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ECONOMIC DIVERSIFICATION IN THE MENA

Contents

Diversification efforts in MENA (particularly GCC) countries obviously correlate with international oil prices. It would be naïve to believe a rapid decoupling is either feasible or necessary in the short term. Economic logic favours specialization over diversification—individuals and enterprises should concentrate on what they can do best and where they have a comparative advantage. The increasing importance of global value chains for development emphasizes this economic logic, by moving competition from entire sectors to single stages of production and even individual jobs. GCC states hold a comparative advantage in oil and gas production, so why should they not tailor their economies to this sector and approach their own diversification in the context of the value chain of petroleum products? One might argue that countries with large resource reserves and small populations could then simply accept, for the time being, that price shocks will happen periodically. Of course, GCC countries are heterogeneous, with several states now having declining reserves and sizeable populations. In this context, with additional drivers of technological advancement and environmental unsustainability, diversification is more urgent.

the central government. In the short run, given Saudi Arabia's modest debt level (below 20 per cent of GDP), the market will be large enough to absorb both Aramco debt and moderate government borrowing. Aramco will need to disclose more financials for the bond issuance than it has ever done before, yet given the company's cash flow and operational track record, investors are likely to demand less transparency than they would if they were obtaining equity in the firm.

Outlook

Aramco now has important and visible stakes in industrial diversification, domestic energy reform, national employment and entrepreneurship, and secondary, vocational and higher education. It has become a political player, but it is not run by politicians: Most of its senior management below the topmost level are primarily engineers, instinctively careful and probably lacking the appetite to get involved in more controversial policy fields, or the experience to defend the company's interests publicly. Aramco will in the end fall in with the wishes of the political leadership—while tweaking their implementation to protect the firm.

Even in its core mission, Saudi Aramco will have an ever tougher task. The window of acceptable oil prices is becoming ever narrower. It is constrained from the bottom by increasing spending needs: Although the fiscal break-even is somewhat lower than it was two years ago, it is likely to remain around $80 per barrel due to planned spending growth. It is constrained from the top by the need to placate the United States as well as concerns about reactivating shale investment and triggering demand destruction through high prices. The danger of an ever narrower price window has become real: According to Wood Mackenzie, the break-even price for US shale producers was $52 in 2017. This was expected to drop to $44 in 2018. At the same time, demand destruction becomes a threat at oil prices exceeding $80.

The Saudi economy remains deeply oil-dependent and hence dependent on Aramco. The company's debt operations will provide some temporary fiscal space for government, but Aramco will remain in the spotlight and under pressure from various sides.

Saudi Aramco remains by far the best national oil company in OPEC. Yet it faces new risks of domestic overstretch and new complexities of governance through the IPO and SABIC acquisition plans. The company has an unparalleled track record on building and managing large physical infrastructure. It remains to be seen how astute its engineers are in navigating the treacherous waters of industrial policy that it has been involved in more recently. It is too important an asset not to be used for diversification, but it will come under closer local and international scrutiny as a result. One of Aramco's core strengths has always been to be perceived as separate from politics in Riyadh (and indeed, parts of its management are blissfully unaware of the goings-on among Riyadh-based elites). This stance will be harder to maintain as Aramco takes on more government tasks and becomes more visible through large-scale industrial and debt transactions.

CLIMATE STRATEGY IN SAUDI ARABIA: MORE CRUDE, LESS COMBUSTION

Jim Krane

The threat that climate action poses to hydrocarbon rents is bringing about two policy shifts in producer countries. First, national leaders are finally getting serious about diversifying economies into non-oil enterprises, despite comparatively lacklustre prospects for profitability and rents. Second, policymakers are simultaneously protecting and enhancing the competitiveness of state-owned oil industries.

The two strategies appear compatible. Diversification has been among the perennial recommendations of multilateral institutions. The urgency is heightened by climate policy and the possibility of long-term reduction in oil rents' contribution to the state's fiscal revenue. Diversification may be unattractive to a low-cost oil producer, but it is more attractive than standing by as the economic mainstay of the state is whittled away. The second strategy—the subject of this article—has policymakers taking steps to protect the flow of oil and gas rents from climate action, by seeking ways to preserve market share for oil in general and by creating preferences for national supplies of crude oil as differentiated from grades produced by other countries.

