Energy Transition and Prospects for Producing Countries in the MENA Region

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The MENA region is well endowed with natural resources. For decades, governments have managed their reserves to preserve wealth potential for future generations as all countries (both resource-rich and resource-poor ones) have developed a rentier mentality. Today's energy transition poses a threat to the status quo as the world seeks to end its thirst for fossil fuels. Hydrocarbon producing countries need to find new strategies and opportunities in order to adapt and adjust to the upcoming low-carbon future. This article examines the different starting points among hydrocarbon producing countries in the MENA region, highlights their different challenges and advantages, in order to discuss and assess the prospects of their energy transition strategies. It also takes into consideration the consequences of the energy crisis and the reconfiguration of energy flows which may affect the energy transition across the world's regions. It applies a multidisciplinary approach evaluating sociopolitical (e.g. demography, governance), economic and (geo)political factors to analyze potential strategies (maximization of resources, decarbonization, economic diversification). Among others, the role of hydrogen, CCUS and electricity trade are considered.

The Middle East and North Africa (MENA) region is one of the cornerstones of the global energy system, accounting (in 2021) (BP, 2022) for 52% of the world's oil reserves and 43% of its gas reserves. The region, which accounts for 35% of the world's oil production and 22% of its production (in 2021), includes some of the largest oil and gas producing and exporting countries. Thanks to its natural endowment, many MENA countries have benefited over the last five decades from sizeable export revenues (the so-called oil rents), which have guaranteed a substantial improvement of its citizens' socioeconomic conditions. Hydrocarbon resources have also shaped and determined the state formation and consolidation process in these countries. In essence, the main function of the State in these countries is to allocate and distribute the wealth generated by hydrocarbon exports to its citizens. As a result, the State does not need to extract wealth from its citizens through taxation, but at the same time, this has contributed to a lack of political representation. Despite a clear cleavage between resource-rich and resource-poor countries, the entire MENA region has developed a rentier mentality as oil revenues have traditionally been distributed regionally. In short, there is no other region that embodies such a deep interplay between oil, economics and politics as the MENA region. For these very reasons, hydrocarbon producing countries in the region – and their energy sector – are expected to be profoundly affected by the global energy transition and face growing pressures and the challenge of adapting to the upcoming low-carbon future. This could lead to a major transformation (Hafner et al., 2023) in MENA countries' energy sector and their energy geopolitics. MENA countries are also richly endowed with renewable energy resources, especially solar and wind, which their governments seek to develop with the aim of decarbonizing the domestic energy sector, as well as enhancing economic diversification. Given their pivotal role in the global energy market, hydrocarbon producing and

exporting MENA countries are a crucial component for the success of the energy transition. Furthermore, their different strategies and choices they make will define their economic stability and international relevance.

Transition and Challenges

Over the past three decades, a growing global consensus on the need to fight climate change has emerged. The energy sector is at the centre of climate policies as it accounts for about 75% of global CO_2 emissions. In particular, the key goal of the global energy transition is to reduce from 80% of the world's energy supply in 2020 to 20% in 2050 and simultaneously strongly ramp up the deployment of renewable energy sources from 12% in 2020 to around two-thirds in 2050, according to the IEA Net-Zero Scenario (IEA, 2021).

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Today's energy transition is mainly a policy-driven process that responds to a climate issue caused by a market failure. This implies that the energy transition will occur at a different pace and speed from one region to another. Nonetheless, by aiming at drastically reducing the use of fossil fuels and upscaling clean energy technologies, today's energy transition puts the existing hydrocarbon production model under pressure. MENA hydrocarbon producing countries have focused more on price maximization than on volume maximization, thereby not exploiting their competitive advantages (low production costs). As a consequence, they have preserved their reserves for the future and this has made sense since they are the government's main revenue source. This strategy has resulted in hydrocarbon producing countries having reserves-to-production ratios extending for several decades well beyond all peak oil demand forecasts in any deep-decarbonization scenario. This entails the risk that MENA hydrocarbon exporting countries could potentially end up with stranded assets as the countries may have limited possibilities for monetizing their vast reserves base. Thus, a scenario of lower oil and gas demands undermines the ability of MENA countries to monetize their large reserve base, which is vital for the functioning of their economies and sociopolitical architecture. The loss of rents will change the fundamental nature of the allocative rentier state.

