

Viewpoint

A refined approach: Saudi Arabia moves beyond crude



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HIGHLIGHTS

- Saudi Arabia is diverting crude oil into an expanding refining sector.
- In doing so, the kingdom is moving beyond its role as global “swing supplier” of crude oil.
- The kingdom will benefit from increased refining, including enhanced demand for heavy crude.
- Strategic complications may force it to seek security partners beyond Washington.

ARTICLE INFO

Article history:

Received 27 February 2015

Received in revised form

9 March 2015

Accepted 11 March 2015

Keywords:

Saudi Arabia
Crude oil
Refining
Geopolitics
Security
OPEC

ABSTRACT

Saudi Arabia's role in global energy markets is changing. The kingdom is reshaping itself as a supplier of refined petroleum products while moving beyond its long-held role as a simple exporter of crude oil. This change is commensurate with the typical development trajectory of a state progressing to a more advanced stage of global economic integration. Gains from increased refining include reducing fuel imports and capturing margins now bequeathed to competitors. Refining also allows the kingdom to export its heavy crude oil to a wider array of customers, beyond select importers configured to handle heavy crudes. However, the move also presents strategic complications. The world's "swing supplier" of oil may grow less willing or able to adjust supply to suit market demands. In the process, Saudi Arabia may have to update the old "oil for security" relationship that links it with Washington, augmenting it with a more diverse set of economic and investment ties with individual companies and countries, including China.

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1. Introduction

Saudi Arabia is nearing completion of a big expansion of oil refining capacity that, over the next few years, stands to change its character as a market-balancing supplier of crude oil to the world at large. Rather than varying its oil production to suit market needs, the kingdom is increasingly adopting a less adaptable role as supplier of more valuable refined products.

In the process, Saudi Arabia appears to be updating the old “oil for security” relationship that links it closely with Washington, augmenting it with a more diverse set of economic and investment ties with individual companies and countries, including China.

The catalyst for this shift is the ongoing development by Saudi Aramco, and two joint venture partners of an additional 1.2 million barrels per day (mb/d) in refinery capacity within the kingdom. The new refining capacity comes atop Saudi Aramco's pre-existing equity interest in 4.5 mb/d in domestic and international

refining capacity.

There are numerous potential gains from the Saudi refining push. These include economic diversification and deeper integration with downstream industries, including those in key importing countries. Refining also allows the kingdom to reduce fuel imports and capture margins now bequeathed to competitors. Refining heavy crude allows it to be exported to a wider array of customers, rather than to select refiners configured to handle heavy and sour crudes.

But there are also drawbacks. These start with increased exposure to a low-margin, low-labor business at a time of global overcapacity. Saudi Aramco's new refineries will also exacerbate domestic demand for crude oil. Although the refineries may not, by themselves, generate an increase in crude production or lead to increased consumption in the kingdom, they will divert a greater share of crude oil into the less flexible refining sector. As a result, Saudi Arabia will export a greater share of its production as refined products, and a smaller share as raw crude oil.

On the one hand, the project signals the kingdom's evolution toward a more developed economy; on the other, it implies reduced flexibility to “swing” oil production alongside fluctuations

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in global price and demand. Saudi Arabia's long-held geostrategic role is at risk.

In November 2014, Saudi Arabia demonstrated that it was unwilling to let market demand dictate its level of oil production, since doing so would mean relinquishing market share to higher-cost non-OPEC competitors. OPEC left production quotas unchanged in its November 27 meeting, and oil prices fell dramatically, losing about half of their June values by December. As Baker Institute research showed, the swing supply role has since been taken up, in part, by US shale producers (Krane and Agerton, 2015).

Saudi Aramco's refining push will intensify this trend by providing a steady source of demand that is less sensitive to prices. The kingdom may not only refuse to cut output at times of low prices, but, since a greater level of its oil is earmarked for refining and other domestic sources of demand, Aramco may also be less able to increase production in response to outages or other market shocks.

These developments suggest that relations between Riyadh and the importing world will change. The kingdom's focus is shifting away from the global market and onto individual economies, starting with America, the kingdom's external protector, but increasingly emphasizing the big importers of East Asia.