In the past, low-cost oil producers like Saudi Arabia responded to international climate negotiations in ways that ranged from noncommittal to obstructionist. Recently, Saudi Arabia has adopted a more nuanced and sophisticated climate strategy, driven in part by national oil company Saudi Aramco, which has played a leading role in the kingdom's approach to climate change. Several Aramco employees are on the Saudi climate negotiating team, which is under the control of the Ministry of Energy, Industry, and Mineral Resources. One member is an acknowledged author of the 2018 Intergovernmental Panel on Climate Change report. Deep involvement in global climate policy may have helped Aramco design a strategy that could preserve its role,

and that of crude oil, in a future global economy beset by restrictions on fossil fuels.

Some of the strategies that Saudi Arabia has developed alter the nature of its future participation in the oil business. From simply supplying crude oil, the kingdom is increasing its involvement in refined oil and gas products, as well as in import markets and oil-consuming technology. Three of these strategies are discussed below.

Strategy no. 1: 'dig in'—reduce the vulnerability of the oil sector to climate action

Saudi Arabia finds itself on the front lines of climate change in several ways: as a major fossil fuel consumer and greenhouse gas (GHG) emitter, as the world's largest commercial source of GHGs (Saudi Aramco's oil and gas production is behind roughly 4.3 per cent of current global GHG emissions—Mayer and Rajavuori, 2016), and as an early victim of climate damage through extreme temperatures.

However, to national oil company executives, the default concern about climate change tends to be the indirect threat posed to oil demand and exports, rather than the direct threat to habitability of the national territory. As a result, national policymakers have been 'digging in' in various ways to protect their economies against the aims of GHG accords such as the 2015 Paris Agreement.

Petrochemicals and noncombustion uses for crudes

Conversion of unburned crude oil and natural gas into chemical products may be Saudi Aramco's most promising climate hedge. Chemicals represent a growing 'climate-proof' use for hydrocarbons, through which oil and gas feedstocks are converted into precursor resins and polymers that form the basis for finished products ranging from plastic auto components to foam cushions, paint, and even toothpaste. As in the manufacture of lubricants, the carbon from oil and gas is sequestered in the finished product—rather than released upon combustion, as is the case with gasoline and other fuels.

Saudi-based companies have made major investments in petrochemical plants, including the $20 billion Sadara joint venture with Dow Chemical, the largest single-phase chemical plant ever built. Demand for plastic goods is closely correlated with GDP growth, with large markets emerging in developing countries where populations are moving into the middle class.

Differentiating among crude oil grades by carbon intensity

Saudi Arabia also seeks to leverage a competitive advantage of its crudes: their low upstream carbon intensity. Carbon intensity of crude oil varies substantially from country to country, and Saudi Arabia is among the very lowest emitters of CO_2 per unit of oil extracted, about 3.5 g of CO_2 equivalent per megajoule (MJ) of oil produced, according to a paper in *Science* (Masnadi et al., 2018a). In the highest emitters, Algeria and Venezuela, upstream emissions average more than 20 g CO_2/MJ. Low upstream emissions in Saudi Arabia are due to the low levels of energy expended in lifting crude oil from the reservoir to the surface, and in processing and transporting it. Minimized associated gas flaring in Saudi Arabia and some of its neighbours, such as the United Arab Emirates, Qatar, and Kuwait, also contributes.

Other neighbours, such as Iran and Iraq, flare gas at high rates, which increases the carbon footprint of their crudes. Gas wasted during the US shale boom has turned the United States into another flaring front runner, raising the average carbon intensity of US oil to 12 g CO_2/MJ, above the global average of 10.3.

Given such a timely advantage, Saudi Aramco has begun highlighting the low carbon intensity of its crude oil. In the future, the company could use its environmental edge as a marketing strategy. Low carbon intensity could even translate into a price advantage in countries that levy carbon taxes, if carbon taxes were designed to differentiate among crude grades by carbon intensity. More typically, carbon taxes apply an average value to oil products irrespective of origin.

Carbon taxes on Saudi and Venezuelan crudes at $70 per barrel

Crude oil source	Upstream GHG intensity (g CO_2 eq/megajoule)	Upstream GHG tax per barrel		Total GHG tax [a]		Oil price @ $70/barrel	
		@ $25/tonne	@ $50/tonne	@ $25/tonne	@ $50/tonne	+ $25 tax	+ $50 tax
Saudi average	**3.5**	$0.54	$1.07	$11.64	$23.28	$81.64	$93.28
Venezuelan Orinoco	**31.9**	$4.88	$9.76	$15.98	$31.97	$85.98	$101.97

[a] This includes upstream CO_2 emissions as well as those from transport, refining, and final combustion. Venezuelan heavy crude oil typically sells at a discount to more valuable lighter grades, a distinction that is not captured in this analysis.
Source: Baker Institute using CO_2 intensities from Masnadi et al. (2018b).