Growing Climate Ambitions Motivated by Economics

Global commitment to climate change mitigation has increasingly grown over the past eight years, since the 2015 Paris Agreement. Since then, there has been a sharp acceleration in decarbonization strategies and targets. Today, 88% of global emissions are covered by countries' net-zero ambitions. The largest emitters in the world, such as the EU, US, China and India, have set mid-century emission targets.

Massive developments have occurred in hydrocarbon producing countries as well over the past three years. Until COP26 in 2021 in Glasgow, hydrocarbon producers have had conflictual attitudes toward climate negotiations and policies. This resulted in them being considered climate obstructionists. Since then, most hydrocarbon producing countries around the world have slowly, but steadily, increased their climate ambitions at different paces. Within this trend, the five Gulf Cooperation Council (GCC) countries[1] have pledged to reach carbon neutrality by around the middle of the century. In order to exploit their great renewable potential, especially solar and wind, all GCC countries have announced major plans to boost renewables, by setting ever-growing renewable targets in power generation capacity, with shares that range from 15% to 50%. Moreover, the GCC countries have joined several international

[1] Bahrain, Kuwait, Oman, Saudi Arabia and the United Arab Emirates

climate-related initiatives, such as the Carbon Sequestration Leadership Forum, the Oil and Gas Climate Initiative and the Net Zero Producers Forum.[2] They all also participants in the Global Methane Pledge. Finally, two MENA hydrocarbon producers, Egypt and the UAE, hosted COP27 in 2022 and COP28 in 2023, respectively.

The main concern for hydrocarbon producers is, therefore, how to guarantee enough export revenues to preserve the rentier-state model

While greater climate ambitions are dictated by greater international pressure, these countries have also embraced energy transition for domestic reasons. The energy transformation is motivated by economics and politics. Given the interplay of oil, economics and politics in the region, hydrocarbon producing countries' energy transition strategies are aiming to preserve export revenues even in a decarbonizing world. The energy transition in these countries is thus intertwined with ambitious economic diversification strategies (the so-called Visions). The main concern for hydrocarbon producers is, therefore, how to guarantee enough export revenues to preserve the rentier-state model. Under such a transformative process, the energy sector will certainly come under increasing pressure, because it will need to prove that it can not only generate rents, which are instrumental in creating new industries and sectors, but also that it can extend the value chain and create new industries within the energy sector (Fattouh & Sen, 2021).

Indeed, even taking into consideration their climate strategies, net-zero does not mean that these countries will no longer export any oil at all. Fossil fuels are expected to still play a role globally (though a more modest one) even in a net-zero scenario. Therefore, net-zero will not cause the demise of petrostates – at least not all of them -, especially in the short term. Renewables may replace hydrocarbon resources in the domestic energy mix, but not in the government budget, as investments in renewables still do not generate the same high returns that the hydrocarbon industry provides.

Different Starting Points, Different Opportunities and Challenges

Against this backdrop, hydrocarbon producing countries need to find new solutions and opportunities in order to adapt and adjust to the world's upcoming low-carbon future. Yet, their ability to implement national strategies will depend on several domestic factors. MENA oil and gas producing countries are far from being homogenous, hence the global energy transition is expected to affect these countries differentially depending on several factors, which will define the national strategies for adapting and reacting to the energy transition.

A first distinction to make is between hydrocarbon producers in North Africa and in the Gulf. Generally, Gulf producers, which have expressed the highest ambition in this energy transformation, are characterized by lower production costs, stable governments, strong financial capabilities and lower populations; whereas North African producers have, over the last decade(s), experienced domestic instability, declining hydrocarbon production, rising populations and lower financial capabilities.