2. Growth of Saudi refining

Saudi Aramco, and its joint venture partners are in the final stages of a nearly 60% expansion of domestic refining capacity from 2.1 mb/d in 2013 to 3.3 mb/d by 2018. Globally, Saudi Aramco will own a share of refineries with combined total capacity of 5.7 mb/d (Table 1).

Three new refineries in the kingdom will produce a slate of sophisticated products calibrated to meet stringent European environmental standards. Output will be dominated by ultra-low sulfur diesel (about two-thirds of output) and high-quality gasoline (about a quarter of output). Remaining products include heavy distillates, petrochemical inputs like benzene and propylene, as well as residual sulfur and petroleum coke.

The first of the three is the Satorp refinery, a joint venture with France's Total, which began operations in 2014. Satorp has since reached full processing capacity of 400,000 b/d of Arabian Heavy crude, which it refines in Jubail, just north of Aramco's Ras Tanura

export terminal on the Persian Gulf (Saudi Aramco Total Refining and Petrochemical Co. (SATORP)). Across the Arabian Peninsula at Yanbu on the Red Sea, another 400,000 b/d heavy crude refinery has also reached initial start-up. The Yasref refinery made its first shipment of high-quality diesel fuel on January 15. Yasref is Aramco's second joint venture with China's Sinopec (Yasref).

At the southern end of the Red Sea, a third big refinery is under construction at Jazan, wholly owned by Saudi Aramco. The Jazan refinery is scheduled in 2018 to begin converting another 400,000 b/d of heavy and medium Saudi crudes into a diesel-dominated product slate that also includes gasoline, as well as petrochemical feedstocks which can be used to manufacture plastics, fabrics, drugs and other products (Oil and Gas Journal, 2014).

3. Background

The incentive for recent Saudi refining investments dates to the run-up in crude prices in the mid-2000s. At the time, outside analysts commonly claimed that high prices stemmed from insufficient crude oil for market demand. Saudi officials responded that the shortage was not in crude oil, per se, but rather in refining capacity for the full spectrum of oil, including heavy and sour crudes (OPEC Bulletin, 2005). Aramco embarked on a refining expansion that would capitalize on lower prices and reduced demand for heavy crude.

The refining push was also designed to meet rising demand for transportation fuel inside the kingdom. Saudi Arabia has been a net importer of gasoline for most of the last decade. In 2013 it imported about a quarter of its gasoline and a fifth of its diesel (JODI, 2015).

At the same time, Saudi Aramco sought to reduce the ever-larger amounts of valuable crude oil diverted to domestic electricity generation, where it is burned as feedstock. Some 61% of Saudi Arabia's 278 TW h of electricity production in 2013 came from liquid fuels – more than half of which was unrefined crude oil – with the remaining 39% from natural gas (Fig. 1).

It was hoped that refining would reduce the domestic "crude burn" by separating out valuable light and middle distillates, including gasoline, diesel and jet fuel. The lighter products could be distributed domestically or exported, while the remainder – low-

Table 1
Saudi Aramco's worldwide refining ventures (Source: Saudi Aramco 2013 Annual Report).

Refinery name and location	Completion	Shareholders	Capacity (b/d)
Domestic			
Jeddah	1967	Saudi Aramco	100,000
Yanbu	1979	Saudi Aramco	240,000
Riyadh	1981	Saudi Aramco	124,000
Yanbu (Samref)	1983	Saudi Aramco (50%), ExxonMobil	400,000
Jubail (Sasref)	1986	Saudi Aramco (50%), Shell	305,000
Ras Tanura	1986	Saudi Aramco	550,000
Petro Rabigh	1990	Saudi Aramco (37.5%), Sumitomo Chemical	425,000
Jubail (Satorp)	2014	Saudi Aramco (62.5%), Total	400,000
Yanbu (Yasref)	2014	Saudi Aramco	400,000
Jazan ^a	2018	Saudi Aramco	400,000
Total domestic capacity (by 2018)			3,344,000
International			
China: Fujian Refining and Petrochemical Company	2007	Saudi Aramco (25%), Sinopec, ExxonMobil	240,000
USA: Motiva Enterprises	2002	Saudi Aramco (50%), Shell	1,070,000
Japan: Showa Shell Oil	2004	Saudi Aramco (15%), Shell	395,000
South Korea: S-Oil	1991	Saudi Aramco (35%), S-Oil	669,000
Total international ventures			2,374,000
Overall total refining capacity			5,718,000

^a Under construction.