As the table above shows, Saudi medium crude priced at $70/barrel with a $25/ton carbon tax would cost $81.64 per barrel. A barrel of Venezuelan Orinoco crude would be priced at $85.98, a $4.34 premium. At a $50 carbon tax, the effect would be magnified: the Saudi barrel would be nearly $9 cheaper.

Backing internal combustion engines over electric vehicles

The kingdom has also made strategic investments to improve engine efficiency so that gasoline engines remain cost-competitive with electric vehicles, which rely on power generation feedstocks that rarely include oil. In August 2018, Saudi Aramco announced it would cooperate with Japanese auto manufacturer Mazda to develop more efficient combustion engines and gasoline that would reduce GHG emissions from the transport sector. These developments would improve petroleum's competitiveness versus alternative fuels and technologies.

'Locking in' market share through refining

Saudi Aramco has also created foreign joint ventures in refineries configured for Saudi crude oil, all but assuring the kingdom a share of the market in countries where it has invested. Aramco has bought stakes in refineries in China, South Korea, Japan, Malaysia, India, and the United States. Similarly, the Kuwait Petroleum Co. has purchased a stake in a refinery in Vietnam configured around Kuwaiti crude. These investments in vertical integration enable preferential access to crudes from states with ownership stakes.

Strategy no. 2: 'join in' climate action

As international resolve has coalesced around the desirability of GHG mitigation, Saudi Arabia has, at times, shifted its public stance from obstruction to open support for climate action. Energy minister Khalid Al-Falih has supported the Paris accord as 'balanced and fair', saying in a 2017 ministry press release that the kingdom was 'determined to see it implemented'. The Paris Agreement also provides useful political cover for unpopular—albeit environmentally beneficial—actions like Saudi Arabia's reforms of energy subsidies in 2016 and 2018. These reforms have economically rational goals of reducing government spending on energy provision and decreasing the 'cannibalism' of exportable energy commodities, while allowing renewables to compete more readily with fossil generation. Subsidy retractions serve double duty as environmental policy, since they also reduce growth in the kingdom's GHG emissions.

Internationally, Saudi Arabia promotes a different 'join in' strategy, featuring efforts that protect the interests of oil-exporting states in ways that do not harm demand for fossil fuels. Supported strategies include the following:

- **Carbon capture and storage—** This actually increases fossil fuel input for the same energy output, because capturing and compressing CO_2 requires combustion of additional fuel.
- **Flaring reductions—**Saudi Arabia seeks to persuade other countries to reduce upstream emissions so as to reduce pressure to curtail final consumption.
- **Focus on GHGs other than CO_2—**Saudi officials want more attention paid to GHGs such as methane and nitrous oxides, which, although a smaller portion of overall emissions, have much higher heat-trapping properties than CO_2.

The Saudi international climate negotiation brief also argues that fossil fuels should be retained in a future energy mix due to their synergies with renewables. The kingdom sees CO_2 emissions as a harmful side effect that can be mitigated with technological solutions. In 2014, Saudi Aramco joined the Oil and Gas Climate Initiative, a group of 11 major oil companies each pledging $100 million for research into low-emissions fossil fuel technology.

In the coming years, the kingdom and Saudi Aramco appear likely to highlight these efforts, as well as the low carbon intensity of its crude, lack of flaring and fugitive methane, and investments in high-efficiency engines to claim credentials as an environmentally responsible supplier of necessary fossil fuels.

Strategy no. 3: 'throw in' and accept climate damage

Saudi Aramco and other fossil fuel producers, scholars, and sympathetic elites have been promoting a relaxed path toward decarbonization that amounts to a concession ('throwing in the towel') that 2°C emissions limits are too costly and disruptive. The 'pragmatic' climate strategy, as outlined by Gross and Matsuo (2017), argues that trade-offs are needed between mitigation costs and allowances for losses, even if the result means that average warming reaches 3°C and brings increased climate damage. Proponents argue that damage costs would be more than offset by reductions in spending on mitigation, and by reduced economic losses among producer governments.

