



## Growing Importance of Refined Oil Products

- In the decade to 2013, Saudi Arabia saw a rapid expansion in domestic demand for refined products, (such as diesel and gasoline) which led to steadily rising level of imports and slower growth in refined product exports.
- As a result the Kingdom only saw small rises in annual refined product export revenue between 2006 to 2013, despite crude oil prices, from which refined products are priced off, rising to record levels.
- Since 2014, expansions in more highly complex refineries together with domestic energy price reform has resulted in lowering domestic consumption and raising the level of refined product exports.
- Whilst the Vision 2030 stresses diversifying the Saudi economy away from oil, this does not mean oil production or oil-related industries are going to be neglected in any way. Accordingly, a number of key steps are planned to be taken to ensure that crude oil refining remains an essential, albeit less prominent, pillar of the Saudi economy.
- Ultimately, if the Kingdom keeps pursuing the development of its downstream sector in order to promote higher valued refined product exports, and curbs the use of domestic refined product consumption, we would expect to see substantially larger levels of oil and refined product export revenue by 2030 (Figure 1).
- Although the importance of oil revenue, in proportion to non-oil revenue, is expected to decrease come 2030, investment in the refining sector is still expected to ensure diversified economic growth and employment opportunities.

For comments and queries please contact:

Fahad M. Alturki  
Chief Economist and Head of Research  
faltaruki@jadwa.com

Asad Khan  
Director  
rkhan@jadwa.com

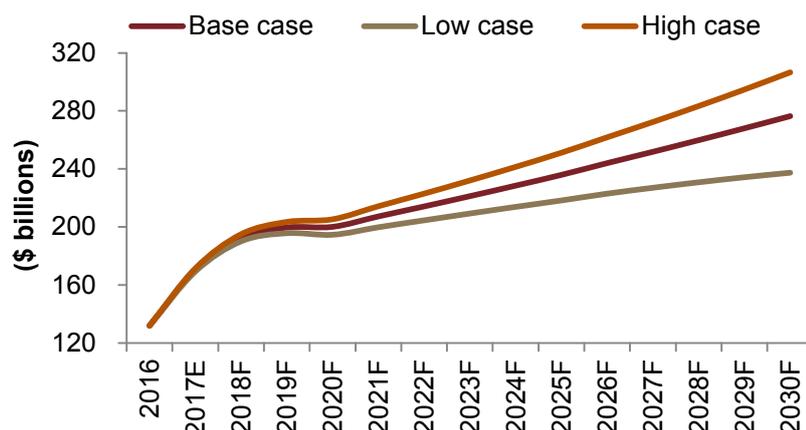
Head office:

Phone +966 11 279-1111  
Fax +966 11 279-1571  
P.O. Box 60677, Riyadh 11555  
Kingdom of Saudi Arabia  
www.jadwa.com

Jadwa Investment is licensed by the Capital Market Authority to conduct Securities Businesses, license number 6034-37.

View Jadwa Investment's research archive and sign up to receive future publications:  
<http://www.jadwa.com>

**Figure 1: Forecasted Saudi Arabian crude oil and refined product export revenue under different scenarios.**





## Overview

*Whilst the Vision 2030 (Vision) stresses diversifying the Saudi economy away from oil...*

*...this does not mean oil production or oil-related industries are going to be neglected in any way.*

*Since the majority of Saudi refinery capacity was built before 1990, many of the assets were older and less advanced...*

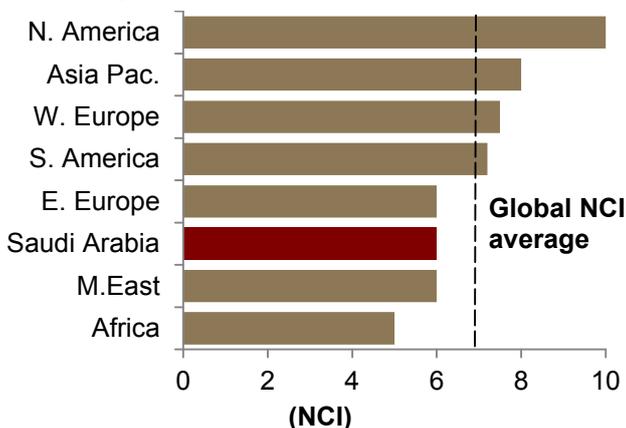
*...which resulted in lower value heavy distillates forming a larger component of output.*