Saudi Power Generation by Fuel, 2013

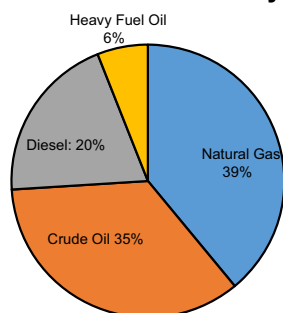


Fig. 1. Saudi power generation by fuel, 2013.
Source: MEES.

value heavy fuel oil – could replace crude in electricity production. Crude could thus be “stretched” and the opportunity cost of diverting crude oil into the power sector would be reduced.

However, as Saudi Aramco sought to attract joint-venture partners, the company found it had to adopt a different refining slate, one that maximized production of high-value products that brought the largest possible return on investment from heavy crude refining. This meant extracting more light and middle distillates from heavy crude, while nearly eliminating residual fuel oil output.

Product slates were thus adjusted to conform to export markets in Europe, Japan and North America, where demand is dominated by ultra-low sulfur diesel refined to European specifications, as well as high-quality gasoline. Unlike the Middle East, these markets have very little demand for heavy distillates (Gelder, 2014; Fig. 2).

Saudi Aramco altered its strategy from one aimed at developing two separate streams of refined products – one for export and one for local use – to a more unified strategy of producing high-quality export products that could also be distributed in domestic markets.

While this strategy has succeeded in soaking up demand for heavy crude, it fails to provide sufficient low-value residual feedstock for power generation. The probable result is that the kingdom will become an importer of heavy distillates by 2020 while burning valuable, domestically refined diesel that could otherwise be exported. In 2013 the Saudi Electric Company consumed about 200,000 b/d of diesel, fueling about a fifth of its power output (Jadwa Investment, 2014).

Despite the huge implied costs of generating power with fuel oil and especially diesel (rather than natural gas), burning refined

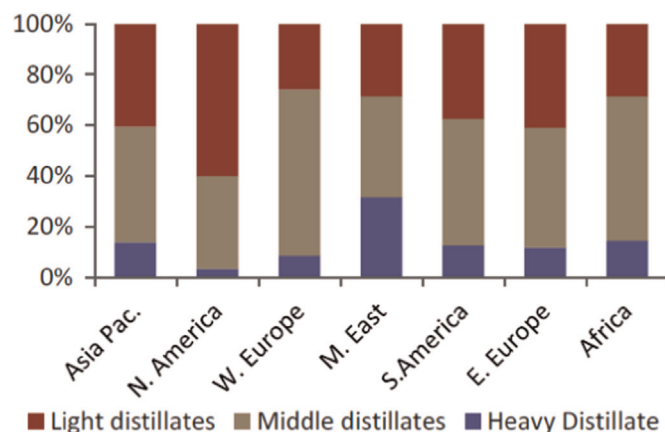


Fig. 2. Regional consumption of refined products by distillate.
Source: Jadwa Investment.

products represents an improvement upon burning crude oil. Unlike diesel, crude oil cannot typically be used as a backup fuel in high-efficiency natural gas-fired power plants. Further, the separation of crude oil into products is enhanced by refinery processing gains through which output volumes are 5–10% larger than inputs (U.S. Energy Information Administration (EIA), 2015).