However, the coalition's estimates of mitigation costs are based on modelling carbon taxes required to bring about sufficient reductions in demand. A very brief comparison of *actual* climate damage costs and hypothetical lost revenue highlights potential weaknesses in the assumptions used.

In 2017, the United States alone experienced a record $306 billion in damages from weather and climate disasters. That amount is almost five times the 2017 revenues of Saudi Aramco (roughly $65 billion) and more than 70 per cent of OPEC's 2016 oil export revenues. If anthropogenic climate factors were responsible for 20 per cent of the damage—due to intensified drought-induced wildfires and flooding from extreme rainfall—paying for that portion alone would require Saudi Aramco's entire 2017 revenues. Of course, 20 per cent may be too large an estimate of the anthropogenic role, but the damages tallied are also incomplete and do not account for heat-related mortality, decreased crop yield, increased electricity demand, and other factors such as negative feedback loops from shrinking snow and ice cover, or methane releases from thawing permafrost.

In summary, the 'throw in' strategy revolves around speculation that improved technology will emerge in the future and reduce GHG emissions without terminating the fossil fuel industry. Given that such technologies have yet to be demonstrated or deployed, the strategy may be described as a nuanced update of Saudi Arabia's prior obstructionist approach.

The Saudi advantage

Saudi Arabia has developed a sophisticated climate strategy that leverages its significant advantages as a low-cost oil producer with substantial market and investment power. The kingdom has staked out an early advantage in noncombustion uses for oil and gas, and has made investments that should place it in a strong future position as a relevant supplier. However, it is worth noting that the strategies outlined range from activities that would bring a decrease in emissions—at least at the margins—to those that would increase or prolong them. To the extent that these tactics assist in the marketing of fuels that continue to be combusted in unabated fashion, they prolong damage to the Earth's climate, geography, inhabitants, and their property, despite providing short-run economic benefits, particularly in developing countries.

OIL AND ECONOMIC DIVERSIFICATION IN NORWAY

Petter Nore

Norway has experienced substantial success in managing its oil and gas wealth. It has converted a large part of its reserves to financial assets, with a sovereign wealth fund equivalent to 2.5 times its GDP. This is a unique accomplishment. The closest historical parallel is Britain, which before World War I had external assets amounting to twice its GDP (Picketty, 2014) – but that wealth was mainly owned by private individuals, while Norway's fund is a way to take care of the collective savings of the Norwegian people .

The Norwegian Oil Fund (formally known as the Government Pension Fund Global (GPFG)), which has strict limits on annual withdrawals, has helped Norway avoid turning into a rentier state. The country has maintained a diversified economic structure even though its important oil- and gas-related supply industry has made it industrially more dependent on the hydrocarbon sector.

The Oil Fund as an instrument of diversification

The Oil Fund serves as a savings fund to prepare Norway for future pension commitments. But it also prepares the country for a new low-carbon energy system. Energy markets are likely to change fundamentally during the coming decades. The world is moving towards low-carbon energy; the great uncertainty is how quickly this energy transition will occur. This will put existing oil and gas producers, including Norway, under much more pressure as their main source of income is likely to diminish over time. It is in Norway's interest to transfer as much wealth as possible from oil in the ground to other forms of capital before these assets risk becoming worthless. The Oil Fund is instrumental in this transfer (even though this was not its original purpose).

The Oil Fund also operates as a stabilization fund to even out fluctuations in oil revenues by separating the earning and spending of those revenues. A "spending cap" limits the amount of money which yearly can be transferred from the Fund to the budget to 3 percent of the value of the fund. This figure is an average over the business cycle. It is set about one per cent below the historic real rate of return of the Oil Fund. This has led to greater macroeconomic stability, greater ability to live with market risk, and less vulnerability to the potential negative effects of oil income on economic diversification. The Oil Fund stands out as the most important diversification policy of the Norwegian oil age.

The oil revenue mechanism

The Oil Fund was created in 1990 and became operational in 1996, more than 20 years after production started on the Norwegian continental shelf. At the start, it was considered a fiscal instrument to smooth volatile income streams. It was much later that it became an intergenerational savings fund.

Norway channels all its state revenues from oil and gas into the Oil Fund. This is different from almost all other oil- and gas-producing states. There are, however, some hybrid solutions.

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