Demography will define the general environment for pursuing diversification strategies and transforming the rentier state model. Countries with a large and predominantly young population will encounter significant obstacles compared to those with smaller populations, which are likely to find it easier to adjust. Indeed, population growth influences per capita income and patterns of employment. Two of the largest producers, Iraq and Saudi Arabia, are expected to see an important population growth, +20 million and +7.7 million by 2040, respectively. Consequently, they could see a decline in net income from oil rents, calculated on a per-capita basis. By contrast, this is less of a concern for producers with relatively small populations, notably the UAE and Qatar, which have 9.7 and 2.8 million cit-

[2] This includes Canada, Norway, Qatar, Saudi Arabia and the US.

izens, respectively. Should demographic growth offset economic growth, it could determine domestic unrest and socioeconomic instability, which may in turn pose a threat to critical operations in the domestic hydrocarbon industry and delay energy transformation.

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Another two key factors are domestic stability and financial capabilities. Stable and strong governance will be crucial in order to implement a domestic socioeconomic transformation. Countries experiencing governance issues and instability, like Libya and Iraq, are expected to lag behind on energy and economic diversification as they might prefer to focus their efforts on maximizing the revenues from oil and gas in the short run, rather than on a strategy to adapt their energy sector and economy in the long run. By contrast, countries with more stable and stronger governance, such as those in the Gulf, are better equipped to steer the transformation of the sector. Moreover, Gulf countries with large financial reserves and institutions, such as sovereign wealth funds (SWFs) are in a better position to finance the transformation and offset possible negative outcomes (e.g. price volatility) in order to preserve domestic stability, compared to those in North Africa. Moreover, these elements are also intertwined to a certain degree, as domestic stability is instrumental in attracting the investments required for the energy transformations, in particular when countries lack the domestic financial capabilities and financial reserves that would allow them to counterbalance negative economic conditions and thereby guarantee social stability. Furthermore, rich producers could increase their financial support for decarbonization policies across the world in order to gain international relevance. This is, for instance, the case of the UAE, which, along with the US, formed the Partnership for Accelerating Clean Energy (PACE) at the COP27 in Sharm El-Sheikh, Egypt. This initiative aims to "catalyze $100 billion in financing, investment and other support and to deploy globally 100 gigawatts (GW) of clean energy by 2035 to advance the energy transition and maximize climate benefits."

Finally, the opportunities and challenges producers will face also depend on changing energy demand patterns. Despite the expected drop in demand, this will not occur at the same pace for oil and gas. Oil demand is expected to experience a faster decline compared to natural gas, which is still pivotal for decarbonizing certain sectors and regions (especially in those that rely heavily on coal for power generation, such as Asia). A further distinction for gas exporters concerns the type of transportation mode: LNG can easily follow demand changes, while piped gas does not provide the same degree of flexibility. Gas exporters, such as Algeria and Libya, that are heavily reliant on piped gas are more exposed to demand dynamics. Thus, gas (especially LNG) exporters may experience a longer transitional period, which is even more the case for those focused on rising energy markets (i.e. Asia).

Hedging Strategies: Stronger Hydrocarbon Sector and New Low-carbon Fuel Industries

Given the need to guarantee stable revenues required for both domestic stability and investments in new solutions, MENA hydrocarbon producers will focus on their competitive advantages and increase the resilience of their hydrocarbon sector against potential risks of disruption and threat due to the energy transition.

At the core of this strategy are several measures, such as: i) decarbonizing hydrocarbon production in light of potentially rising carbon prices and climate policies; ii) enhancing the sector's cost efficiency to make it more competitive in a tough global environment; iii) decarbonizing final petroleum products; and iv) moving down the value chain and producing decarbonized final products through the use of clean hydrogen.

Regarding hydrocarbon production, MENA producers benefit from among the lowest production costs in the world; thus, they are confident they will remain the last barrel standing in a net-zero scenario.

Nonetheless, they will need to take into consideration their (high) "social" cost, represented by the high fiscal breakeven price of oil. To avoid a major loss of revenues, oil exporters could pursue oil output maximization strategies to boost their revenues, which would fuel competition and ultimately depress oil prices. A high volume or market share strategy could result in a fall in oil revenues as higher revenues due to higher volumes may not compensate for the loss in revenues due to lower oil prices. The more producers are dependent on oil rents, the less a higher volume/lower price strategy would be bearable – especially in the short and medium term. It will be fruitful if the higher volume strategy were to drive a few higher cost producers out of the market. A key factor in determining oil strategy is elasticity of supply and demand. In this regard, the latest OPEC cuts (2 mb/d in 2022 and 1.1 mb/d in 2023) were possible because of the inability (or unwillingness) of the US shale oil sector, which was the readily available spare capacity that could compete with OPEC, to grow at the same rate as it was until 2020. With much less supply elasticity in the market, OPEC is less worried about losing market share if it defends higher prices, which are vital for diversification efforts.

