Arab Oil in the Global and Domestic Context

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Like no other region, the Arab world's development trajectory has been shaped by its oil wealth. The region's massive oil reserves have turned Arab producers into the world's most important source of oil supply, integrating the Arab world into the global economy. The region has a dominant position in international trade of crude oil and acts as the oil market's most important swing producer. Oil revenues have also been a key source of wealth for the Arab region as a whole, and have driven the region's socio-economic, as well as its growth, agendas like no other natural resource. Oil still plays a critical role as a domestic fuel, covering around half of the region's own energy needs.

This oil-led development model, however, has come with its own economic caveats: aside from energy-intensive industries, oil seems to have fallen short of generating the kind of economic growth and diversification, including employment-generating private sector development in non-oil activities. The Arab world's continued reliance on oil for around half of its own domestic energy needs also raises challenges of a different kind: surging domestic demand for energy implies an increasing drain on the region's oil production, diverting growing shares to domestic markets away from export. The opportunity cost of a continuation of business-as-usual are increasingly unsustainable, raising the question for what role oil should play in the Arab economies over the long-term. This means many Arab oil producers need to invest considerably more capital and efforts into developing incentives for private sector activity beyond oil and energy-intensive industries.

This chapter concludes that oil will continue to be the Arab world's most important natural resource. The continuingly large share of Arab oil in the world crude oil market, its relatively-cheap to extract massive reserves, and its position as the world's largest spare capacity holder imply that this status is unlikely to change any time in the near future, and in spite of the game-changing technological breakthroughs in unconventional oil technologies in North America. However this prominent position also brings challenges which include timely and sufficient investment in production capacity to maintain the region's role as a production leader over the coming decades; the more effective use of oil revenues to diversify the region's economies away from their continued reliance on the oil sector in Arab oil producers; and the management of domestic energy demand and supply, including through a more diversified regional energy mix.

I. INTRODUCTION

Like no other region, the Arab world's development trajectory has been shaped by its oil wealth. Since oil was first discovered on the Arabian Peninsula during the 1930s, the region's significant reserves have turned Arab producers into the world's most important source of oil supply, integrating the Arab world fundamentally into the global economy. In many instances the region (particularly Saudi Arabia) has also played the role of a supply shock absorber, mitigating the impact of output disruptions originating from within and outside the region. Despite considerable intra-regional differences, oil revenues have also been a key source of wealth for the Arab region as a whole, and have driven the region's socio-economic, as well as its growth, agendas like no other natural resource.

Oil also plays a critical role in the Arab world's domestic energy mix; in the absence of any substantial share of renewables or other alternative sources of energy, oil continues to provide around half of the region's domestic energy needs. The Arab world's rapidly rising demand for oil and oil products over recent decades has emerged as one of the most fundamental challenges facing the region and its energy sectors – through the potential erosion of export capacity in producing countries and the rising fiscal burden incurred by importing Arab economies. The dominant role played by oil in Arab energy consumption is also questionable from an environmental point of view, considering the vulnerability of the region to the negative impacts of excessive pollution and climate change (IPCC/UNEP, 1997; Sowers and Weinthal, 2010).

In addition to rising energy consumption, the Arab world's oil sectors face many other challenges. Investing in existing and newly producing fields to ensure a smooth supply of oil remains a persistent challenge, not least in response to continuing demand uncertainty in main consumer markets – in many cases furthered by the pursuit of energy efficiency measures and policies to reduce the share of oil in the energy mix. Oil revenues have also been unable to spur the kind of economic diversification many Arab producers had aspired to, leaving most Arab oil producers exceptionally reliant on what has proven to be highly volatile oil revenues. The political turmoil that has toppled several Arab regimes has, furthermore, revealed the vulnerability of regional oil supply to political disruption at times of intra-regional crisis. And so, the Arab world demonstrates that regional oil wealth does not come without its own challenges, and it is these challenges and their successful management which will determine the pace and the development path of the region.

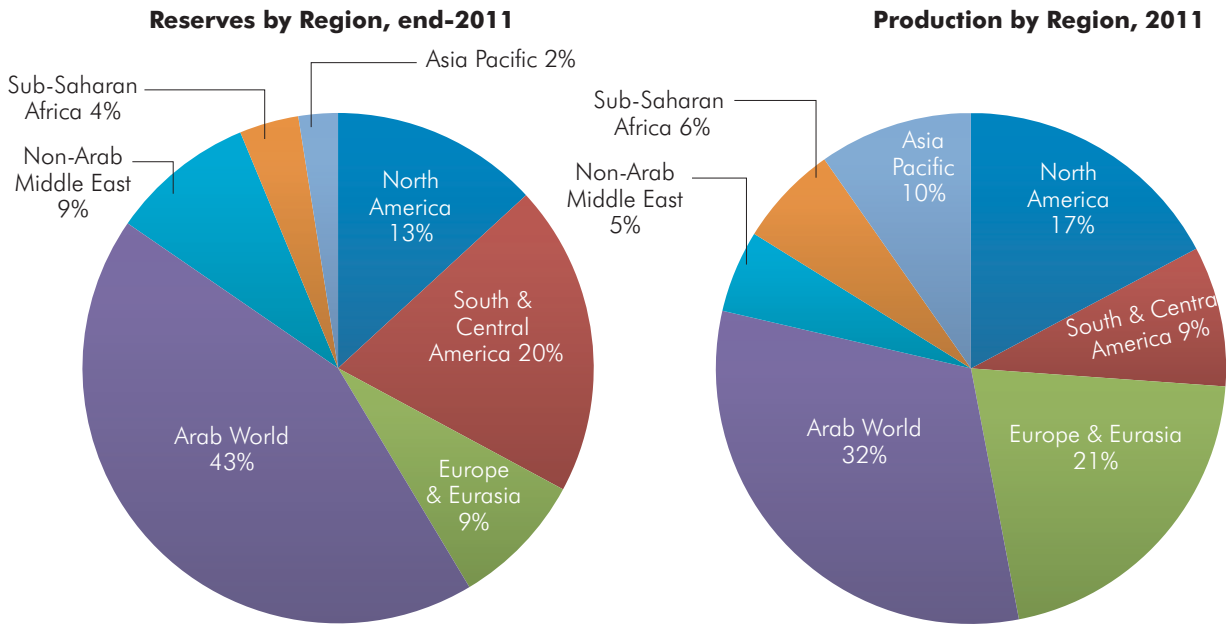
In this chapter we discuss some of the most important themes in the Arab world's use of oil, focusing on the role of Arab oil both in international markets and as a domestic fuel within the Arab world; its role in the region's economic development; and the key challenges the region is likely to encounter in the future management of its oil wealth.

II. THE ROLE OF ARAB OIL IN INTERNATIONAL AND DOMESTIC MARKETS

A. Reserves and Production

The importance of Arab oil cannot be over-emphasized. In 2011, Arab countries held some 713.6 billion barrels, around 43 percent of the world's proven oil reserves (see Figure 1 and Table 1).[1] Of the 22 Arab League members, 16 are producers of oil.[2] The Arab world's combined production in 2011 amounted to over 26 million barrels per day (mb/d), or nearly a third of world oil supply, making the Arab world the world's largest producing region (EIA, 2012). Four of the

FIGURE 1 WORLD OIL RESERVES AND PRODUCTION BY REGION AT END-2011



Source: Authors' calculations based on BP (2012)

world's ten largest producers of oil (Saudi Arabia, the UAE, Kuwait, and Iraq) are Arab producers. (Production figures for 2011: BP, 2012). Together with Algeria, Libya, and Qatar, these producers form seven of the 12 member states of the Organization of Petroleum Exporting Countries (OPEC), of which three Arab states (Saudi Arabia, Iraq, and Kuwait) were also founding members.

