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Summary of Recommendations

Emerging Technologies, Innovations, and Policy Gaps in the Green Energy Transition:

Opportunities for the acceleration of NDC implementation in Arab States



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About this publication

This publication has been developed with contributions from the MENA Clean Energy Business Council (CEBC) under a partnership between UNDP's Regional Bureau for Arab States and CEBC that aims to strengthen collaboration and cooperation on climate change, sustainable energy, and the energy-water nexus.

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This brief has been developed under the Climate Promise initiative, with support from Japan. Japan recognizes the climate crisis is a threat to the human security, and, in cooperation with UNDP, leads countries to accelerate their climate action.

About the Clean Energy Business Council (CEBC):

The CEBC is a non-government, non-profit member organization of leading local, regional, and international organizations operating in the Middle East and North Africa (MENA) clean energy sector. An umbrella organization, the CEBC offers corporates, start-ups, SMEs, and the public sector with an inclusive forum for idea sharing and best practice promotion in the area of clean energy. Members are drawn from amongst the industry's key players, including financiers, project developers, and service providers. Amongst the most important of the CEBC's objectives are to increase public awareness of clean energy and technological developments, address the availability and accessibility of region-wide data, and nurture a dialogue between the private and public sectors to achieve our mission of accelerating the development and deployment of clean energy in the MENA region.

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Background

The Arab States region has demonstrated a deep political commitment to the 2030 Agenda for Sustainable Development and the Paris Agreement, with many countries setting clean energy transition targets to be achieved by 2030-2035 and net-zero emissions commitments by 2060 or earlier.

To date, almost all Arab States have submitted a Nationally Determined Contribution (NDC), outlining their commitments to mitigate and adapt to climate change, while 17 countries have submitted updated or new NDCs since 2016, reflecting the ratcheting of their commitments.

UNDP's policy brief, "**Emerging Technologies, Innovations, and Policy Gaps in the Green Energy Transition: Opportunities for the acceleration of NDC implementation in Arab States,**" examines technologies, investment opportunities, and scale-up enablers surrounding four areas of the green energy transition across 17 Arab States¹: 1) renewable power generation, 2) demand-side efficiency, 3) supply-side efficiency, and 4) hydrogen. Acknowledging the central role the private sector has in this transition, the brief also explores how to mobilize private sector finance through two areas: 1) enabling environments and 2) financial mechanisms.

Policy recommendations to advance the green energy transition in Arab States and to mobilize private sector finance in support of this, are summarized here.

¹ Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Saudi Arabia, Somalia, State of Palestine, Sudan, Syria, Tunisia and Yemen.

Green energy transition policy recommendations

1. Renewable power generation

Financial incentives and subsidies

While they are sometimes costly to the government, financial incentives, such as feed-in-tariffs, exemptions, contracts for difference, and carbon taxes are important policy tools with a proven track record of accelerating the deployment of renewable energy technologies, development of local value chain capacity (engineering, procurement, construction; operations and maintenance services), attracting international investment and lowering carbon emissions. Feed-in tariffs are best suited for projects below 50 MW capacity¹ and have been implemented by Jordan² and Algeria.³ The least-cost approach to incentivizing renewable energy is removing subsidies for fossil fuels.

Enabling measures for the power market

Continued uptake of renewables is contingent on favorable power market design, which depends on net metering, procurement methods and auction design. However, these approaches require governments to implement robust policy and technological frameworks. For example, net metering is contingent on the capacity of the utility to measure all generation and consumption at a household unit level. In terms of project procurement methods, IRENA suggests auctions and competitive bidding by independent power producers for projects on a scale of several hundred MW and direct proposal submission for GW-scale projects.⁴

Additionally, wheeling directives would allow generation companies to direct power to specific customers and drive expansion of corporate power procurement. This has been implemented by the United Arab Emirates (UAE),⁵ Algeria⁶ and others.



Ecosystem support for renewable energy supply chains

Developing a domestic renewable energy industry requires a systemic approach that entails establishing research centres, support programs for small- and medium-sized enterprises, policies that set local content requirements and favorable import tariffs. Appropriate use of tariff exceptions can foster specific segments of the value chain. For example, by waiving tariffs on solar cells but not on PV modules encourages developers to seek local capacity for assembling the modules to minimize the cost. However, applying tariff exemptions is preferred for segments with relative competitive advantage to avoid excessive costs of localization. In terms of technology development, creating regional centres would improve economies of scale of the research work and improve exchange of best practices and standards. There is an opportunity for the higher-income Arab States to take a lead on this initiative for the benefit of all.