Whilst the Vision 2030 (Vision) stresses diversifying the Saudi economy away from oil, this does not mean oil production or oil-related industries are going to be neglected in any way. Although less prominently featured in the National Transformation Plan 2020 (NTP) and the Vision, what transpires in both plans is the desire to raise not only capacity, but also the value of output from oil-related sectors. Specifically, the Vision states that the Kingdom's global leadership and expertise in oil should receive investment in order to develop adjacent and supporting sectors. In the case of oil production, the most obvious sector earmarked for development would be crude oil refining and petrochemicals (*for more on this please refer to our [Petrochemicals and the Vision 2030](#) report published February 2017*). Under the Vision, the importance of oil revenue, in proportion to non-oil revenue, will decrease come 2030, but investment in the downstream sector is still needed to ensure growth in oil export revenue. Accordingly, a number of key steps have been taken, or are planned to be taken, to ensure that crude oil refining remains an essential, albeit less prominent, pillar of the Saudi economy.

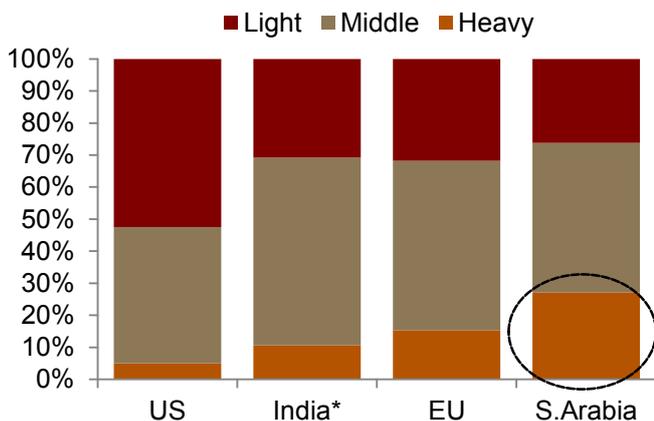
## The Story Up Until 2013

Investment in the refining sector in Saudi Arabia has been a long term policy goal for the government as it was, and still is, seen as sure way of achieving diversified economic growth and employment for the Saudi population. The first wave of investment started during the 1980's when refining capacity stood at 700 thousand barrels per day (tbpd). By the end of 2013, refining capacity rose to 2.5 mbpd, the largest in the Gulf region. Since the majority of Saudi refinery capacity was built before 1990, many of the assets were older and less advanced compared to regions where more recent investment had taken place, such as North America. Prior to 2014, the average Nelson Complexity Index (NCI) (*for more details please see our [Outlook for crude oil refining](#) published November 2014*) for the middle east region was around six, and we assume that Saudi NCI was similar to this (Figure 2). Due to the lower complexity of Saudi refineries, vis-a-vis global averages, lower value heavy distillates formed a larger component of output (Figure 3).

**Figure 2: Saudi refineries exhibited a lower complexity prior to 2014...**



**Figure 3: ...leading to lower value heavy distillates formed a larger component of output.**



\* Based on export-oriented refineries



*The decade to 2013 saw a rapid rise in domestic Saudi crude oil and refined product demand...*

*...as a result of rising population, economic growth, improving living standards...*

*...and one of the lowest priced fuels in the world.*

*Due to the combination of rapid expansion in domestic demand and heavy distillate output....*

*...the level of imports increased and exports decreased....*

*...resulting in lower refined product export revenue.*

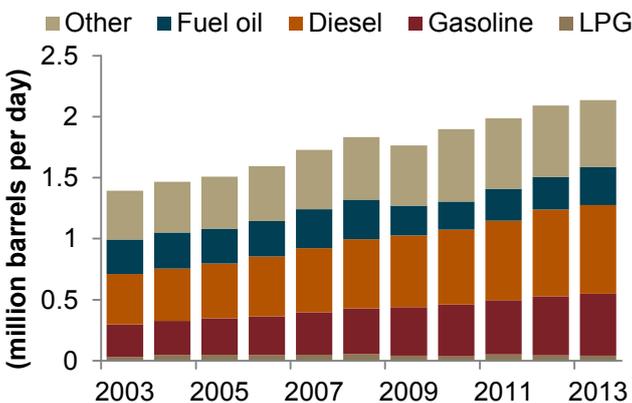
Meanwhile, on the consumption side, the decade to 2013 saw a rapid rise in domestic Saudi crude oil and refined product demand. In 2003, Saudi demand totaled 1.5 million barrels per day (mbpd), but rose to 2.2 mbpd in 2013, the equivalent of an average annual rise of 4 percent over a ten year period (Figure 4).