4. Domestic crude oil demand

Boosting refinery capacity comes at a price. Refineries add yet another source to the accumulating pull of domestic demand for Saudi crude oil, which has grown by an average of 6% per year for the past decade. In 2013, domestic consumption, including refinery intake – some of which is exported in the form of products – reached 3.1 mb/d, roughly 27% of total oil production (BP, 2014). At that rate of growth – all else constant – domestic oil consumption would double by 2025.¹

Saudi demand for crude is exacerbated by fast growth in the power generation sector, where low, subsidized electricity prices have encouraged consumption and waste. During peak summer months, the power sector has consumed as much as 800,000 b/d of crude oil. Further, the kingdom is still building oil-fired power plants: five plants with 14 GW of generating capacity are due for completion by 2018. Peak crude burning could top 1 mb/d by 2020 (MEES, 2014a). Outside the Middle East, oil-based power generation has been largely replaced by much cheaper coal, natural gas and nuclear power.

Intensifying domestic crude burning coupled with a 1.4 mb/d increase in crude shipments to Aramco refineries inside and outside the kingdom (MEES, 2014a) signal that Saudi Arabia is moving beyond its long-held role as the world's market-balancing supplier of crude oil. Recent data show slipping Saudi crude exports, alongside flat or rising production. Assuming that Saudi crude production remains constant at around 10 mb/d, the amount of crude available for export could fall below 5 mb/d by 2020.²

Reductions in crude exports would be complemented by increased exports (and reduced imports) of refined products, as the kingdom transitions away from imported fuel and becomes a long-term net exporter of diesel and a shorter-term net exporter of gasoline and heavy fuel oil.

These trends, outlined in Table 2, point to a shift in export dynamics of the Gulf region. As the Saudis move beyond crude, neighboring Iraq, a fellow OPEC member state, may continue to increase oil production and exports, perhaps capturing crude markets that Saudi Arabia can no longer serve.

5. Saudi rationale for refining

Crude oil refining is typically described as a low-margin business that has grown less attractive to international oil companies (IOCs), which have been ceding market share to state-run national oil companies (NOCs). Many NOCs are motivated by non-financial considerations, including social and market factors that are of less importance to shareholder-owned firms.

Saudi Aramco's enthusiasm for refining extends beyond financial gain. The company hopes to enhance the kingdom's financial and energy security, by meeting domestic demand at lower cost while eliminating imports (at least temporarily³) and

¹ This implies 6% growth for 12 years. If average yearly growth slowed to 3%, consumption would not double until 2037.

² Not including NGLs. See: “New Gulf Refineries to Make Middle East Major Products Exporter”, MEES, Vol. 57, No. 31, August 1, 2014.

³ Riyadh's Jadwa Investment (2014) calculates that the diesel-dominated yields

Table 2
Saudi crude oil production, exports and refining.

	2009	2010	2011	2012	2013	Source
Crude oil and NGLs produced (mb/d)	9.7	10.1	11.1	11.6	11.5	BP
Crude oil consumed (mb/d)	2.6	2.8	2.8	3.0	3.1	BP
Domestic consumption as % of production	27	28	26	26	27	BP
Annual growth in oil consumption (%)	9	8	2	5	3	BP
Refinery intake ('000 b/d)	1756	1744	1827	1725	1577	JODI
Refinery intake as % of consumption	68	62	64	58	51	JODI/BP
Gasoline produced ('000 b/d)	273	288	391	399	384	JODI
Gasoline demand (incl. exports)	398	422	447	483	506	JODI
Net gasoline exports (– imports) ('000 b/d)	–101	–81	18	–48	–96	MEEES
Diesel produced ('000 b/d)	493	497	628	637	590	JODI
Diesel demand (incl. exports)	588	615	651	710	730	JODI
Net diesel exports (– imports) ('000 b/d)	–61	–67	–39	–68	–142	MEEES

producing a surplus of diesel for export. As Table 2 shows, the kingdom has been a net importer of gasoline and diesel for most of the last five years. Aramco has long imported fuels at international prices and then resold them domestically at a heavy loss, given its subsidized retail prices of 57 US cents per gallon (15 cents per liter) for gasoline and just 25 US cents per gallon (7 cents per liter) for diesel. In early 2015, wholesale gasoline was selling internationally for around \$1.80 per US gallon, and diesel was near \$2.