2. Demand-side energy efficiency



Energy performance labelling

Informing energy consumers – both households and industrial users – about the energy requirements for the use of appliances, machinery and vehicles is the easiest way to induce greater awareness about energy consumption and a shift to more energy efficient devices. This measure can be enacted through legislation by countries in all groups with implementation of labelling done by manufacturers.

Minimum performance standards

The next step for improvement of demand-side energy efficiency beyond labelling is implementation of minimum performance standards that require manufacturers of devices, such as air-conditioning units, refrigerators or motors to implement measures that reduce energy use per unit of output. This action results in research and development costs

on the side of industry, which are going to be passed down to consumers, but results in lower operating costs in the long-term.



Subsidies and rebates for energy-efficient appliances and retrofits

Energy efficiency measures can be further incentivized by providing subsidies and/or rebates. These can take the form of direct subsidies for purchasing energy efficient appliances, such as recently implemented heat pump subsidies in the European Union,⁷ or for energy-efficient refurbishment of residential buildings. Subsidies are an expensive measure more suitable for upper-middle or high-income countries (Bahrain, Egypt, Kuwait, Jordan, Morocco, the State of Palestine, Tunisia, Saudi Arabia). An alternative approach is tax rebates on energy efficient measures, for example, being able to claim tax returns on retrofits. This policy tool is available to all countries in the region.

3. Supply-side energy efficiency



Develop flexible power systems and smart grids

Grid connection bottlenecks are one of the leading barriers for increasing the share of renewables and generation of renewable electricity. Annual global investment in grids of US\$ 600 billion is required to stay on track with decarbonization goals.⁸ The deployment of smart, flexible grids will be one of the key enablers in this process. Due to its capital-intensive nature, it can be most easily implemented in high-income countries (Algeria, Bahrain, Iraq, Kuwait, Libya and Saudi Arabia) but it will be relevant in all jurisdictions. Jordan has a streamlined process of grid expansion, where the project developer evaluates transmission congestion constraints and informs the relevant authority so that capacity expansion and transmission expansion happen side-by-side.⁹ Upgrading grid infrastructure is a capital-intensive undertaking that requires long-term stability from policy makers to ensure return on investment for grid operators.¹⁰ As the frequency of climate-induced extreme weather events increases, grids will need to become more resilient. Smart grids will also facilitate better demand response. Planning and implementing grid expansion needs to be based on robust datasets and modelling of future loads.¹¹ Regulators should promote the use of connected data platforms for enhanced forecasting and flexible operations¹² and grid codes need to be adapted to enable integration of higher levels of variability.



Expand energy storage capacity

Energy storage will be critical to ensuring reliable power supply as the share of renewable energy technologies in the electricity mix increases. While wind and solar PV are intermittent, storage provides dispatchable power and so complements renewables on all timescales.¹³ Currently, many large-scale energy storage technologies remain expensive and hence, they are most likely to be implemented in Bahrain, Egypt, Jordan, Kuwait, Morocco, the State of Palestine, Saudi Arabia and Tunisia. The policy recommendation is to develop markets that make energy storage commercially viable and incentivize expansion of capacity: time-of-use pricing, development of flexibility markets and ancillary service markets. Beyond the conventional power system, policies that facilitate vehicle-to-grid services and regulations for all electric vehicle chargers to have a two-way function (G2V and V2G) enable deployment of mass distributed storage in the long run.



Improve cross-border grid interconnectedness

Developing transmission networks, including ultra-high voltage lines, between countries provides an opportunity to further manage the geographic variability of renewable power generation and reduce curtailment.¹⁴ Furthermore, opening national electricity sectors to neighboring power producers would introduce competition and cross-border efficiencies¹⁵ and interconnection would also provide balancing services and in extreme cases, provide emergency services. Currently, there are some existing interconnections between groups of Arab States, and with Europe, however, there is potential for closer integration.