The main factors in demand growth during this period can be attributed to a rapidly rising population, economic growth and improving living standards. The combination of these factors, in turn, contributed to larger crude consumption via increasing electricity generation, higher usage of energy in industry and increased car ownership. Another important factor contributing to a rise in consumption was the pricing of domestic energy.

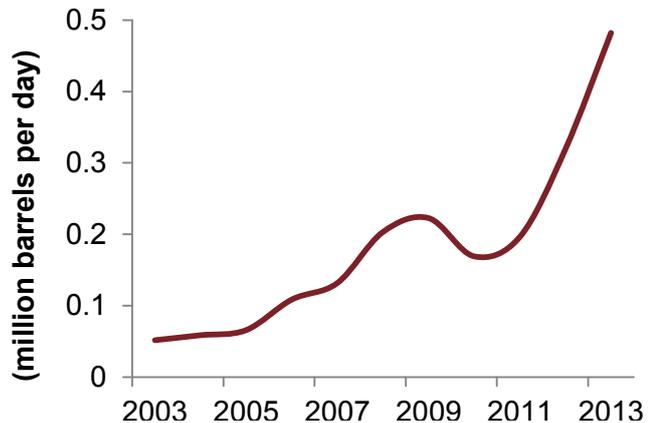
Saudi Arabia had, and still has, one of the lowest priced fuels in the world. Prior to 2014, transport diesel was priced at 6.7 US cents per liter and gasoline at 16 US cents per liter. This equated to approximately 5 percent of the import price of diesel and 19 percent for gasoline, at the time. Furthermore, crude and refined products (such as diesel and fuel oil) were also supplied at a discounted rate for electricity generation. Considering that electricity generation consumes around 1.7 mbpd, the pricing set-up represented, and continues to represent, a sizable opportunity cost (*for more on this please see our [Fiscal Balance Program: The Path to Fiscal Sustainability](#) report published February 2017*).

Due to the combination of rapid expansion in domestic demand and Saudi refineries' higher proportion of heavy distillate output, a deficit in light and middle distillate products began to develop. In particular, the rise in the consumption of diesel and gasoline translated into steadily rising levels of imports (Figure 5). As a result, refined product exports began to decline and this naturally took a toll on revenue. In fact, between 2006-08 refined product export revenue averaged around \$29 billion per annum, but only increased to an average of \$31 billion per year between 2010-13. The small rise in export revenue came despite crude oil prices, from which refined products are priced off, rose from an average of \$79pb (Brent oil) in 2006-08, to record levels of \$104, during 2010-13 (Figure 6). All in all, up until 2013, the net effect of higher domestic demand for refined products was; rising imports, declining exports and lower refined product export revenue.

**Figure 4: Saudi crude oil and refined product demand rose rapidly in the decade to 2013...**



**Figure 5: ...resulting in a rising number of refined product imports**





## All Change from 2014

*Saudi Arabia planned a new wave of investment to modernize its refinery sector...*

*...which contributed to changing Saudi Arabia's refined product balance.*

*At the same time, measures were taken to incentivize consumption reduction...*

*...with price increases for domestic energy products in the 2016 & 2018 fiscal budget.*

### Investment in refining capacity:

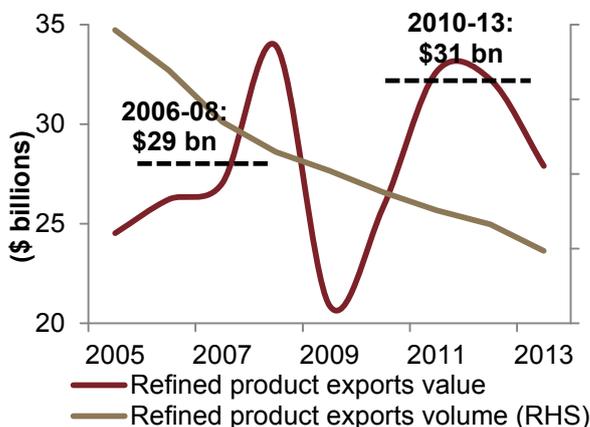
Faced with growing domestic demand for lighter products and insufficient capacity to convert fuel oil and heavy crudes into such products, Saudi Arabia planned a new wave of investment to modernize its refinery sector. At the end of 2013, a 400 tbpd highly complex Jubail refinery, a joint venture between Saudi Aramco and Total, came on-line. Shortly after, another highly complex refinery was commissioned, which was also a joint venture, and added another 400 tbpd to the Kingdom's refining capacity (Figure 7). These two new highly complex refineries, which had significant output of middle distillates, contributed to changing Saudi Arabia's refined product balance.