However, oil endowments differ considerably within the region: the six GCC[3] member states, along with Algeria, Iraq, and Libya, account for nearly 98 percent of the Arab world's total oil reserves, and 93 percent of its total production. Saudi Arabia alone holds more than 265 billion barrels of proved oil reserves, or 16 percent of global total reserves (EIA, 2012).[4] By contrast, oil producers such as Egypt, Syria, Yemen, Sudan and Tunisia hold comparably small reserves, thus generating a considerably lower share of their revenues from oil; Arab economies with low or no proven reserve base – such as Jordan, Morocco, and Lebanon – have been net importers of crude oil and oil products for the bulk of their energy needs.

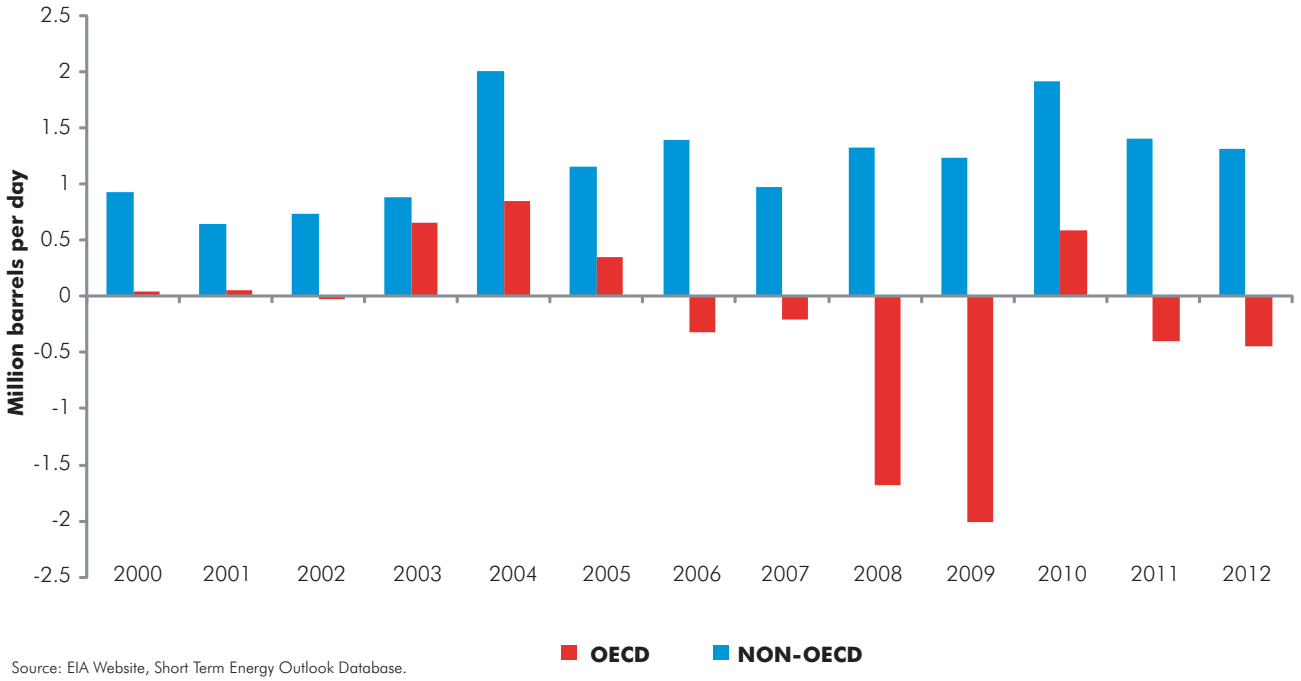
Given the region's key position in the global oil market, the security of Arab oil supplies has been central to oil importers' energy policies. In addition to their high dependency on such a strategic resource, an underlying security concern for importers is that the regular flow of oil may be subject to physical disruptions, limiting the availability of oil supplies and causing sharp rises in prices. Since the big price shocks of the 1970s, it has been widely argued that sharp rises in oil prices have had significant macroeconomic effects on the global economy – see for instance, Hamilton (2009). In addition, the transport and aviation sectors – the lifelines of a modern economy – are still almost totally reliant on refined products. Thus, some analysts consider the most important facet of energy security is that of limiting vulnerability to disruption. Output disruptions in a number of Arab countries such as Libya, Yemen, Syria, and Sudan over the last two years have reinforced these fears, though the impact of such disruptions on oil market dynamics has so far been limited (Darbouche and Fattouh, 2011).

B. Dominance of International Trade and Shift in Trade Dynamics

The significance of the Arab world extends beyond the size of its reserves and its share in world production. Unlike many other producers in the world, Arab producers export the bulk of their oil production, which gives the region a dominant position in international trade of crude oil (see the export–consumption ratios in Table 1). In 2011, the region's exports constituted around 40 percent of the world's crude oil exports, rendering the region the most important source of oil trade movements (authors' calculations based on EIA, 2012). Crude oil exports from the Middle East are projected to reach almost 20 mb/d by 2035 (OPEC, 2012)[5] with most of these exports destined to fuel the fast-growing Asian economies. Indeed, one of the most important shifts in oil market dynamics in recent years has been the rapid growth of oil consumption in non-OECD economies. Between 2000 and 2012, oil demand growth in non-OECD countries outpaced that of the OECD in every year (see Figure 2). During this period, non-OECD total liquid fuel consumption increased by around 16 mb/d while OECD consumption dropped by 1.5 mb/d (EIA Website, Short-Term Energy Outlook Database). At the heart of this growth lies China and India, which accounted for more than 45 percent of the incremental change in demand during this period.

This current shift towards non-OECD countries is likely to accelerate as the incomes of households in emerging economies improve, and car ownership rates increase from a low base. The emergence of the non-OECD economies as the main engine of growth in global oil demand has had far-reaching implications on the dynamics of trade flows. This is perhaps best illustrated by the shift in direction of oil flows from Saudi Arabia to the rest of the world. In 2000 the share (from its total exports) of Saudi crude exports to North America, Western Europe, and Asia and the Far East stood at 25 percent, 21 percent, and 45 percent respectively. By 2010, the North American and Western Europe shares fell to 18 percent and 10 percent respectively, while that of Asia and the Far East increased to 64 percent (SAMA, 2011). The drastic shift in the direction of trade flows is likely to have wide geopolitical and economic implications, affecting many

FIGURE 2 **SHIFT IN LIQUID FUEL DEMAND DYNAMICS IN OECD AND NON-OECD (YEAR-ON-YEAR, MILLION B/D)**



Source: EIA Website, Short Term Energy Outlook Database.

aspects of the oil market, such as the emergence of new trade routes and refining centers (Fattouh and El Katiri, 2012b).

