

ERF Policy Brief

Navigating the Green Energy Transition in the MENA Region

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About the authors

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In a nutshell

- The MENA region's over-reliance on hydrocarbon exports has led to serious economic imbalances and limited political representation, thereby creating challenges.
- Solar and wind energy production in the region is cost-effective and competitive, in addition to holding vast potential.
- Projections suggest that the MENA region could contribute up to 45 percent of the world's renewable energy with sufficient investments.
- The region's transition to a green economy involves electrifying activities primarily reliant on fossil fuels.
- Developing essential components like solar panels and lithium-ion batteries is critical and possible.
- Collaboration is needed to navigate the challenges faced by high-emission export industries, especially for oil and gas exporters facing declining exports.
- Harnessing renewable energy locally is a key incentive to attract energy-intensive industries.
- Effective institutions and macroeconomic management are essential to minimize country risk and advance the energy transition.
- Recognizing technological uncertainty, MENA countries must stay abreast of global trends by investing in research and development (R&D) and emulating successful models for innovation.
- Attracting strategic investments and supporting research programs is crucial in contributing to global decarbonization efforts.

Introduction

The Middle East and North Africa (MENA) region is home to significant oil and gas reserves, with estimates varying between 48.3 percent and 58 percent of the world's oil reserves¹ and over 43 percent of its gas reserves as of 2021. The region has immensely benefited from substantial oil and gas export revenues, which have contributed to major socioeconomic advancements in the entire MENA region, particularly in the Gulf Cooperation Council (GCC) countries. These benefits, however, came at a cost manifested in a lack of economic diversification and lopsided economic structures, as well as a few sociopolitical anomalies such as a slow transition to democracy and a limited private sector role. Capturing, allocating, and distributing the wealth generated from hydrocarbon exports has been the dominant role of the state in the GCC countries.

This exclusive capture of the oil wealth by the state reduced, if not eliminated, the need for citizens' taxation. Oil revenues, in one sense or the other, have reversed the normal relationship between rulers and the ruled, which led to limited political representation (Luciani and Beblawi, 1987). Despite variations in resource abundance, the entire MENA region has developed a rentier structure, either directly or indirectly. This is due to citizens of MENA non-oil producers sending large remittances back to their countries on incomes generated in GCC countries, or through non-oil Arab countries directing their main exports to GCC countries or receiving generous aid from them as well as large streams of investments. This deep interplay between oil, economics, and politics within the MENA countries has become a defining characteristic of the region.

In 2021, the total MENA primary energy supply exceeded 32,229,297 terajoules (TJ). Oil and natural gas accounted for 96.7 percent of this total, while renewable energy (solar, wind, hydro, and biofuels) supplied less than 0.56 percent. The projected annual increase in energy demand in the MENA region is expected to reach 1.9 percent based on two factors. The first is the high population growth, while the second is the rapid urbanization accompanying economic growth. At present, the installed renewable energy capacity (electricity generation) in the MENA region is approximately 28 GW, primarily dominated

by hydropower. Existing non-hydro renewable energy sources account for approximately seven percent of total energy generation, with four countries contributing 80 percent of this share. Solar photovoltaic (PV) and wind energy have emerged as the most cost-effective and competitive resources in the region. There is large room, however, to expand renewable energy generation in the region given its large and rich endowments of solar radiation and wind. A few credible projections have suggested that the region could contribute up to 45 percent of the world's potential renewable energy generation with sufficient investments.

We review the current primary energy supply and the share of renewable resources in this supply and in electricity generation to set the stage for estimating the potential supply shares of renewable energy in the MENA countries' supply mix in 2030 and 2050. The main focus is on the expected shares of solar, wind, hydro, geothermal, and waste in each of these countries to determine the potential of the energy transition by 2030 as declared in the nationally determined contributions (NDCs) and the Net Zero Emissions by 2050 Scenario.

Opportunities and considerations

In the realm of transitioning to renewable energy and the broader scope of cultivating a green economy, economists are beginning to explore the associated benefits and risks. A pivotal contribution in this domain comes from Hausmann (2022), who emphasizes the criticality of incorporating climate change in the development strategies of developing countries. With climate-related disasters taking a toll on the global economy, nations are recognizing the imperative to slash emissions and prevent a climate catastrophe. Moreover, the decarbonization journey is expected to bring structural changes, offering new opportunities as well as threats. Drawing on insights from the success stories of Southeast Asian economies, Hausmann underscores the importance of developing comparative advantages to sustain high growth. This entails breaking away from traditional industries and venturing into fast-growing sectors. For developing countries, including those in the MENA region, transitioning to a green economy—with an emphasis on green energy—presents an avenue for job creation, economic diversification, and economic growth opportunities, especially for those quick to adapt.