MENA producers are increasingly starting to move to new low-carbon solutions in order to exploit their natural resources, both fossil fuels and renewables

Furthermore, some hydrocarbon producers can benefit from new competitive advantages, such as the carbon intensity of their hydrocarbon production. Countries like Saudi Arabia, UAE and Qatar have lower carbon intensity due to a combination of the nature of their reserve base and their significant investment in infrastructure and technology. Moreover, they have worked extensively to reduce flaring and venting activities, which are critical in defining the carbon intensity rate of production. By contrast, Algeria, Iraq and Iran have higher carbon intensity. For example, Algeria could see its hydrocarbon exports to Europe challenged by the growing EU methane regulations in the longer term, as Algeria is a methane hotspot.

All these factors (low flaring, reducing methane leakage, improving the energy efficiency of operations and inherent advantages such as prolific reservoirs and limited water cut) contribute to the greater competitive advantage of Saudi Arabia, Qatar and the UAE. The carbon intensity rate issue of oil and gas is expected to become a more decisive factor in a world of rising carbon prices and carbon border taxes, and is destined to become a key factor of the competitiveness of oil and gas producers.

To further strengthen the resilience of their hydrocarbon sector, countries are developing low-carbon solutions, such as carbon capture use and/or storage (CCUS). CCUS represents a technology that will contribute to positioning MENA countries in a low-carbon scenario, as the case of Qatar illustrates. The small emirate has put carbon capture and storage (CCS) at the heart of its LNG expansion plans. The country seeks to capture over 11 Mtpa of CO_2 by 2035, enhancing the previous targets set at 7 Mtpa. This will be pivotal in reducing the carbon intensity of Qatar's LNG facilities by 35%, and of its upstream facilities by at least 25%, in order to support the role of cleaner LNG for the energy transition. In 2019, Qatar commissioned the largest CCS facility in the MENA region with a capacity of 2.1 Mtpa of CO_2, and they plan to expand in order to store more than 5 Mtpa by 2025. Instead of being reinjected, the captured carbon can also be used in combination with clean hydrogen to produce low-carbon synthetic fuels (e-fuels), needed for instance for the global aviation industry, which has few other decarbonized fuel options.

Decarbonization and New Sectors

As regards decarbonization and new sectors, MENA countries are also looking for solutions to decarbonize their domestic energy system, still heavily reliant on fossil fuels. These solutions could respond to multiple pressing issues, such as tackling the negative consequences of climate change in the region, meeting growing domestic energy consumption, freeing additional hydrocarbon volumes for export, providing jobs to young and grow-

ing populations, attracting new investments and technologies and, ultimately, creating a new social contract and a new relationship between rulers and citizens. Despite the urgency and existing ambitions, renewable energies are still quite modest contributors to power generation in 2022, hovering at less than 1%. To actually reach the national targets, countries need to overcome historical challenges. Barriers to the deployment of renewables vary from market constraints, such as fossil fuel subsidies, to a lack of infrastructure and an unfavorable regulatory framework.