Average gasoline demand growth over the past decade of 7% per year has nearly doubled consumption in that period. Diesel's 6% demand growth over the same period equates to a doubling of demand every 12 years. Projecting forward at those growth rates, the kingdom's additional refining capacity will eliminate imports of diesel beyond 2020, but the smaller gasoline output will only briefly allow self-sufficiency. By the end of the decade, imports of gasoline and later, fuel oil, will be required. Of course, subsidy reforms under discussion⁴ in the kingdom, if enacted, would greatly reduce consumption. For instance, rationalized gasoline prices could reduce long-run demand by about a fifth, even at low levels of price elasticity.⁵

Beyond the benefits of increased supply are the technology transfers implied in attracting IOC investment into the domestic refinery sector. The complex new Aramco refineries are being configured with the latest cracking and coking units to maximize middle and light distillate yields, as well as hydrotreating for removing sulfur from sour crudes. Increased refining also furthers Saudi Aramco's goal of integrating its upstream with a larger downstream business to provide greater insulation from fluctuating oil prices. The kingdom will still capture refining margins (from exports) when crude prices are low.

Also important are the social drivers inspiring the Saudi state to create employment sectors that can soak up new entrants to the workforce, especially in Jazan in the southwestern corner of the

kingdom. Jazan is the poorest city in the poorest region in Saudi Arabia, a politically restive province on the Yemeni border where more than a third of families live in poverty.⁶ Although direct employment in refineries is typically small – Wilson (2013, p. 124–6) shows that automated systems allow fewer than 100 workers to operate refineries with throughput of 250,000 b/d – Aramco will increase production of petrochemical feedstocks such as paraxylene and benzene to support more labor-intensive downstream industries.

Finally, there are market benefits from encouraging demand for heavy crude, given the expansion of production from the Saudi offshore Manifa field. Heavy crudes are typically priced below lighter counterparts since heavy crudes tend to produce a larger proportion of low-value products like residual fuel oil and asphalt; otherwise they require more intensive processing to produce higher-value products. U.S. refineries which invested in complex units to crack heavy crudes into lighter products were, in the past, reliable destinations for Saudi Aramco. But Saudi exports to the United States have been displaced by a combination of new US shale production and increasing imports from the bitumen-infused oil sands of Canada (discussed below). For Aramco, refining heavy crude and marketing it in the form of finished products allows it to avoid crude-on-crude competition for refinery capacity. Otherwise, had an additional 1 mb/d of Manifa heavy been marketed directly it might have widened the differential between heavy and lighter crudes.

6. Geopolitical effects

Saudi Aramco's refining expansion is yet another sign of Saudi Arabia moving away from its long-held role as a simple supplier of crude oil to the world. As the kingdom has developed over the past four decades, its population has nearly quintupled and wealth per capita has risen nearly nine-fold. The country's energy-intensive industrial structure has added complexity and new sources of energy demand that are whittling away the kingdom's spare oil production capacity. An enlarged refining sector signals a further step toward a more developed economy; one that is gearing toward supplying the world with finished products rather than raw materials. A side effect is that the kingdom will have less flexibility to “swing” production in accordance with fluctuations in price and demand, not least because refining joint venture partners espouse profit-maximizing goals that may exclude reductions in output.

These changes will affect Saudi Arabia's geopolitical role. Spare capacity, and the willingness to deploy it in tandem with US intervention in the Middle East, has proven a great strategic asset for the Saudi regime. It has made Saudi Arabia a valuable foreign policy partner with Washington and helped protect the oil-importing world from volatile prices.

As Saudi Arabia's geo-economic profile changes, one must ask how the kingdom can maintain the strategic backing of the United States under the longstanding “oil for security” arrangement.⁷ O'Hanlon (2010) estimates that America spends \$50 billion a year

(footnote continued)

of the three refineries will provide sufficient gasoline to cover Saudi needs until 2019, when fast-growing domestic demand will surpass output and further imports will be required. Similarly, a shortage of heavy distillate yields will require imports by 2020.

⁴ See, for example: “Saudi central bank chief calls for energy subsidy reform,” Reuters, February 9, 2015. (<http://www.reuters.com/article/2015/02/09/saudi-subsidies-idUSL5NOVJORV20150209>).

