



## 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.

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## 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)
<b>Domestic</b>			
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 <sup>a</sup>	2018	Saudi Aramco	400,000
<b>Total domestic capacity (by 2018)</b>			<b>3,344,000</b>
<b>International</b>			
<b>China:</b> Fujian Refining and Petrochemical Company	2007	Saudi Aramco (25%), Sinopec, ExxonMobil	240,000
<b>USA:</b> Motiva Enterprises	2002	Saudi Aramco (50%), Shell	1,070,000
<b>Japan:</b> Showa Shell Oil	2004	Saudi Aramco (15%), Shell	395,000
<b>South Korea:</b> S-Oil	1991	Saudi Aramco (35%), S-Oil	669,000
<b>Total international ventures</b>			<b>2,374,000</b>
<b>Overall total refining capacity</b>			<b>5,718,000</b>

<sup>a</sup> Under construction.

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