### Rises in domestic energy prices:

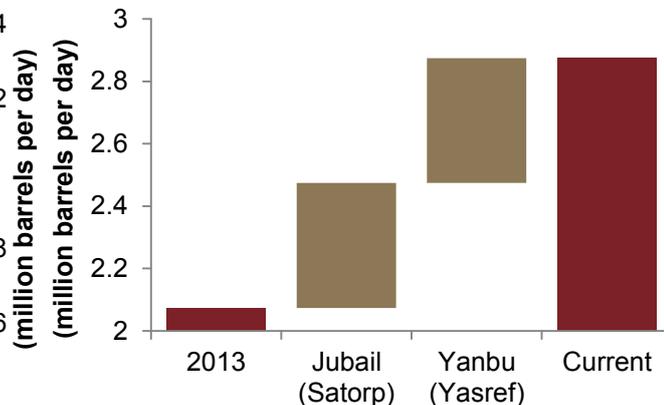
At the same time, measures were taken to incentivize consumption reduction. Accordingly, the 2016 & 2018 Saudi fiscal budgets included price increases for domestic energy products. Gasoline, diesel, crude oil, natural gas, fuel oil, and electricity tariffs were all raised in 2016, with gasoline, industry diesel, and electricity tariffs being raised in 2018.

By adding the weighted average price of the domestically consumed crude oil and refined products, we calculate that the price of a barrel of energy (crude oil and refined products, excluding water, electricity, and natural gas) in the Kingdom equaled around \$11 per barrel (pb) prior to the hikes in 2016. We also calculate that the average cost of energy rose to \$17 pb in 2016, and, after the 2018 hikes, currently equals \$27 pb. We can see that higher pricing of energy has lowered overall domestic demand, with a decline by 5 percent year-on-year in 2016 and a further 1 percent year-on-year in 2017. That said, there has been a wide variation in demand between oil products. Most notably, the largest consumed product, diesel, saw a sizable fall in consumption by 11 percent and 16 percent year-on-year in 2016 and 2017 respectively, whilst direct crude oil burn was down 13 percent and 1 percent year-on-year over the same period. Meanwhile, gasoline demand was up 1 percent and 6 percent and fuel oil rose by 17 percent and 9 percent year-on-year in 2016 & 2017 (Figure 8).

**Figure 6: Saudi refined product exports volume and values**



**Figure 7: Domestic refinery capacity and complexity has risen since 2013**





*Rise in capacity and improvement in the overall quality of Saudi Arabia's refined product exports...*

*...led to a rise in year-on-year exports in 2016...*

*...and an improvement in the refining margin.*

*Expansion of domestic refining capacity has also been accompanied by major international acquisitions/expansions.*

Rise in product exports and refining margin:

As a result of the slower pace of demand growth in refined products, and a large amount of highly complex refining capacity coming on-line in the last few years, two major trends have been observed. The first is a growth in refined product exports and secondly, the improvement in the overall quality of Saudi Arabia's refined products. Latest available data shows that refined product exports rose by 30 percent in year-on-year in 2016. Major rises were seen in diesel (up 36 percent year-on-year), gasoline (up 34 percent year-on-year), and Liquid Petroleum Gases (LPGs) (up 24 percent year-on-year). Meanwhile, our analysis of GaStat data shows an improvement in the general quality of refined products. Specifically, the opening of highly complex refineries has resulted in an improvement in the differential between Saudi Arabia's refined product export price and crude oil export price (Figure 9).