⁵ If gasoline prices were raised from 57 US cents to \$2 per gallon, a nonlinear price elasticity calculation finds that long-run demand would shrink by about 21%, when price elasticity is estimated at –0.2. This assumes that consumers are relatively insensitive to price.

⁶ Doman, Ahmad “Poverty in the Kingdom of Gold,” Al Monitor, November 2, 2012. (<http://www.al-monitor.com/pulse/culture/2012/10/poverty-rising-issue-in-saudi-society.html>). Worth, Robert F., “Saudi border with Yemen is still inviting for Al Qaeda,” New York Times, October 26, 2010. (<http://www.nytimes.com/2010/10/27/world/middleeast/27saudi.html>).

⁷ The useful “oil for security” paradigm underestimates the strength and rationale underpinning the Washington–Riyadh friendship. Other shared factors include and a long tradition of US-educated Saudi elites in key positions, a shared and deep Cold War aversion to Soviet Union and Soviet atheism, and mutual hostility toward Iran and Syria (and Russia's backing of those regimes). See Rachel Bronson “Understanding U.S. Saudi Relations” In: Paul Aarts and Gerd Nonneman, Saudi Arabia in the Balance: Hurst, London, pp. 372–398.

to protect the Gulf monarchies from external threats in exchange for their maintenance of reliable flows of oil to markets. Can the Saudis move beyond crude exports while keeping America's protection?

The refining expansion lays the groundwork for maintaining US protection while evolving toward a multilateral security arrangement that may someday substitute for the bilateral "oil for security" strategy. Rather than relying solely on Washington, the kingdom's refining ties promote deeper integration with powerful importing countries which, in turn, are becoming stakeholders in Saudi Arabia's stability and security. This strategy involves enhanced ties with the United States, but also with other importers, including those where Saudi Aramco owns equity in refining businesses. In America, Saudi Aramco owns a 50% share (alongside another 50% held by Shell) in the three Motiva Enterprises refineries in Covent and Norco, Louisiana and Port Arthur, Texas. The 600,000 b/d capacity Port Arthur refinery is America's largest.

Aramco supplies a dominant and discounted share of the more than 1 mb/d of crude oil which Motiva refines into gasoline and diesel fuel. Most of the output is sold under the Shell brand at some 8200 service stations across America. In this way, Motiva guarantees Saudi Arabia a prominent role in US energy security whether or not the kingdom maintains its traditional market-balancing role (Krauss, 2013). Saudi Arabia's global refining and petrochemical ventures are tethering the kingdom more directly to other strategic partners including Japan, South Korea and especially China, which became the world No. 1 oil importer in 2013 (Table 1).

One-sided security dependence on Washington has long been a concern in the Gulf capitals, where ruling families and officials have often advocated diversifying beyond the Pentagon's security umbrella. These concerns were especially acute after America's 2003 invasion of Iraq, which most Gulf regimes opposed. However, Saudi Aramco's experience in the United States presents a cautionary tale about the risks involved in such a diversification strategy.

Aramco originally intended to leverage its Motiva refineries to become the No. 1 supplier of imported oil to the United States (Krauss, 2013), an ambition that challenged regular calls by US politicians for reduced dependence on Mideast oil. But the Saudi plan was undermined by surging North American oil production, brought about by high oil prices. By 2004, Canadian exports to the United States surpassed those from the kingdom. Saudi Aramco was forced to impose deeper and deeper discounts on its crude to maintain a share of the US market. Still, by 2014 Canada supplied

America with 2-1/2 times more crude oil than Saudi Arabia (Fig. 3).

Nevertheless, Motiva allowed the Saudis to maintain a foothold in the US market, even as a decline in US gasoline demand encouraged the refiner to export products outside the United States.

The potential onset of the Keystone XL pipeline looks particularly threatening to the Saudi strategy. Keystone would deliver a competing grade of heavy crude – diluted bitumen from the Alberta tar sands – to the US Gulf Coast. If the Keystone XL is built, Aramco could be forced into an intensified price war with Canada. Saudi Aramco may find itself offering even deeper discounts to retain a share of the American market.⁸

The costs of this strategy are mounting. The delivered price of Saudi crude into the United States is already Riyadh's lowest worldwide, despite comparatively high freight costs. Wood Mackenzie calculates that Saudi Aramco suffers a \$3 to \$6 opportunity loss for each barrel it markets in America rather than Asia, its best market (Gelder, 2014).