A faster large-scale deployment of renewables in the region could also be crucial for export prospects – especially towards Europe. Yet, clean energy exports will not provide the same amount of rents. Moreover, long-distance clean energy exports must face several economic, security and efficiency issues. Therefore, MENA producers are increasingly starting to move to new low-carbon solutions – first and foremost hydrogen – in order to exploit their natural resources, both fossil fuels and renewables. Gulf countries have increasingly stepped up in the quest for developing hydrogen (and its derivatives, like ammonia) in order to position themselves in a low-carbon energy trade. Given their vast hydrocarbon reserves, they are exploring opportunities to produce and export blue and green hydrogen as well as ammonia. As regards blue hydrogen production, the development of CCUS solutions is instrumental. Among Gulf producers, Saudi Arabia, the UAE and Oman have been the first movers in the region concerning hydrogen/ammonia production plans, while Qatar has just recently joined the race. Saudi Arabia is planning to develop a $5-billion green hydrogen and ammonia project producing 1.2 Mt of green ammonia in NEOM, which would make it the world's largest green hydrogen facility. Saudi Aramco seeks to meet a significant share of global blue hydrogen demand by 2025 and has already exported the world's first blue ammonia cargo to Japan in 2020 and to South Korea in 2022. The UAE is also looking to both blue and green hydrogen given its leading role in renewable and vast hydrocarbon reserves. The UAE can benefit from multiple players with large financial capabilities as well as the ability to attract international actors. For example, the Dubai Electricity and Water Authority launched, with Siemens Energy, the region's first industrial-scale green hydrogen project in 2021. Oman recently released its new strategy on green hydrogen, envisaging around $140 billion in investment by 2050. The strategy aims to increase hydrogen production to around 1 Mt/y by 2030, about 3.5 Mt by 2040 and between 7.5 and 8.5 Mt/y by 2050. Hydrogen may allow Oman to position itself as an energy exporter despite its smaller hydrocarbon reserves compared to its regional peers. Lastly, Qatar has joined the regional race, announcing in 2022 its intentions to build the world's largest blue ammonia plant (Ammonia-7). The $1.1-billion facility would produce 1.2 Mt of ammonia per year and should be launched in 2026.

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In the hydrogen race, North African producers could benefit from their geographical proximity and existing gas pipeline interconnections if a big clean hydrogen market arises in the future (i.e. the EU). Egypt's hydrogen ambitions have increasingly gathered pace in 2022 after the North African country hosted COP27. The country managed to sign several MoUs that would link renewable projects to its green hydrogen ambitions. Also in 2022, the country has released its hydrogen strategy and renewable deployment has had positive developments with many international commitments to invest. By contrast, Algeria has increasingly looked into hydrogen opportunities but still lacks a regulatory framework and the planned renewable deployment has so far not taken off. The EU is eager to import green hydrogen also in the framework of its REPowerEU plan launched in the aftermath of Russia's war in Ukraine. The EC is working on a Mediterranean Green Hydrogen Partnership (MGHP) and is also exploring opportunities with Gulf countries for concluding Green Hydrogen Partnerships in order to

create win-win solutions and establish a new sustainable energy cooperation. The MGHP will start with the EU-Egypt Hydrogen Partnership.

Since hydrocarbon producers will need to ensure export revenues and the challenges for hydrogen trade, producers have started to consider using hydrogen domestically to decarbonize products, such as steel, cement and fertilizers, which have been key sectors for economic diversification strategies. Oman is working on a project to establish a green steel plant powered by green hydrogen with an annual production of 5 Mt, while the UAE has been working on decarbonizing its steel industry through international partnerships, such as with the Japanese ITOCHU Corporation and JFE Steel Corporation. This option could overcome logistical, technological and economic challenges guaranteeing higher returns and fostering green industrialization.

Conclusion

Since 2021, MENA hydrocarbon producers have embraced the global energy transition after many years of obstructionism. The game changer is mainly economic rather than climate concerns. Hydrocarbon producers need to find the best solution to ensure export revenues and the monetization of their resources in a world which has decided to decarbonize. In this sense, energy transition in producing countries is both focused on promoting renewables, mainly solar and wind, for the domestic market and towards export-oriented projects, which are necessary to ensure income and preserve the current political and socioeconomic model (rentier state). To do so, MENA producers are committed to enhancing the resilience of their hydrocarbon sector, which will remain a key component of the economy in a global net-zero carbon scenario, and develop low-carbon solutions, such as hydrogen and CCUS, that would guarantee future revenues. Especially in light of the recent energy crisis following Russia's invasion of Ukraine, MENA producing countries have advocated, within the international climate negotiations, for a more balanced approach regarding the energy transition, stressing the need to combine both renewable energy and decarbonized fossil fuels. This mirrors their own strategy.

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