C. Low-Cost Reserves and Spare Capacity

In addition to their position of dominance in international crude oil trade, many of the Arab world's oil reserves, particularly those of the GCC economies, are among the cheapest in the world to find, develop, and produce (with the exception of those in Oman). The IEA estimates that total production costs in Saudi Arabia, Kuwait, and the UAE vary between US$ 3 and US$ 5 per barrel of oil produced, providing the region with a significant competitive advantage over most other producing world regions (IEA, 2005).[6] Furthermore, all the oil market's critical spare capacity is concentrated in three Gulf Cooperation Council (GCC) member states – Saudi Arabia, Kuwait, and the UAE – with Saudi Arabia holding the bulk of the world's available spare capacity. This has allowed Saudi Arabia to act as the oil market's most important swing producer, filling the gap at times of oil supply disruptions or curbing production at times of perceived over-supply, in an attempt to balance the market (Fattouh and Mahadeva, 2013).

TABLE 1 **PROVED OIL RESERVES AND PRODUCTION IN THE ARAB ECONOMIES AT END-2011**

	Proved reserves (bbl)	Share of world reserves (%)	R/P ratio	Production ('000 b/d)	Share in World Production (%)	Ratio Exports: Consumption**
The GCC States	**495.0**	**29.9**	**69.5**	**19,505**	**23.3**	**5.8**
Bahrain	0.1	< 0.05	7.0	47	0.1	5.0
Kuwait	101.5	6.1	97.0	2,682	3.2	7.7
Oman	5.5	0.3	16.9	889	1.1	6.7
Qatar	24.7	1.5	39.3	1,638	2.0	6.0
Saudi Arabia	265.4	16.1	65.2	11,153	13.3	3.8
UAE	97.8	5.9	80.7	3,096	3.7	5.3
Other Major Oil Producers	**202.4**	**12.2**	**110.5**	**5,020**	**6.0**	**4.2**
Algeria	12.2	0.7	19.3	1,884	2.3	4.2
Iraq	143.1	8.7	> 100	2,635	3.2	3.0
Libya	47.1	2.9	> 100	502	0.6	5.5
Other Oil Producers	**16.6**	**< 0.05**	**26.2**	**1,737**	**2.1**	**1.1**
Egypt	4.3	0.3	16.0	706	0.8	0.3
Mauretania	< 0.1	< 0.05	n/a	8	0.0	0.4
Morocco	< 0.1	< 0.05	n/a	4	0.0	0.1
Sudan & S. Sudan	6.7	0.4	40.5	455	0.5	4.1
Syria	2.5	0.2	20.6	331	0.4	0.6
Tunisia*	0.4	< 0.05	n/a	70	0.1	0.9
Yemen	2.7	0.2	32.0	163	0.2	1.4
Total Arab World	**713.6**	**43.2**	**74.4**	**26,262**	**31.4**	**3.3**
World	**1,652.6**	**100.0**	**54.2**	**83,576**	**100.0**	**n/a**

Notes: * Production figure for 2010;
** Ratio for 2008.
Source: EIA (2012).

D. Regional Reserve Depletion

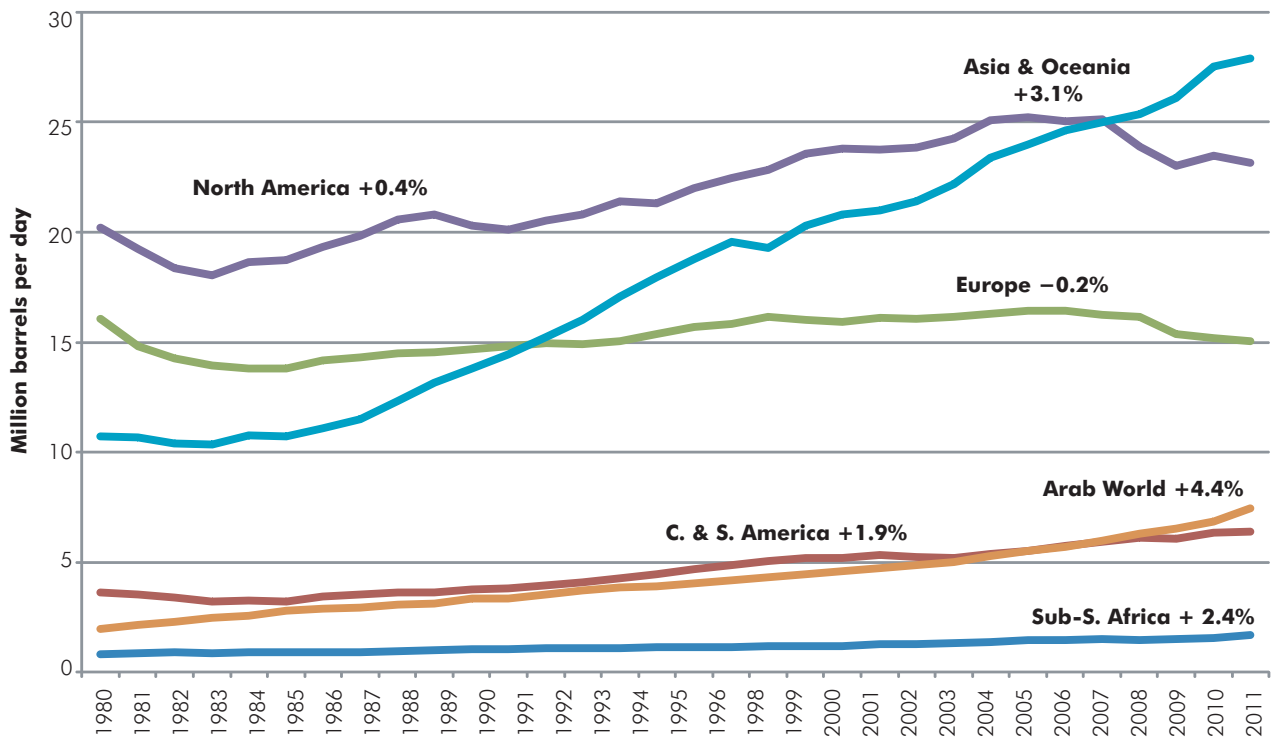
Another distinguishing feature of Arab oil is the longevity of its reserve base, estimated at over 78 years for the Middle East, and more than 40 years for North Africa. Individual oil producers face considerably longer production horizons at current rates of production, for example, Kuwait and the UAE at over 80 years, and Iraq and Libya with more than 100 years (BP, 2012). This picture is not reflective of the entire region, however. For many Arab medium and small reserve holders, the depletion of their oil reserves is, at current rates of production, just a few decades away, and for some even less; the production outlook of Oman, Syria, Algeria, and Egypt is currently estimated at 20 years or less (BP, 2012; El-Katiri 2013, for a detailed discussion).

Even where the increased use of technology could help raise this production estimate, or maintain it at constant levels for some time, the end to these countries' oil production is in sight. In view of this depletion outlook, several Arab oil producers have shifted their policy-focus away from a concentration on oil towards giving a greater weight to natural gas exploration and production, as well as export (Fattouh and Stern, 2011 eds., for a detailed account). However, the gradual loss in oil export revenues – as yet unmatched by natural gas export income – paralleled by the growing domestic demand for oil, will eventually force a growing number of Arab oil producers to shift position from being traditional oil exporters toward becoming oil importers (El-Katiri, 2013).