In short, Riyadh will pay to preserve US strategic interest – even as the kingdom jettisons its swing supply role – by using discounts to guarantee a long-term American home for its oil.

7. Conclusion

Saudi Arabia's role in global energy markets is changing. The kingdom is reshaping itself as a big supplier and consumer of complex, high-value refined petroleum products, rather than a simple exporter of raw material. This is commensurate with the typical development trajectory of a state that is progressing from an early to a more advanced stage of global economic integration.

Saudi Arabia's strategy involves controlling the supply of crude oil to refining ventures with IOCs, in some cases on foreign soil, while capturing additional value from converting oil into high-quality products. Where it sees strategic importance, Saudi Aramco's investments are also aimed at defending markets from competing suppliers.

At the same time, the kingdom is drawing back from its long-held role as swing supplier of crude oil. For the time being, that role appears to be defaulting to the US shale sector and other high-cost oil producers which can make short-term production cuts (Krane and Agerton, 2015). In the longer term, Saudi Arabia's spare oil production capacity will diminish as it earmarks a larger share of its crude for domestic demand and the products market. Refining will also allow the kingdom to meet fast-growing domestic energy demand without resorting to imports, at least temporarily.

The shift in economic strategy points toward a concurrent shift in geopolitical strategy. Saudi Arabia is seeking new ways to prolong US commitments to its external security, including by ensuring it delivers a large share of US crude imports. The kingdom has been able to protect its share of the US market through its joint ownership of US refining capacity. Saudi Arabia also appears to be using refining to diversify its strategic relations, by building direct ties to individual economies and companies beyond the United States, including those of China, Japan and South Korea.

There are risks to this strategy, as seen in the competition with Canadian heavy crude for the US market. The rewards include the

U.S. oil imports from Saudi Arabia and Canada

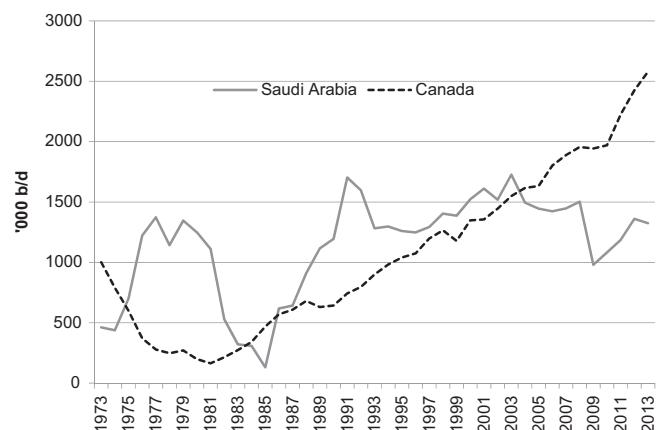


Fig. 3. Saudi Arabia and Canada competing for the US import market. Source: EIA.

⁸ Discounted Canadian heavy crude via Keystone XL may also trigger an internal debate among Motiva partners, with Shell willing to consider Canadian crude to capture higher margins and Aramco preferring to maintain Saudi imports for geo-strategic reasons. One argument in favor of Saudi crude is its comparatively low carbon content. Canadian oil sands crude is 17% more carbon-intense at final combustion than average US imports. The production process is where the key difference lies: Energy-intense extraction and processing of oil sands is twice as carbon-intense as that of typical Middle Eastern sour crude (Lattanzio, 2014).

capture of a larger share of the crude oil value chain, as well as a long-overdue diversification of the Saudi economy. The Saudis appear to be cautiously calibrating their transition so as not to lose the US security umbrella. They appear to be succeeding by controlling the crude supply to refineries owned by Saudi Aramco, providing discounts when competition demands it.

Acknowledgments

Research assistance was provided by Maria Gabriela Gonzalez del Bosque and Michael Sands.

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