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The Shifting Sands under Saudi Oil Prowess

By

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Outline

- Changing Saudi oil fundamentals
- Saudi proven oil reserves
- Role of renewable energy
- The shift from “hawk” to “dove” in oil price policy
- The impact on the oil price & global oil security
- Conclusions
Overview

- Saudi oil production peaked in 2005 and has been in steady decline since then with domestic oil demand rising at an alarming rate and accounting for 35% of crude production in 2011. As a result, Saudi crude exports have already declined by 30% between 2005 and 2011 and are projected to decline further by 10% by 2015. Population growth and robust economic development and also fuel subsidies drive that demand.

- The changing Saudi oil fundamentals are forcing Saudi Arabia to become more hawkish on the oil price. Since 2008, Saudi Arabia has been undergoing a strategic shift in its oil price policy from “dove” to “hawk” prompted by economic, demographic and security pressures. As a result, the pressure on the oil price will continue unabated in coming years.

- This presentation will discuss the reasons for the Saudi shift and will also assess its implications for the global economy, energy security and the price of oil.
• Saudi Arabia’s oil demand is rising at a very high and alarming rate. Population growth and robust economic development and also fuel subsidies drive that demand. The country currently gets almost all its energy from oil and natural gas (see Figure 1).
Figure 1
Annual Saudi Petroleum Consumption Growth Rates

Source of data: EIA International Petroleum Statistics
Growing Domestic Oil Demand
(Continued)

- In 2011, domestic consumption amounted to 2.86 mbd and is projected to reach 3.78 mbd by 2015. Between 1980 and 2011, consumption grew at an average rate of 12% per annum (see Table 1).
Table 1
Saudi Oil Production, Consumption & Exports
(mbd)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Consumption</th>
<th>Net Exports</th>
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<tr>
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<tr>
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<tr>
<td>2015</td>
<td>8.70</td>
<td>3.78</td>
<td>4.92</td>
</tr>
</tbody>
</table>

% change 1980-2015 -12 + 520 - 47

Sources: US Energy Information Administration (EIA) / Official Saudi data.
* Peak production year.
Power Generation & Water Desalination

• Saudi Arabia uses crude oil and natural gas as fuels for power generation and water desalination plants as well as for its petrochemical industry.

• Oil generates 62% of its power now, with natural gas accounting for the remaining 38%. Saudi Arabia already burns 1mbd for power generation. This could only continue to rise with power generation capacity projected to increase from 45,000 megawatts currently to 75,000 megawatts by 2018 and to 120,000 megawatts by 2030.

• Saudi Arabia also uses up to 20% of its daily oil production (1.6 mbd in 2011) to power its 27 water desalination plants and this is projected to rise to an estimated 40% by 2025 if no alternative energy sources are found (see Figure 2).

• The drive to decrease the carbon footprint of new plants is leading Saudi Arabia to experiment with renewable energy. Solar-powered desalination is a hot topic but still a long way from commercialization especially for large capacities.
Figure 2
Saudi Fuel Consumption
Long-term Trends: Population Growth

- Saudi Arabia’s population grew rapidly from 5 million in 1965 to 25 million in 2010. The population is projected to reach 27 million in 2015 and 32 million in 2025 (see Figure 3).
Figure 3
Saudi population Growth
(in millions)
Impact of Population Growth on Oil Consumption

• This fast population growth is impacting hugely on oil consumption and exports (see Figure 4). Net exports in 2011 were at their lowest level since the Gulf War.

• Saudi Aramco’s Chief Executive Officer, Mr Khalid Al-Falih, warned that domestic daily energy demand would more than double to 8.3 mbd of oil equivalent in 2030 from 4.36 mbd in 2011 if there were no improvements in energy efficiency and current trends continued.
Figure 4
Saudi Arabia’s Oil Production, Consumption & Exports (mbd)
Saudi Natural Gas Production & Consumption

- With no infrastructure for the import & export of natural gas, Saudi Arabia consumes 100% of its own production. In 2011, natural gas accounted for 41% of total energy consumption with oil making up the rest (see Figure 5).