E. Domestic Oil Consumption

Oil has been the Arab world's main traditional domestic energy source across a number of different economic sectors including power generation, transport, refining, various energy-intensive industries such as aluminum and steel, and for the Gulf states' ambitious fertilizer and petrochemicals industries. More than 98 percent of Arab energy supplies consist of oil and natural gas, with a

FIGURE 3 OIL CONSUMPTION AND 30-YR COMPOUND ANNUAL CONSUMPTION GROWTH RATE BY REGION, 1980–2011



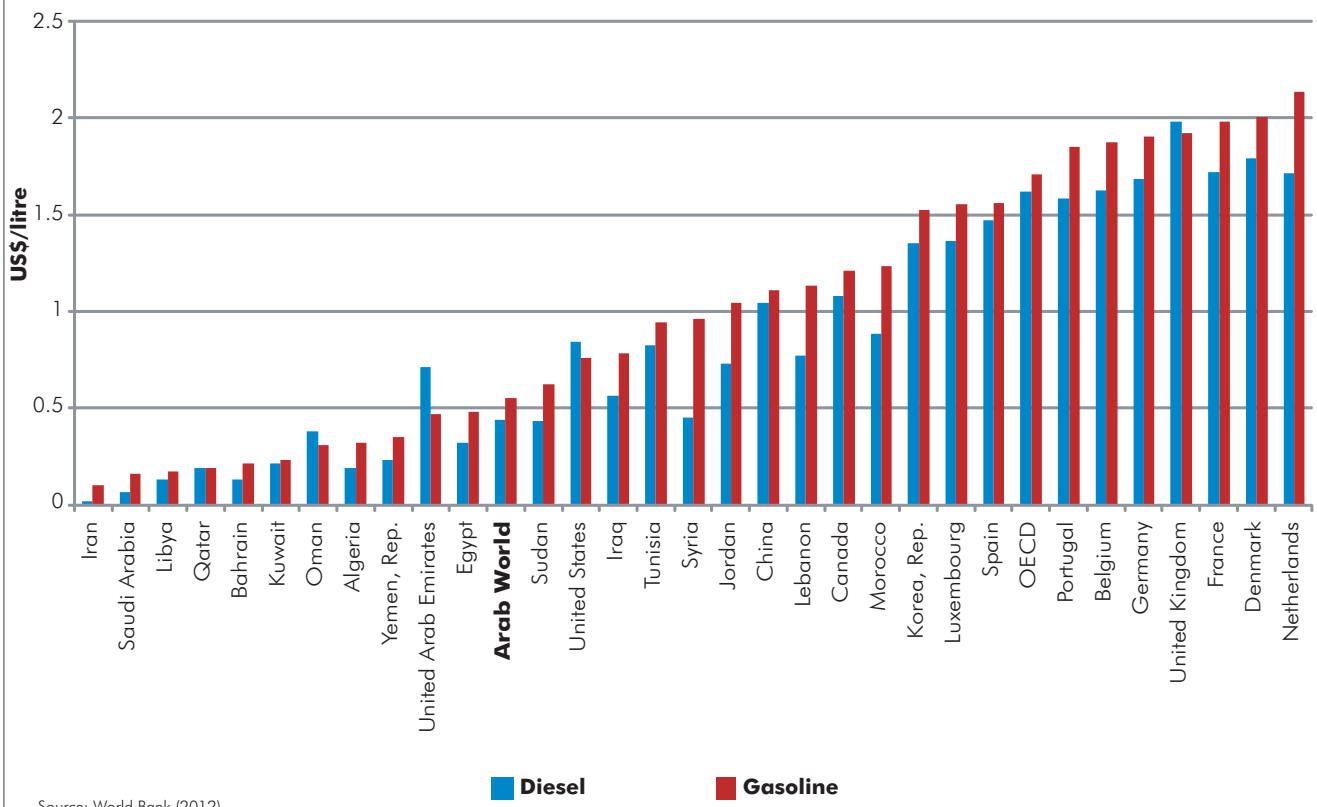
Source: EIA (2012).

marginal share of alternative energies. Oil covers 52.9 percent of the Arab world's energy needs, and natural gas 45.4 percent (AMF, 2011, 81, 89: numbers for 2010). While the role of natural gas has been rising over the past decades, oil continues to account for around half of aggregate Arab energy supply, a higher share than in any other region.

Its demand for oil makes today's Arab world anything but a marginal oil consumer; regional demand for oil has tripled over the past 30 years, from a modest 2 mb/d in 1980 to 6.97 mb/d by 2010 (EIA, 2012), alongside rapidly rising energy consumption rates over the same period across the entire region. At the end of the 2000s, aggregate Arab oil consumption amounted to about 8 percent of world demand, surpassing the, by then, more populous regions Africa and Central and Latin America (see Figure 3). The GCC producers Qatar, the UAE, and Kuwait are today amongst the most energy-intensive economies in the world, as measured by the amount of energy used per unit of GDP (Fattouh and El-Katiri, 2012a). Per capita primary energy consumption in the GCC states today is among the highest in the world, well above the average for the OECD and other industrialized economies. (See World Bank (2012) for comparative data; Fattouh and El-Katiri, 2012b; El-Katiri, 2013.)

The region's rapidly rising oil demand, and its persistence in using oil alongside natural gas over alternative fuels for virtually its entire energy needs, is largely accounted for by economic and industrial growth, a high rate of regional population growth, rapidly rising living standards, and low domestic energy prices. Prices for crude oil and oil products have, in many parts of the Arab world, been among the lowest in the world, as a result of either active subsidy policies implemented by importing governments, or marginal production cost pricing by Arab oil producers. The resulting price disparity between Arab prices for oil and those prevailing in other regions is evident in a cross-country comparison for diesel fuel and petrol, shown in Figure 4.

