to advance RE while maximizing grid's operational efficiency and connectivity. The Mashreq and GCC grids need energy subsidy and cost-reflective pricing reform. Institutional and governance reforms must complement market reforms. RE institutions must be incorporated into existing systems to avoid stalling energy transitions. Carefully sequenced reform must be adopted with targeted protective measures for people in vulnerable situations (e.g., low income and refugees).

It is through these steps that MENA's subregional grids can be transformed into resilient, efficient and low-carbon integrated grids that offer short-term stability and long-term security.

Further Readings

Dione, O. & Nounba Um. P. (2004). *Bridging Borders with Energy: MENA's Path to Regional Energy Integration*. World Bank.

Shehabi, M. (2023). *The Hurdles of Energy Transitions in Arab States*. in *Disruptions and Dynamism in the Arab World* (ed. Wehrey). Carnegie Endowment for International Peace.

United Nations (2023). *Advancing SDG7 in the Arab Region*.

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