In particular, regulators should enable transmission system operators to buy and sell power across borders in places where it is currently restricted, as many interconnections are limited to providing backup in the case of blackouts. The Pan-Arab Regional Electricity Market would have 280 GW of capacity and could be realized by 2038.¹⁶ Implementing it would require general agreement from Member States, market agreement from asset owners and an Arab grid code developed by Transmission System Operators (TSOs). Recent announcements about interconnection of Arab States to neighboring regions include the subsea power link between Egypt and Greece¹⁷ and Saudi Arabia and India.¹⁸



Deploy minigrids and microgrids

Minigrids and microgrids will play a critical role in ensuring last-mile electricity access, especially in remote and rural areas where grid expansion would be costly and time-consuming. This solution is particularly suitable for countries with limited access to capital, such as Algeria, Djibouti, Iraq, Lebanon, Libya, Somalia, Sudan, Syria and Yemen. As small-scale renewable energy generation and energy storage become cheaper, microgrids and minigrids will become more feasible. To ensure long-term viability of minigrids, regulation should both protect the capital invested in minigrids when the national grid eventually reaches the spot powered by the minigrids and ensure common standards so minigrids assets can be utilized by the national grid. In the industrial context, minigrids in industrial parks with self-generation help to manage the huge industrial loads with their own dedicated systems, reducing pressure on the national power system.



Consider whole-of-economy approach for planning flexibility

The presence and functioning of various heavy industries can be an opportunity or a challenge for ensuring responsiveness to variability to renewable energy and should be addressed accordingly. For example, Qatar's must-run cogeneration units pose risk to curtailment as the share of renewable energy increases and the issue needs to be addressed by deploying more flexible desalination technologies.¹⁹ On the other hand, in Saudi Arabia, aluminum smelters provide flexibility to curtail their demand if needed and they have indeed previously covered for failures of the grid.²⁰ Demand response will be critical in the coming years and policy makers could create a regulatory 'sandbox' in which demand-response programs can be trialed, and then pilot them with large industrial and commercial users so they can provide flexibility to the grid at a lower cost than peaking plants during times of high demand. This assures that these services can be used and helps with price discovery. The open electricity market should allow aggregators and large individual consumers to offer demand-side management services in the same way that independent power producers can, where the breadth of Demand-Side Management (DSM) functions includes all relevant ancillary services to the grid (e.g. capacity markets, fast frequency response, balancing and others).

4. Hydrogen

The green hydrogen economy will be strongly integrated with the emerging energy system based on renewables. Renewable power generation will be at the core of the upstream part of the hydrogen value chain where the power is used to produce hydrogen. Downstream segments of the supply chain include transport (via ships, trucks or pipelines) and storage of hydrogen, transformation (into synthetic fuels or green ammonia) and end use (in industry, transport, heating and power generation).

Setting targets and objectives

Setting long-term targets provides certainty for the private sector about the needed pipeline of projects to meet national targets. For example, the National Hydrogen Strategy of Morocco anticipates deployment of 1 GW of projects in the mid-term (2020-2030).²¹ Fiscal incentives for supporting the national targets provide further encouragement for the private sector to engage in development of the national hydrogen economy.



Derisking investment by developing infrastructure

Developing a hydrogen economy is a capital-intensive process and by investing in infrastructure that would support operations of private sector companies, governments can encourage development and deployment of technologies.²² In particular, pipeline transmission networks and import and export facilities will be critical for enabling cross-border hydrogen trade and leveraging the export potential in countries with abundant renewable energy potential, such as many Arab States.



Creating a single portal for energy auctions and procurement

Hydrom is an example of a pioneering entity established in Oman which serves as a single portal for energy auction and procurement. Such a one-stop-shop solution provides an opportunity to maximise the use of resources available in the country and allocate them to developers in a manner that benefits from economies of scale. Effective and efficient use of centralised data centres allows all stakeholders to develop a connected industry ecosystem.

Mobilizing private sector finance policy recommendations:

1. Enabling environments



Develop green finance taxonomy

Given the commitments of countries to green energy transition, unified definitions of what investments are aligned with decarbonization goals would provide certainty to investors, strengthen regional collaboration and prevent greenwashing.²³ A regional collaboration platform, such as The Regional Center for Renewable Energy and Energy Efficiency (RCREEE), would be best suited to develop the taxonomy and national adoption of the policy should follow. While this is a regional recommendation, it should be prioritized in countries with strong existing financial systems in Bahrain, Egypt, Jordan, Kuwait, Morocco, the State of Palestine, Saudi Arabia and Tunisia.