FIGURE 4 DIESEL AND PETROL PRICES IN SELECTED ARAB AND NON-ARAB COUNTRIES, 2010

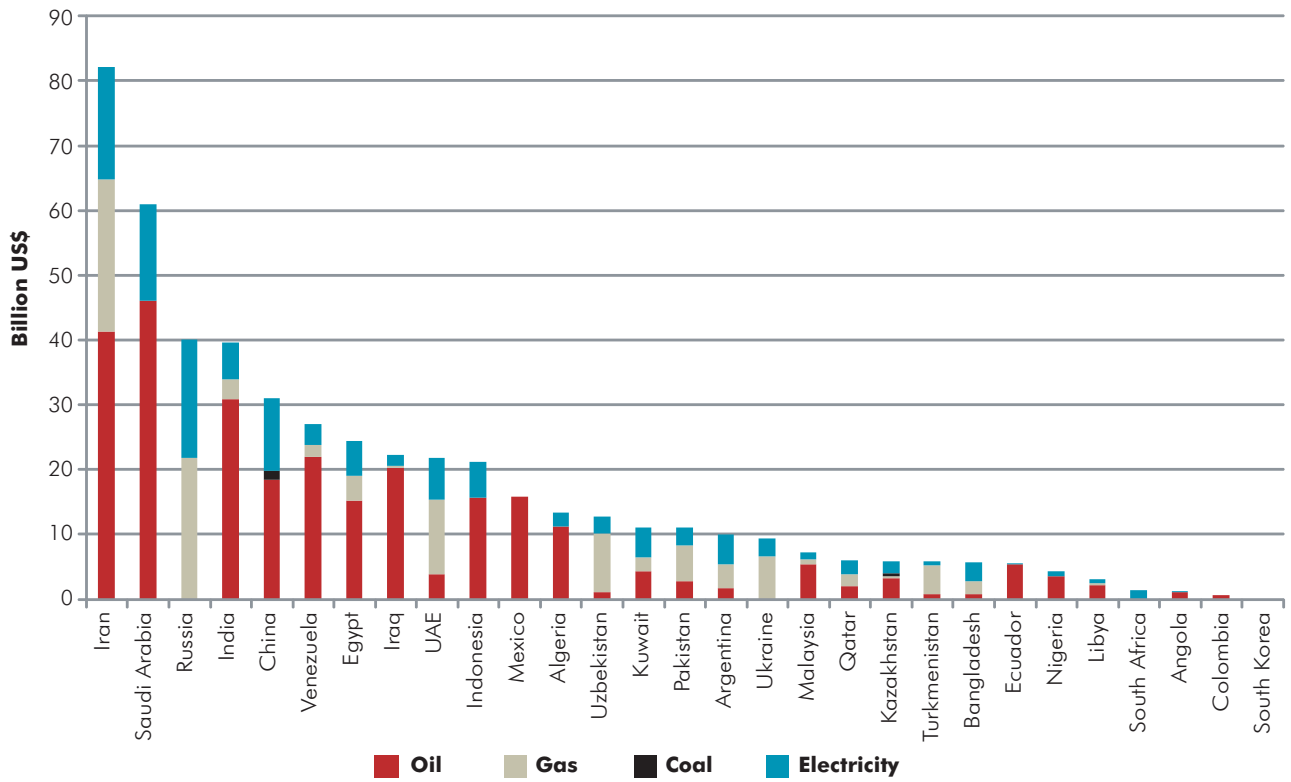


Source: World Bank (2012)

Using the price-gap approach, the IEA estimates the cumulative subsidies on oil and oil products – both explicit, via governmental subsidies, and implicit, found by measuring the difference between the price of crude oil and petroleum products charged domestically, and the price in international markets (in other words the opportunity cost) – at more than US$ 46 billion in Saudi Arabia, US$ 20 billion in Iraq, US$ 15 billion in Egypt, and over US$ 11 billion in Algeria in 2011 (see Figure 5 below). Rising consumption, together with strong international prices, has increased this bill for both oil importers and producers in the Arab world. These IEA figures however should be treated with caution given the many caveats in defining and measuring energy subsidies (Fattouh and El-Katiri, 2012a). This is evident in the disagreement between the major international organizations such as the World Bank, the IEA and OPEC on common definitions of subsidies.[7] Issues such as the production of joint products (for instance crude oil, natural gas and Natural Gas Liquids), the availability of spare capacity in some Arab producing countries, and the ability of key Arab oil exporters to influence international oil prices could affect the measurement of subsidies. This has been recognized in a recent IEA/OPEC/OECD/World Bank (2010) joint report, which notes that 'the price-gap method has limitations which apply particularly in the case of countries with large endowments of energy resources'.

The practice of supplying domestic markets with low-cost oil has also led to many structural demand patterns favouring the use of oil as a fundamental energy source, with most citizens considering the access to cheap petroleum products as their birthright. Similarly, within industry, oil is considered as a low-cost input factor; this discourages investment in efficiency-enhancing technology and investment in new, or the upgrading of existing, facilities favouring

FIGURE 5 ESTIMATED ENERGY SUBSIDIES BY TYPE OF ENERGY (US$ BILLION), 2011



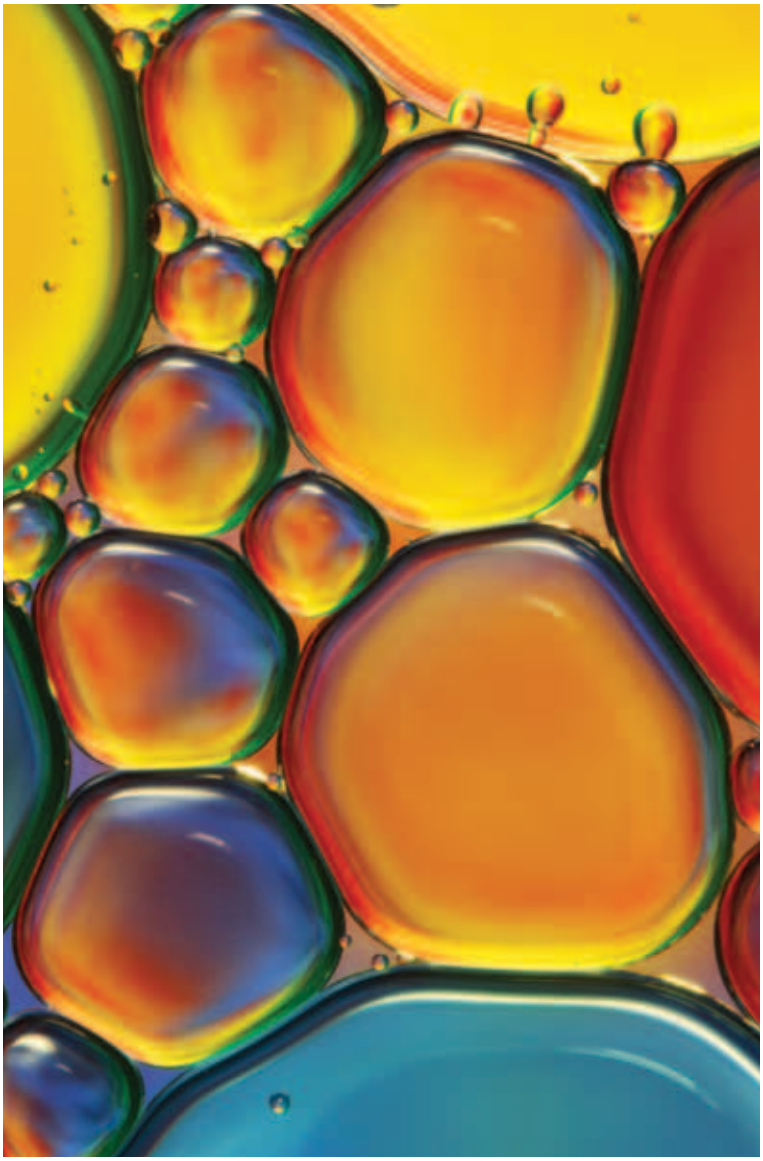
Source: IEA (2012)

the use of alternative fuels whose costs are not subsidized. High-cost initial investment in renewable technologies such as solar power hence appears considerably more expensive relative to oil, which is supplied domestically at very low prices (Fattouh and El-Katiri, 2012a; Fattouh and El-Katiri, 2013; El-Katiri, 2013)

III. OIL AND DEVELOPMENT IN THE ARAB WORLD

The Arab world's oil wealth has undoubtedly made the region a key supplier of world energy resources, but has it helped Arab economies to prosper? The question of whether oil and other natural resources have been more of a blessing, or more of a curse, has been the subject of a large and controversial body of literature (Sachs and Warner, 1995; Sachs and Warner, 1999; Davis, 1995; Stijns, 2005; Brunnschweiler and Bulte, 2008; Bornhorst, Gupta, and Thornton, 2008; Boyce and Herbert Emery, 2011; Gylfason and Zoega, 2006; Ross, M.L., 2001. For a discussion of oil in the Arab context, see Al-Moneef, 2006.) The purpose of this chapter is not to provide a critical review of this voluminous literature, but rather to make the following three general observations: first, resource-rich economies in the region have experienced relatively low per capita GDP growth and high levels of growth volatility. Second, in the case of the GCC economies and to a lesser extent Libya, per capita growth rates alone do not provide an adequate picture of their achieved levels of overall economic development and social welfare, as these countries have maintained a high level of per capita income. Third, some Arab oil and gas producers seem to have used their hydrocarbon revenues to spur economic growth and development in more effective ways than others – see Fattouh and El-Katiri, (2012b) for a detailed discussion. Hence, one should be careful in making wide generalizations about the relationship between oil resources, and growth and development, in the context of the Arab world.