Of course, there are major uncertainties embedded in this transitioning strategy given the unknown technologies that will power the low-carbon global economy, the materials and manufacturing capabilities

¹ Statista puts these reserves at 48.3% of global reserves (<https://www.statista.com/statistics/237065/share-of-oil-reserves-of-the-leading-ten-countries/>), while OPEC puts this share at 58% (https://www.opec.org/opec_web/en/2211.htm#:~:text=OPEC%20Member%20Countries%20in%20MENA,metres%20of%20proven%20gas%20reserves).



required, and the regulatory regimes the world will adopt. Hausmann suggests that active and early participation, coupled with mastering future comparative advantages, will likely resolve these uncertainties. The following six themes are crucial for countries navigating the transition, according to Hausmann, as they explore and exploit the new opportunities and deal with the new threats.

1. Advancing global electrification:

Given that approximately 70 percent of global emissions stem from energy use, transitioning to green energy involves greening the electrification activities currently reliant on fossil fuels to achieve decarbonization. This involves harnessing electricity from eco-friendly sources like wind and solar, requiring a significant increase in the production of essential components such as solar panels, wind turbines, and lithium-ion batteries. In anticipating a future where green energy is vital in mining, MENA countries must integrate green energy into water-scarce desalination processes. The main challenge lies in establishing investment-friendly regimes for mining activities, a hurdle faced by many countries globally. Recognizing that minerals must undergo processing for use in the electrification process, MENA countries must swiftly develop the infrastructure or acquire the capabilities to host crucial facilities like lithium-ion battery factories. The transition to a green economy implies the growth of some industries and the contraction of others, requiring collaborative efforts from MENA countries to cooperatively navigate the challenges faced by high-emission export industries. For oil and gas exporters in the region, the prospect of declining exports and financial sources looms large, necessitating a proactive approach to the circular carbon economy. This presents an opportunity for repurposing oil and gas reserves to produce innovative products, offering significant returns and benefits for the region while saving on damaging emissions.

2. Leveraging renewable energy proximity:

While sunlight and wind are abundant in many nations, certain MENA countries stand out with unparalleled opportunities. The region's richness in renewable resources is complemented by the energy density of oil and coal products, making them highly cost-effective for long-distance transport. Historically, fossil fuels contributed to flattening the world from an energy perspective, enabling cost-efficient global transportation. In contrast, countries lacking fossil fuel resources can now compete in energy-intensive sectors. Notably, major steel exporters like China,

Japan, and Germany, which are traditionally reliant on energy imports, may face challenges in a transition away from fossil fuels. MENA countries, blessed with abundant sunshine and the ability to produce solar energy for less than USD 20 per megawatt-hour, become pivotal. However, storage solutions like ammonia are essential for transporting this energy over extended distances, thereby increasing energy costs six-fold, excluding transportation expenses. This dynamic creates a compelling incentive to harness renewable energy locally. Anticipating this shift, energy-intensive industries are likely to gravitate toward regions rich in green energy, positioning the MENA region as a highly desirable location for energy-intensive production.

3. Optimizing capital cost:

Hausmann highlights the irony that while nature provides sunlight, wind, and rain freely for renewable energy, the predominant cost lies in the fixed expenses of equipment, particularly the capital needed for its generation and distribution. A crucial aspect is the cost of capital, where variations exist globally. For instance, Germany secures funding at a low two percent, whereas Morocco, despite having more sunlight, faces a higher rate of seven percent, affecting the affordability of solar energy. This poses a significant challenge for the Middle East, where the sun is abundant but capital markets often hesitate to invest, potentially eroding the region's comparative advantage. The key to overcoming this lies in establishing robust institutions and effective macroeconomic management to minimize country risks. Hausmann warns against the peril of mismanaging natural resources, citing examples like Venezuela, the oil production of which has plummeted due to sanctions and macro mismanagement.