Map out a bankable pipeline of projects

National strategies, such as the NDC and national renewable energy action plans, present country-level plans for energy transition. Translating these targets into specific, costed projects would provide a basis for a financing strategy that matches priority projects with appropriate funding sources. This is a low-regrets strategy that is recommended across all country groups.



Establish climate-related disclosure standards

Compliance disclosure regulations are increasingly being implemented in leading markets, including the European Union's Sustainable Finance Disclosure Regulation.²⁴ To maintain inflow of foreign investments, stakeholders in Arab States should consider compliance with standards such as Taskforce for Climate-related Financial Disclosures (TCFD). This policy is recommended for countries with strong administrative capacities in Bahrain, Egypt, Jordan, Kuwait, Morocco, the State of Palestine, Saudi Arabia and Tunisia.



Direct central banks to support sustainability projects

Central banks have the capacity to steer the financial system to diversify away from carbon intensive projects and increase investment in green energy. It is already happening in Lebanon where the central bank provides loans with subsidized interest rates for industrial projects.²⁵ Central banks should also be encouraged to join the Central Banks and Supervisors Network for Greening the Financial System. This recommendation is relevant to **all countries** because the task of the central bank is to protect macroeconomic stability by pursuing a diversified, resilient and future-oriented economy.



Tax exemptions

Favorable tax regulations, combined with the introduction of carbon taxes, can further attract private investors and also be applied to reduce the cost of low-carbon products and equipment. Tax exemptions can be wide-ranging, such as low corporate tax rate (UAE²⁶), or support specific objectives such as, property tax exemption on industrial projects (Jordan

and Lebanon²⁷) or tariff exemptions on energy efficient products or machinery and raw materials for manufacturing of components in renewable energy technologies.

2. Financial mechanisms



Develop a regional carbon market

Market mechanisms, such as cap-and-trade systems, serve reducing emissions at the most optimal total cost²⁸. By expanding the scope of high-integrity carbon markets, it is possible to facilitate cost-effective solutions more efficiently within the region. With support from more fiscally resourced governments in Bahrain, Egypt, Jordan, Kuwait, Morocco, the State of Palestine, Saudi Arabia and Tunisia, a regional approach could be adopted from the beginning across the studied countries.

because of high perceived risk due to economic and political instability. Securing guarantees and risk insurances from the World Bank, the International Monetary Fund or other multilateral development banks would encourage private capital to flow to these markets. An example is the MENA CSP Scale-up Investment Plan led by the World Bank and the African Development Bank to accelerate concessional financing for CSP projects in Algeria, Egypt, Jordan, Morocco and Tunisia.³⁰



Leverage sovereign wealth funds

With some of the world's largest sovereign wealth funds in Bahrain, Kuwait and Saudi Arabia, the governments could provide substantial capital for clean energy industries.²⁹ Mubadala of the UAE through [Masdar](#) and the [Public Investment Fund of Saudi Arabia](#) are leading the way in investments in renewable energy. The funds could be further used to de-risk emerging technologies and projects.



Regulate subsidies in the energy sector

If funding is available, subsidies are a powerful tool to spur investment in selected areas of the economy. These programs could range from incentivizing energy efficiency improvements among end users to promoting localization of segments of renewable energy technology value chains, as successfully illustrated in Jordan by the [Jordanian Renewable Energy and Energy Efficiency Fund \(JREEEF\)](#), which supports renewables deployment and energy efficiency measures across the project development stages, and the Chamber of Industry's Factories Support Program, which provides grants to support small industrial enterprises with the installation of solar PV or solar water heaters.³¹ On the flip side, phasing out inefficient subsidies for fossil fuels is viable across all country groups and would improve competitiveness of clean technologies. For many of the initiatives listed above, pooling them across countries into regional frameworks would further reduce the cost of initiating them resulting in decreased cost of capital and increased attractiveness to investors.



Issue green bonds or green sukuk

Green bonds are an important tool to raise money for sustainable investments. For countries with a good credit rating, especially Bahrain, Egypt, Jordan, Kuwait, Morocco, the State of Palestine, Saudi Arabia and Tunisia green bonds would help to raise the necessary finance for green investments.



Secure risk insurance

Some countries in the region, especially Algeria, Djibouti, Iraq, Lebanon, Libya, Somalia, Sudan, Syria and Yemen continue to suffer from limited interest of private investors

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