In an attempt to move beyond the simplistic characterization of the oil and gas sector as an "enclave" industry, we use the framework proposed by Hirschman (1958, 1977) to analyse some of the linkages between the energy sector and the wider economy for Arab oil producers.[8] We focus



on fiscal linkages, and production linkages, which are split into forward and backward linkages.

A. Fiscal Linkages

Fiscal linkages refer to the rents that the government extracts from the energy sector through a combination of taxes, royalties, and dividends. For many Arab producers, the cost of developing oil reserves is low and hence the size of the rent is relatively massive and constitutes a big fraction of the country's GDP. In countries such as Egypt and Yemen, where oil reserves are developed jointly with foreign oil companies, part of the rent is leaked to foreign investors. Still, the contribution of rents to overall

economic activity can be large, especially where the size of the overall economy is small and where few other productive, export-oriented sectors exist.

Fiscal linkages play an important role in shaping the structure and the growth patterns of Arab economies. Through fiscal linkages, a government obtains the revenues that can be used to finance government spending, accumulate hard currency, accumulate savings, or invest to promote other sectors in the economy such the non-oil private sector or the country's infrastructure, human capital, and social programs. The share of hydrocarbon revenues in most Arab producers' export earnings ranges from 33 percent in the relatively diversified economy of the UAE (with a much higher individual share for the main producing emirate Abu Dhabi) to 88 percent in highly export-oriented economies such as Saudi Arabia and Qatar, and more than 97 percent in Algeria and Iraq.[9]

TABLE 2 **THE OIL AND GAS SECTOR'S CONTRIBUTION TO GDP (NOMINAL) AND GOVERNMENT REVENUES IN THE ARAB ECONOMIES, 2010**

	GDP (US$ million)	Hydrocarbon Sector (US$ million)	Share of Hydrocarbon Sector (%)	Share of individual GDP in Total Arab GDP (%)	Share of Hydrocarbon Revenues in total Government Revenues (%)
The GCC States	**1,084,391**	**479,547**	**44.2**	**53.5**	**80.7**
Bahrain	22,945	5,591	24.4	1.1	81.8
Kuwait	124,244	64,009	51.5	6.1	93.8
Oman	63,199	30,118	47.7	3.1	81.7
Qatar	128,593	71,642	55.7	6.3	60.8
Saudi Arabia	447,762	214,145	47.8	22.1	90.4
UAE	297,648	94,042	31.6	14.7	75.9
Other Major Oil Producers	**357,247**	**172,237**	**48.2**	**17.6**	**84.3**
Algeria	161,947	56,185	34.7	8.0	66.3
Iraq	121,335	62,643	51.6	6.0	96.1
Libya	73,965	53,409	72.2	3.6	90.6
Other Oil Producers	**379,108**	**57,638**	**15.2**	**18.7**	**32.7**
Egypt	218,393	29,999	13.7	10.8	9.5
Sudan and S. Sudan	72,519	6,822	9.4	3.6	51.5
Syria	58,898	15,288	26.0	2.9	8.0
Yemen	29,298	5,529	18.9	1.4	61.8
Other Countries	**205,989**	**9,386**	**4.6**	**10.2**	**2.1**
Djibouti	1,109	0	0.0	0.1	n/a
Jordan	26,463	877	3.3	1.3	n/a
Lebanon	39,221	0	0.0	1.9	n/a
Mauritania	3,629	1,166	32.1	0.2	n/a
Morocco	91,314	3,534	3.9	4.5	n/a
Tunisia	44,253	3,809	8.6	2.2	2.1
Total Arab World	**2,026,735**	**718,808**	**35.5**	**100.0**	**70.6**

Source: Arab Monetary Fund (AMF, 2011)

The Arab world's hydrocarbon resources remain unequally distributed, which means that the region's smaller or non-oil and gas producers have benefited significantly less from hydrocarbon-related direct economic growth linkages. Many smaller or non-oil producers in the Arab world, however, have benefited indirectly from the inflow of oil export rents into larger Arab producers via the intensification of intra-Arab investment flows, intra-Arab aid, and Arab labour remittances. At the end of the 2000s, an estimated 5.8 million Arab expatriates were thought to have generated an intra-regional remittance flow worth over US$ 35 billion per year (Fattouh and El-Katiri, 2012b). The most recent available data suggests some 25 percent of expatriate labour in the GCC states was Arab, down from 72 percent during the 1970s but still a significant number (IOM, 2010). The region's overall oil wealth, however, has not been able to foster a higher level of intra-regional trade integration and corporation, particularly in the area of energy (see Fattouh and El-Katiri, 2012b).

B. Forward Linkages

Resources such as oil may also contribute towards economic development by feeding directly into growth-enhancing activity in other, related economic sectors. By providing an essential, low-cost input factor into many energy-intensive and intermediate industries, oil can thus "push" the creation of new value-added industries, which in turn enhance the export value of oil. These "push effects" are often referred to as forward linkages.

The Arab world's petrochemical industries are an important example of the contribution of the oil sector to a country's industrial development. The past three decades have witnessed rapid expansion of the petrochemical industry, transforming the region into a key player in petrochemicals. Most of the petrochemical capacity in the region is concentrated in the Gulf.[10] Within the Gulf, Saudi Arabia accounts for around 50 percent of the region's total production.

The forward linkages through the petrochemical industry have had a number of consequences. The region's position in this key global sector has been enhanced; national champions (such as SABIC in Saudi Arabia) have developed; the attraction of foreign direct investment has been encouraged; the role of the private sector has been promoted by opening the sector to private participation; and the linkages have helped diversify the economy

and the export base, to some extent. The data for 2010 showed that petrochemicals accounted for 6 percent of the total exports of the Arab world and 11.5 percent of intra-Arab exports (AMF, 2011, Figures 8.2 and 8.4).

C. Backward Linkages

Some arguments are also made in favour of the oil sector having a role in "pulling" other local sectors along, particularly those sectors providing input factors to the functioning of the energy sector and its forward production chain. Such "pull effects" are often referred to as backward linkages. The nationalization of oil assets in many Arab oil producing countries in the 1970s and the emergence of national oil companies (NOCs) has put pressure on the NOCs to maximize backward linkages through providing employment for nationals, increasing reliance on local companies, and designing and implementing local content policies. It has also been argued that the oil sector should promote more indigenous private sector activity, especially around complementary activities such as R&D in areas of technology supply, and around the

service company market segment, which provides equipment, technologies, and other services both to the upstream and the downstream sectors.

\However, there are limits to the depth of these linkages. Employment-wise, the energy sector is a capital-intensive sector and is limited in its ability to attract employment. For instance, in Saudi Arabia, the country with the largest oil and gas sector in the Arab world, the number of people employed in the Mining, Oil, Gas and Quarrying sector stood at 85,145 in 2011. This is only 1.1 percent of the total labour force in the private sector (SAMA, 2013, Table 18.8). The role of the oil sector in helping extend Arab countries' domestic private sectors has been arguably limited. Since the nationalization of the oil industry in the 1970s, many oil upstream services have been provided in-house and hence it is possible to argue that the change in ownership has already contributed to the development of backward linkages.