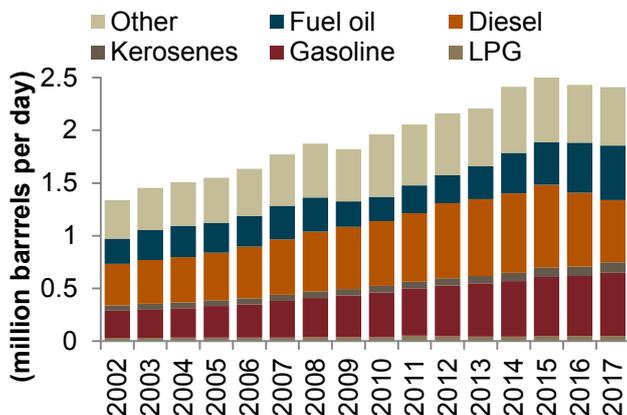
International expansion:

Expansion of domestic refining capacity has also been accompanied by major international acquisitions/expansions, especially so in the last year. Saudi Aramco took over or expanded stakes in three refineries, two of which were located in Asia:

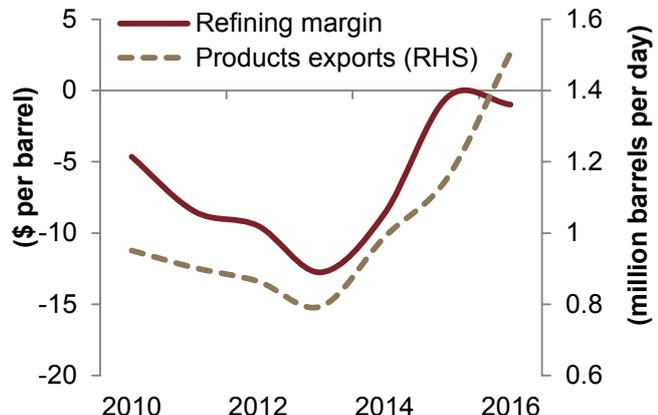
- 1) In late 2016, Aramco signed an agreement with Indonesia's state-owned oil and gas firm Pertamina to jointly own, upgrade and operate a refinery. The project was reported to increase the refinery's capacity to 400 tbpd, of which, Saudi Aramco will have a 55 percent stake, with the project startup scheduled in 2021.
- 2) Saudi Aramco took 100 percent control of the Port Arthur refinery in Texas, US. The facility can process 600 tbpd of oil, and is the largest refinery in North America. Aramco previously owned 50 percent of the Port Arthur refinery.
- 3) In February 2017 Aramco announced that it would invest \$7 billion in the Pengerang Integrated Complex (PIC), in a deal that would give it 50 percent ownership of the refinery and cracker components of Petronas' Refinery & Petrochemical Integrated Development (RAPID) project, equivalent to 150 tbpd of refining capacity.

Aramco has also expanded the operations of its trading arm with the establishment of Aramco Trading, which was set-up in 2012. The primary aim of the company is to increase market share through raising fuel-trading volumes. Although its operations are global, most of Aramco Trading's recent activities have focused around the Asian

**Figure 8: Domestic demand declined in 2016 & 2017**



**Figure 9: Saudi refined product margins and export volumes for domestic refineries**





*Aramco has also expanded the operations of its trading arm to gain growing market share in Asia and Africa.*

region. This is because Asia has been a key refined product export market for the Kingdom (Figure 10) and this is likely to remain the case looking ahead. As the OPEC world oil outlook (WOO) report highlights, Asia will see the largest growth in imports between now and 2040 (Figure 11).

With such large growth forecasted for Asia, focusing on this region is vital. In fact, towards the end of 2017, Aramco Trading inaugurated its first international office in Singapore and this is seen as a part of Aramco's strategy to optimize value across the whole oil and products chain. In fact a recent agreement between the South Korean refinery S-Oil and Saudi Aramco, which owns 63 percent of S-Oil, highlights how this strategy is taking shape. According to stock exchange filings, S-Oil, which buys most of its crude oil from Aramco, has agreed to sell part of the refined product output to Aramco Trading. Specifically, in 2018, S-Oil has agreed to sell a combined total of 46 million barrels of diesel, naphtha and jet fuel to the Aramco Trading, which will then be sold to various customers across the region.

### Looking ahead

A number of different steps are planned to be taken in the years ahead which together will ensure that crude oil refining remains an essential pillar in the Saudi economy going forward.