4. Manage technological risks:

In today's dynamic world, technological uncertainty is a defined characteristic of the world. The unexpected dominance of smartphones over traditional devices like alarm clocks, cameras, CD players, and personal computers exemplifies this reality. Presently, one megawatt-hour of solar energy during sunlight or wind power is more cost-effective than the fossil fuel required for the same output from a thermal plant, a scenario that was deemed inconceivable a mere decade ago. Given the multitude of competing technologies, predicting the winner is challenging. MENA countries must stay aware of global technological trends and investments; while the industry regularly conducts technological surveillance, governmental efforts often fall short. Emulating successful models, such as Singapore's practice of appointing chief scientists in economic ministries, can help anticipate upcoming changes and make informed



research and development (R&D) investments. Chile's proactive investment in a lithium research center with global university collaboration exemplifies a strategy to stay ahead in understanding technologies that may reduce costs or enhance the utilization of critical resources like lithium, while also keeping an eye on potential disruptors. This proactive stance ensures that MENA countries remain at the forefront of technological advancements critical to their sustainable development.

5. Optimizing carbon management strategies:

Several countries in the MENA region are yet to adopt effective carbon pricing mechanisms. Given the limited presence of large forests in the region, traditional carbon sinks are less feasible. However, leasing these may be worthwhile to create the credible offsets they need to prolong the life of their huge fossil fuel deposits as an interim strategy. Beyond traditional carbon sinks, MENA countries should explore geological formations within their deserts suitable for carbon storage; identifying, certifying, and securing these locations is essential. Establishing clear property rights on these geological formations not only ensures their safety but also facilitates investments. This, in turn, allows countries in the region to generate revenue by leasing storage space, a pragmatic step toward sustainable carbon management in the MENA region.

6. Embracing innovation:

In contemplating the technological landscape of the future, it is rational to acknowledge that no country currently dominates in the industries that will shape the coming era. Hausmann asserts that some nations will adapt and thrive while others may not. MENA countries should actively position themselves among the frontrunners. The conventional advice of sticking to what a country already excels at, emphasizing that true growth involves evolving comparative advantages, is challenged. Drawing a parallel with France, which expanded beyond its expertise in wine and cheese to excel in aviation and high-speed railways, the question then becomes why MENA countries shouldn't aspire to competitively manufacture electrolyzers and leverage their abundant sunshine and wind for strategic advantage. Encouraging countries to attract strategic investments and global talent and supporting research programs in universities and beyond are both crucial. MENA nations stand to gain significantly by creating domestic value and livelihoods, contributing to global decarbonization efforts. The evolving challenges in the global landscape present opportunities for new players, and MENA countries could emerge as key contributors with potentially substantial payoffs.

Despite skepticism surrounding the clean energy transition, the International Energy Agency (IEA, 2023) has refuted common concerns. Contrary to claims of high costs, the IEA asserts that the energy transition is USD 12 trillion more economical than the business-as-usual scenario when both capital and operational costs are considered. In fact, grid development, a subject of opposition, is achieving 95 percent of the required expansion. The IEA emphasizes the cost-effectiveness of preventing emissions upfront over carbon removal, estimating a yearly saving of USD 1.3 trillion. Additionally, technological readiness has increased from 50 percent in 2021 to 65 percent in 2023, with ongoing innovations. Even with conservative land use calculations, renewables would require a maximum of 2.5 percent of available land. The IEA suggests that halting fossil fuel infrastructure now can prevent USD 3.6 trillion in unnecessary commitments. Investments in factories for solar and battery production signal a robust renewable supply chain. Furthermore, the clean energy sector is anticipated to create 30 million new jobs by 2030, outweighing the 13 million jobs lost in fossil fuels. A renewable economy is projected to use two-thirds fewer resources than the current fossil fuel-based system. Finally, renewable technologies are positioned to address global energy justice by providing electricity and clean cooking to millions, particularly in emerging and developing economies, while reducing premature deaths due to air pollution.

Conclusion

Amid the growing threat of stranded fossil fuel assets and increased climate change concerns, countries in the MENA region are increasingly inclined and incentivized to transition to renewable energy. This preference is fueled by factors such as (1) abundant renewable energy potential; (2) reduced capital costs; (3) substantial sovereign wealth funds; (4) existing ventures in EV and energy-intensive industries; (5) a great potential to generate green hydrogen that is easily transportable and stored; and (6) the significant employment generation potential in renewable energy and its derivatives.

Renewable energy is viewed as a transformative agent in the MENA region, offering a multifaceted approach to address unemployment, empower youth and women, diversify economies, and contribute to sustainable development.

Navigating the transition to green energy requires a strategic approach that leverages and exploits the new comparative advantages presented by renewable energy, adapts to evolving technologies, and addresses uncertainties. MENA countries have a unique opportunity



to capitalize on their abundant renewable energy resources, fostering economic growth, job creation, and many socially desirable outcomes while contributing to global efforts to mitigate climate change.

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