However, while the upstream sector across all oil producers relies heavily on private oilfield services – drilling equipment, technology providers, information technology, security, and logistics – these services continue to be provided to a very large extent by foreign private companies whose technological know-how in many cases exceeds that of domestic service companies. The following quote from Mr. Khalid Al-Falih, the CEO of Saudi Aramco, suggests that there are still many challenges in fostering the linkages between the oil industry and the domestic private sector:

> " … despite many incentives, the national industrial sector has failed to keep pace with the company's growing demands and its contribution to meeting these demands does not exceed 20 to 25% ... Notwithstanding Saudi Aramco's efforts in support of local industries, these industries are hardly adequate. It is our hope that the private sector will play a greater role in promoting the industrialization sector." (Al-Falih, 2009)

IV. EMERGING CHALLENGES

The undoubtedly central role that oil has in both the global and domestic context has rendered a sensible management of the resource all the more important for the Arab world's future growth and prosperity. Many challenges have emerged, however, and the benefits of oil remain unequally distributed within the region, suggesting increased potential for the role of both national and cross-regional approaches in the coming decades.

A. Investment and Prospects for Capacity Expansion

The issue of investment in the energy sector of the Arab world has two inter-related dimensions: local and international. Oil revenues will

continue to play an important role in shaping the development path of Arab economies, at least into the foreseeable future. Thus, maintaining a well-functioning oil sector and expanding the oil capacity is of key importance to the region's economic, social, and political stability. For those Arab oil producers with declining oil reserves, investment in higher-technology solutions, in order to prolong the lifecycle of their producing fields, is vital to maximizing the revenues still to be expected from these non-renewable reserves. Furthermore, given the large concentration of oil reserves in the Arab world, investment in the oil sector of the region also has an international dimension, since most international organizations project that much of the increase in global oil demand will have to be met by increasing supplies from Arab OPEC members.

These two dimensions – local and international – highlight the issue of what proportion of the revenues generated from the energy sector should be reinvested to expand the sector's capacity. Until the early 2000s, investment in the energy sector of the Arab world was stagnant (with some notable exceptions such as Qatar which embarked on a massive investment program to develop its gas reserves, and Algeria which revised its legal framework and fiscal terms to attract foreign investment). The large spare capacity and the oil price decline in the 1980s and most of the 1990s threw the energy industry into deep recession, reduced the attractiveness of existing investment plans, and adversely affected the incentive to invest.

Geopolitical issues have also prevented capacity expansion in many Arab countries. For example: the Iran–Iraq war, the Iraqi invasion of Kuwait, the US invasion of Iraq and the lack of security and stability that followed, have prevented these countries from undertaking the necessary investment in their oil sectors. Sanctions against Libya, Iraq, and Sudan have limited their access to technology and foreign capital, and hindered capacity expansion. In Iraq, the domestic conflict which has continued since 2003, as well as legal uncertainty surrounding the hydrocarbon law, has delayed investment and exploration decisions. The political turmoil that has swept across the Arab world since the end of 2010 has resulted in oil output losses in 2011 and 2012. South Sudan's shutdown in oil production in 2012, following the country's secession from the oil-poor North, added to the region's production shortfalls.

In countries such as Kuwait and the small producers such as Yemen and Syria, the relationship between the owner of the natural resource (the government) and the NOC that extracts the resource is highly inefficient, yielding low rates of investment. The capital budget for national oil companies is often quite tight, preventing them from either undertaking new projects or upgrading human capital and technological capabilities. Consequently, NOCs in the Arab world are not of uniform quality, and while some are relatively well-managed and score highly on commercial performance, human resources, and technology, others perform very poorly and have to rely heavily on foreign companies for exploration and development of oil reserves.

Driven by energy security and climate change concerns, many OECD and non-OECD countries have also been encouraging the use of renewable energies – often through a combination of regulations, incentives, subsidies, taxation, moral persuasion, and/or a combination of these instruments – to change the composition of their energy mix to one with a lower carbon content. Oil substitution policies can have a large impact on long-term oil demand since their impact is cumulative and irreversible. Thus, from the perspective of Arab producers, oil substitution policies and taxes on petroleum products are seen as discriminatory, tending to dampen oil demand growth, and reducing Arab producers' export share in the energy mix in the long term. Furthermore, these policies induce great uncertainty about long-term demand for Arab oil discouraging investment.

B. Low levels of Economic Diversification

Up to now, the goal of diversifying the Arab world's economies to levels that render the region less dependent on its oil wealth, or (for some small oil producers and net-importers) on oil-induced remittances and foreign aid, remains largely unachieved. The share of the hydrocarbon sector in many Arab producers' economies continues to be exceptionally high (see shares in GDP in Table 2), defying all previous decades' talk of intentions to reduce this share significantly.

Deferred investment in alternative sectors in the Arab world has been attributed to a number of different factors: the persistence of vertically integrated state-owned companies promoted by state sector-specific policies and of old-style industrial policies; the weakness of private sector enterprise and innovative forces; and the specific features of natural resource-led development patterns whereby the flow of oil revenues often reduces the pressure for change, even in the presence of serious strains on the economic development model, seen in many Arab resource-rich economies (see, for example, Nabli, Keller, Nassif, and Silva-Jauregui, 2005).

Part of this investment argument is seen in the debate surrounding many regional oil and gas producers' strategies of diversification into energy-intensive industries such as refining and petrochemicals production. While seen by producers as a strategy of raising the value-added of their exports, and of diversifying away from crude exports, many critics of this policy suggest such forward linkages reinforce rather than mitigate energy producers' dependence on energy.[11] The fact that many Arab oil producers, such as the Gulf monarchies, Algeria, and Libya, began their industrialization process at a much later stage than many of their neighbors – typically following costly state-coordinated industrialization strategies – has, in the eyes of some development economists, rendered these countries less likely to change their industrial strategies once they are in place, even if the economic outcome is below the optimum level.[12]

Low levels of economic diversification amongst the Arab world's oil and gas producers raise a number of different long-term policy challenges. The most immediate concern relates to the fiscal sustainability of economies (such as some of the GCC states and, particularly, Iraq and Libya) which rely to a large extent on oil and gas revenues. A high rate of dependence on oil and gas revenues reinforces patterns of volatile government revenues, whose level and stability remains outside the control of producing countries. Past research has suggested a high level of reliance on widely fluctuating government revenues as being one key explanatory factor for many Arab oil producers' relatively low per capita income growth rates. This forms part of the argument put forward by those seeing oil more as a curse than an economic blessing (for a discussion of GDP–revenue volatility rates see Makdisi, Fattah, and Limam, 2007; Arezki and Nabli, 2012).

Moreover, high levels of oil and gas sector dependence in Arab producing economies do little to help the region deal with its looming unemployment challenge, the gravity of which has been felt across the entire Arab region – not least since the beginning of the Arab uprisings since late 2010.

C. Rising Domestic Consumption and Export Capability

Perhaps the most pressing challenge confronting the Arab world today is its very own oil demand, which has been rising rapidly since the 1960s alongside rapidly growing energy consumption across the

region's industrial and residential sectors. Rising energy consumption within the region, and the rising (opportunity) cost of oil consumed domestically by exporters and net-importers alike, suggest that past patterns of reliance on oil may no longer be sustainable or serve the region's best long-term interest.