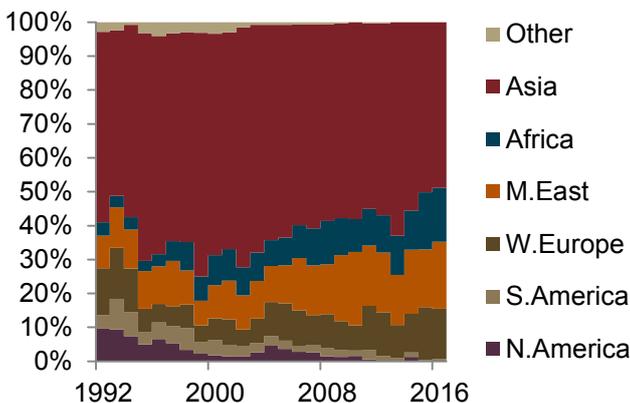
#### Domestic energy price reform:

Following the 2016 & 2018 domestic energy price hikes, further energy price reform is expected in the next few years. Under the government's updated Fiscal Balance Program (FBP), a time-line has been set out for additional energy price rises (*For more on this please see [The Saudi Economy in 2018](#), published February 2018*). Each type of energy input will reflect a reference price, which is expected to be closer to the prevailing international price, when most of the reforms are implemented by 2023. According to an earlier version of the FBP, these reforms will save the government a total of SR209 billion per year and incentivize consumption reduction.

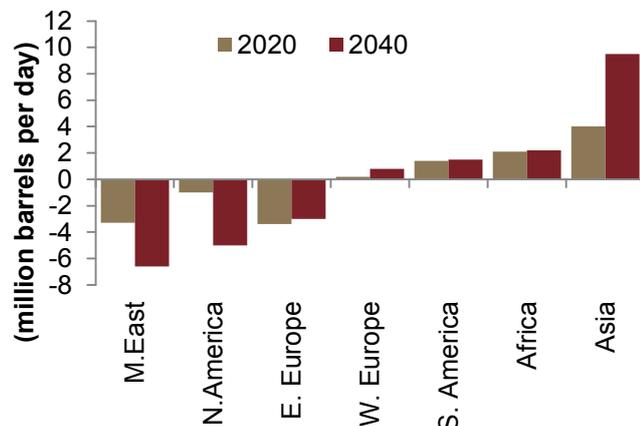
*A number of different steps are planned to be taken in the years ahead that will reduce refined product consumption, including:*

Looking ahead to 2023, the quality of the Kingdom's refined products will benefit further from the opening of the 400 tbpd Jizan refinery in 2018. At the same time, we expect a gradual improvement in global

**Figure 10: Asia is the largest export market for Saudi crude oil refined products**



**Figure 11: Asian region will see largest growth in refined product imports by 2040**





...i) further energy price reform...

...which could push the average price of a barrel of domestic refined oil to anywhere between \$38 pb \$68 pb.

...ii) more gas in electricity generation...

...iii) and renewable energy.

oil prices, with our forecasted Saudi oil export price at \$69 pb in 2023. In addition, due to the improved refined product slate, we estimate the price of Saudi refined product exports will be marginally higher than the forecasted Saudi oil export, at \$71 pb. Using this price as the benchmark, we can see that the average price of a barrel of domestic refined oil could rise from around \$27 pb in 2018, to anywhere between \$38 pb to \$68 pb, depending on what level the government fixes the domestic reference price at. Put differently, we expect the average domestic price of a barrel of refined oil to rise by anywhere between 40 to 153 percent by 2023 (Figure 12).

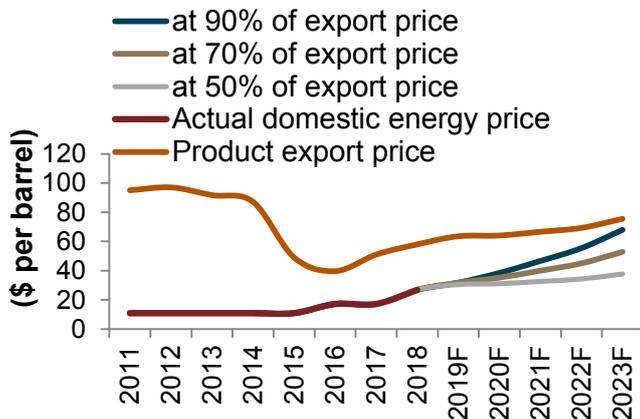
Increased natural gas in generation mix:

A slate of natural gas projects in the recent years, plus the major Fadhili project in 2019, will result in pushing the Kingdom's total raw gas production to 17.8 billion cubic feet a day (bcf/d) in 2020, up from 11.6 bcf/d in 2015. (Figure 13). Looking out into the longer term, considering the existence of vast reserves of unconventional (shale) gas in the Kingdom, we expect the majority of additional supply from 2020 onwards will come from such sources. In fact, we believe that the unsustainable and costly alternative of using crude oil and refined products in the electricity generation will ensure that the development of gas will be prioritized by 2030 (for more on this please see our report [Natural Gas and the Vision 2030](#) published October 2016).