The burning of crude oil by large exporters such as Kuwait and Saudi Arabia has now reached historic volumes. In 2010 Saudi Aramco CEO Khaled Al-Falih expressed his concern about the Kingdom's use of its crude oil resources, arguing that Saudi crude oil exports could fall by as much as 3 million b/d by 2028 should domestic crude oil consumption grow unabatedly for much longer (FT, 2010). These concerns reflect the growing dilemma faced by many Arab oil producers – that of supplying domestic markets with low-cost petroleum products while maintaining or expanding current export volumes.

The reform of domestic oil and energy prices – the most important government tool in managing domestic demand – constitutes a delicate political and economic task, especially in the wake of political uprisings that have struck the region since late 2010. Many Arab governments that have shown some inclination to reform prices are likely to be deterred from increasing fuel prices, to avoid the accompanying socio-economic distress and preserve regime stability. However, the enormous fiscal burden of fuel subsidies has forced many net-importing governments to re-consider their existing pricing policies, which weigh heavily on these governments' budgets. Fuel subsidies, in all Arab oil importing countries, increasingly exceed budgetary capabilities, drawing fiscal resources away from other key sectors such as health and education (Fattouh and El-Katiri, 2012b).

V. CONCLUSION

Oil continues to be the Arab world's most important natural resource, a status that is unlikely to change any time in the near future. Despite the recent discovery of oil reserves outside the Arab world (for instance shale oil in the USA, oil sands in Canada, and deep offshore in Brazil), the Arab world is expected to continue to play a key role in global oil market dynamics, dominating international trade in crude oil and holding the bulk of the world's spare capacity. However, more than a decade into the twenty-first century, Arab oil producers face many challenges. These include: investing in their energy sectors when faced with high uncertainty due to climate change, and energy security policies aimed at reducing oil in the energy mix and dependency on Arab oil; strengthening Arab NOCs' technical and managerial capability; diversifying Arab economies into industries that create jobs for the hundreds of thousands of workers entering the labor market each year; strengthening the forward and backward linkages to enhance the role of the private sector and regional linkages; and diversifying domestic energy sources away from oil and gas towards renewable resources.

Perhaps the region's most fundamental challenges originate domestically, both in the shape of declining reserve bases in some parts of the region, including North Africa's prime exporters Algeria and Egypt; and in the rising domestic oil consumption throughout the region, at rates surpassing most other emerging economies. Far from being immune to the challenge of rising energy consumption, the Arab world is as vulnerable to the effects of wasteful domestic oil consumption and the impact of climate change as many net-importing regions. Hence, the management of Arab domestic energy demand, including the implementation of a potentially painful, and politically risky, reform of domestic energy pricing policies, becomes increasingly important.

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NOTES

1. Collective data sets by BP and the EIA typically quantify regional energy reserves and production under the separate aggregates of "Middle East" and "Africa". In this chapter, we have adapted these aggregates to reflect the Arab world, showing the collective reserves and production of the list of countries covered in this report.

2. The Arab League comprises Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauretania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, the United Arab Emirates, and Yemen.

3. The GCC members comprise Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE).

4. Reserves are proved reserves of crude oil according to EIA data. Production is total annual production of crude oil from domestic reservoirs. EIA (2012).

5. OPEC defines the Middle East as comprising Bahrain, Iran, Iraq, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, UAE and Yemen.

6. In Table 14.2 of a more recent report, (IEA, 2012: World Energy Outlook 2012. International Energy Agency), the capital cost per barrel of capacity for a 500,000 b/d expansion in Saudi Arabia is estimated at US$ 15,000 (2011 US$). The operating costs, which included all expenses incurred by the operator during day-to-day production but excluded taxes or royalties, were US$ 2 to US$ 3.

7. A joint report by IEA/OPEC/OECD/

World Bank for the 2010 G-20 Summit in Toronto notes the existence of a major disagreement among international organizations concerning the choice of the reference price, and consequently 'a commonly agreed definition of subsidies has proven a major challenge in the G-20 context and countries have decided to adopt their own definition of energy subsidies'. IEA, OPEC, OECD, and World Bank (2010).

8. See, for instance, Singer (1950) ("The Distribution of Gains between Investing and Borrowing Countries." American Economic Review, 40(2)) for Singer's seminal contribution. A large number of studies have recently applied this framework to a large number of extractive industries and show that the oil and gas sector can be strongly linked to other sectors, though the depth and extent of these linkages depends on a large array of factors including the institutional development of the country, government policy, and time. For instance, see Mbayi (2011) (Linkages in Botswana's Diamond Cutting and Polishing Industry. MMCP Discussion Paper No 6, Cape Town, the University of Cape Town, and Milton Keynes, the Open University); Mjimba (2011) (The Nature and Determinants of Linkages in Emerging Minerals Commodity Sectors: A Case Study of Gold Mining in Tanzania. MMCP Discussion Paper No 7, Cape Town, the University of Cape Town, and Milton Keynes, the Open University); a specific body of literature examines the oil sector in Nigeria e.g. Oyejide and Adewuyi (2011) (Enhancing Linkages to the Oil and Gas Industry in the Nigerian Economy. MMCP Discussion Paper No 8, Cape Town, the University of Cape Town, and Milton Keynes, the Open University), and Angola Teka (2011) (Backward Linkages in the Manufacturing Sector in the Oil and Gas Value Chain in Angola. MMCP Discussion Paper No 11, Cape Town, the University of Cape Town, and Milton Keynes, the Open University). Al-Moneef (2006) (The Contribution of the Oil Sector to Arab Economic Development. OFID Pamphlet Series No.34, Vienna, 17–21) specifically applies these linkages to the Arab world.

9. These include natural gas export revenues where available, primarily in Algeria, Egypt, Libya, Oman, Qatar, the UAE, and Yemen. Arab gas producers that do not export are thought to generate little direct revenue from the domestic sale of natural gas owing to the low pricing environment, discussed in further detail below. Available statistical data frequently does not allow for a distinction between the two sources of revenue (which are combined under the item "Mining and Quarrying Revenues"), but oil in all cases except Qatar is known to contribute the majority of hydrocarbon export revenues.

10. There is some petrochemical production outside the Gulf, particularly in Egypt, but this is relatively small.

11. Producers of both oil and gas would, in many cases, argue differently; that energy-intensive industries merely make the most valuable use of these domestic natural resources, particularly in the absence of other assets such as large acreages of arable land, a sufficiently large, and skilled local workforce, and an economy big enough to be able to sustain multiple large, internationally competitive industries. Producers' arguments also suggest that the value added by industries such as refining and petrochemicals production exceeds the value of crude exports; and that the revenues for these products are more closely protected against international price fluctuations than exports of crude oil and natural gas. For instance, see SAMBA (2009) (Saudi Petrochemicals Sector: Current Situation and Future Prospects. SAMBA Report Series, Office of the Chief Economist, Economics Department, Samba Financial Group, August 2009). For a critical view, see Luciani (2007) ("The GCC Refining and Petrochemical Sectors." In Gulf Research Centre (2007) Gulf Yearbook 2006–2007, Gulf Research Centre, Dubai).

12. This concept is known in development economics as a "low-equilibrium trap" whereby an economy is stuck at low levels of economic efficiency while a better equilibrium would be possible, assuming all economic agents approve and coordinate their actions accordingly. A low-equilibrium trap might occur because economic structures (such as industrial patterns) are already in place and adaptation costs are high; or because of a massive coordination failure, for instance in economies with few developed institutional structures and high levels of future uncertainty. Rosenstein-Rodan (1943) ("Problems of Industrialization of Eastern and Southeastern Europe." Economic Journal, 53, 202–11).