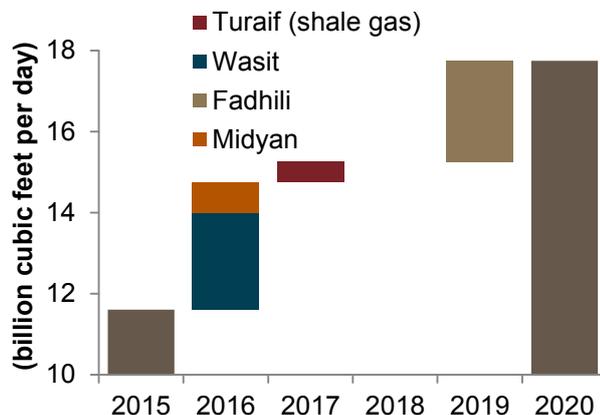
Increased renewables in generation mix:

Aside from natural gas, renewable energy is also planned to be introduced to the generation mix to diversify away from oil and refined products in the electricity generation. According to the International Energy Agency (IEA), the Gulf region will see around 22 percent of electricity generation being produced via renewables by 2035, but this figure is likely to be lower in the Kingdom. According to the Vision, an initial target of 9.5 gigawatt/hour (gw/h) of renewable energy should be achieved through the leveraging of existing local expertise in the production of different forms of energy. In 2014, peak loads stood at 57gw/h, and are expected to increase to 122 gw/h by 2030 according to King Abdullah City for Atomic and Renewable Energy (KA-CARE). Putting the 9.5 gw/h of renewables into context, this is expected to cover around 8 percent of peak demand by 2030 (Figure 14).

**Figure 12: Domestic reference price of oil products could range between \$38-68 pb in 2023**



**Figure 13: Saudi gas production to 2020**





## Outlook

As we have seen, Saudi Arabia's heavy investment in highly complex refineries in recent years has significantly improved both the quality and quantity of refined products as well as overall revenue. In fact, the expansion of refined products has actually reduced the Kingdom's reliance on crude oil revenue to some extent. Figure 15 shows that the ratio of crude oil versus refined products exports has been declining. We can see that refined product exports did not exceed 8 percent of total Saudi liquid exports up until the end of 2013. Since then, the share of refined products has risen sharply, equating to around 20 percent of total liquid exports at the end of 2017.

Ultimately, if the Kingdom keeps pursuing the development of its downstream sector in order to promote higher valued refined product exports and curbs the use of domestic refined product consumption, by raising gas output, increasing renewables in generation mix and raising domestic energy prices, this would, according to our forecast, increase the level of overall export revenue by 2030 (Box 1).

*According to our forecast, increase oil and refined product export revenue could be achieved by 2030.*

*We have mapped out three different cases...*

*...which assume different levels of oil and refined product export revenue.*

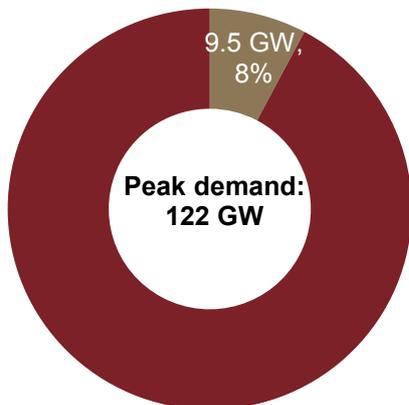
### Box 1: Refined product export revenue scenarios

We have mapped out three different scenarios below which assume different levels of oil and refined product export revenue. All three cases have an underlying assumption that total crude oil production in the Kingdom will rise to 12.5 mbpd and the Saudi crude oil export price will increase to an average of \$90 pb, come 2030. Individually, each of the three cases have differing assumptions:

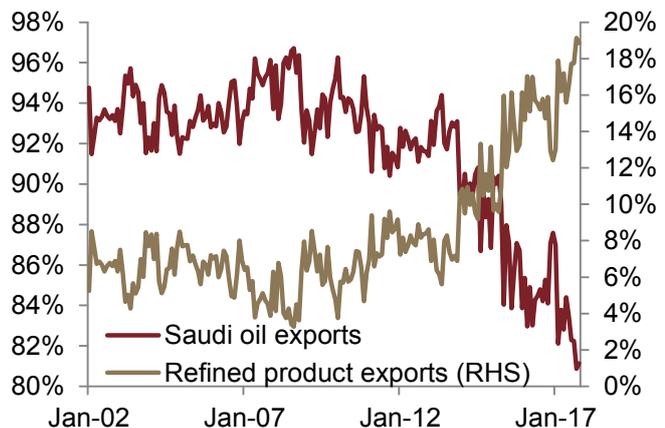
#### Low case

- Total crude oil and refined product exports decline to 7.1 mbpd by 2030, from 9.1 mbpd in 2016, as limited additional measures are taken to decrease domestic demand.
- As a result, we assume consumption grows at same rate it did between 2003 to 2016, at 4.4 percent annually.
- Limited additions to refining capacity result in only 25 percent of total exports constituting refined product exports, compared to 20 percent in 2016.
- Accordingly, refining margins rise only slightly, to a maximum of \$1.5 pb by 2030.

**Figure 14: Renewables expected to make-up around 8 percent of peak demand in 2030**



**Figure 15: Crude oil and refined product shares of total Saudi liquid exports**





*Our model shows that the difference in oil export revenue between the low and high case...*

*...is equivalent to \$69 billion annually in 2030.*

**Base case**

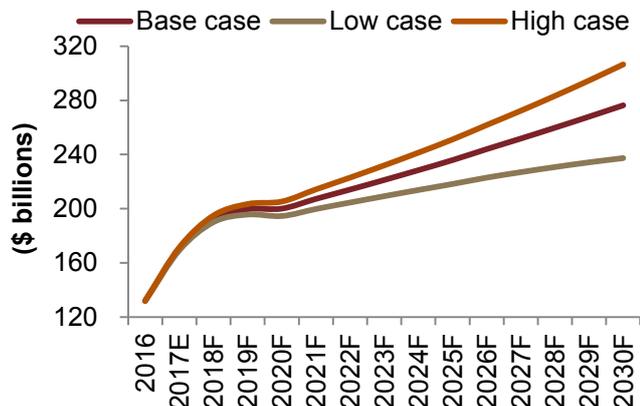
- Total exports rise to 8.3 mbpd in 2030, as modest measures are taken to decrease domestic demand.
- We assume consumption grows at half the rate it did between 2003 to 2016, at 2.2 percent annually.
- Additional expansions in refining capacity takes place leading to 50/50 split between crude oil and refined product exports.
- The Kingdom’s refining margin rises gradually to \$3 pb by 2030.

**High case**

- Raising gas output, increasing renewables in generation mix and raising domestic energy prices results in keeping domestic demand unchanged through to 2030, with total exports rising to 9.2 mbpd in 2030.
- Large expansion in refining capacity results in 80 percent of total exports being refined products.
- Refining margins rise to \$5 pb by 2030.

Overall, our analysis shows a clear advantage in the Kingdom pursuing a strategy of investment and expansion in highly complex refineries. Specifically, we see the difference between the low and high case scenarios equating to around \$69 billion annually by 2030 (Figure 16). That said, investment in refining will have to be accompanied by a roll-out of policies designed to curb domestic consumption, as laid out under the FBP, as well as larger quantities of gas and renewables into the generation mix. Taken together, all of this should bring out consistent growth in overall oil revenue over the next decade or so.

**Figure 16: A difference of \$69 billion annually between low and high case in 2030.**





## Disclaimer of Liability

Unless otherwise stated, all information contained in this document (the "Publication") shall not be reproduced, in whole or in part, without the specific written permission of Jadwa Investment.

The data contained in this research is sourced from Reuters, Eni O&G Review 2016 Bloomberg, EIA, Saudi Aramco, FBP document, SAMA, JODI, BP World Energy Outlook, GaStat and OPEC.

Jadwa Investment makes its best effort to ensure that the content in the Publication is accurate and up to date at all times. Jadwa Investment makes no warranty, representation or undertaking whether expressed or implied, nor does it assume any legal liability, whether direct or indirect, or responsibility for the accuracy, completeness, or usefulness of any information that contain in the Publication. It is not the intention of the publication to be used or deemed as recommendation, option or advice for any action(s) that may take place in future.