- According to Saudi Aramco’s forecasts, natural gas demand in the kingdom is expected to rise to 14.5 bcf/d by 2030 from an estimated 9.59 bcf/d in 2011. In order to free up petroleum for export, all current and future gas supplies (except natural gas liquids) reportedly remain earmarked for use in domestic industrial consumption and desalination.
Figure 5
Saudi Natural Gas Production & Consumption (bcf/d)
Role of Renewable Energy

- Moving into renewable energy for Saudi Arabia is a necessity not a luxury. The country expects domestic power demand to triple over the next two decades and wants a more sustainable mixture of energy sources.

- The expansion into renewable and nuclear energy will be part of a $100 bn spending drive over the next ten years aimed at meeting the expected jump in demand and curbing dependence on crude.

- The Gulf region has some of the world’s best solar resources. However, governments in the region have historically valued oil and gas at cost and have provided their populations with subsidized electricity, two factors which have impeded the development of renewable energy. A Bloomberg Study dated 7 January 2011 shows that falling costs of photovoltaic (PV) technology mean that solar energy is already a viable option for power generation in the region where it can be used to replace oil for power as long as that oil is valued long as that oil is valued at the international selling price.
Peaking of Saudi Oil Production

- Saudi Arabia's crude oil production peaked in 2005 at 9.6 mbd. In 2010 Saudi production averaged 8.2 mbd. A steady production decline was forecast from 2010 onwards (see Figure 6).
Figure 6
Saudi Arabia’s Crude Oil Production Rate

Source: EIA, BP Annual Statistics, Saudi Aramco
Condensate production is excluded
• According to official Saudi sources, Saudi production will not increase beyond 8.7 mbd until 2015 (see Figure 7).

• This is a far cry from the frequent claims by the Saudi oil minister Ali Al Naimi that Saudi Arabia has now an overall production capacity of 12.5 mbd when, in fact, they hardly have any spare capacity. The Saudis have had recently to scrape the bottom of the barrel to partially offset the decline in Libya’s oil exports estimated at 1.25 mbd. Furthermore, it has now emerged from confidential cables sent by the US Embassy in Riyadh between 2007 and 2009 and recently leaked by Wilkileaks that Saudi Aramco's claimed 12.5-mbd capacity needed to keep a lid on prices, could not be reached.
Figure 7
Saudi Oil Supply & Consumption Projection (mbd)
The Saudis claim that their remaining proven oil reserves amount to 265 bb of oil based on a recovery factor (RF) of 52% and an oil initially in place (OIIP) of 716 bb (see Figure 8).

Far from having 265 bb, Saudi proven reserves are estimated at 60 bb-85 bb based on estimated ultimate recoverable reserves (URR) of 185 bb-210 bb and a total of production of 125 bb since the discovery of oil in Saudi Arabia.
Figure 8
Saudi Oil Reserves & Recovery Factor (RF)
Saudi Oil Initially in Place (OIIP)

- The Saudis also claimed that their OIIP was 700 bb at year end 2003 and is projected to grow to 900 bb by 2025 (see Figure 9).

- There is considerable doubt about the validity of this increase given the lack of new oil discoveries and the unusual nature of its steady continuous increase. Only one significant discovery has been made since 1975, the Hawtah Trend, a collection of about six fields during 1989-91 with about 2 bb addition to reserves and 6 bb to OIIP.

- A 2005 study by the Association for the Study of Peak Oil (ASPO) estimated that in 2003 the OIIP was a more realistic 580 bb rather than 700 bb.
Figure 9
Discovered & Undiscovered Saudi Oil Initially in Place by 2025 in Saudi Arabia
Recovery Factor & Remaining Recoverable Reserves

• The Saudis are also claiming an RF of 52% when the average global RF is about 35% (see Figure 10).

• Applying the previously assumed lower and upper global RF limits of 32% - 36% to the more realistic estimate of 580 bb Saudi OIIP gives a range of 185 bb to 210 bb of ultimate recoverable reserves. Given Saudi cumulative production of 125 bb to year end 2011, this gives a range of remaining recoverable crude oil reserves from 60 bb to 85 bb and not Saudi claim of 265 bb.
Figure 10
Recovery Factor Bands
And while Aramco’s use of improved technology in existing fields could have raised Saudi RF by a couple of points, an RF of 52% is out of question (see Figure 11).

Figure 12 from the Norwegian oil company, Statoil, shows possible increases in RF due to enhanced oil recovery (EOR) methods. Statoil calculated how the average RF goes up from 29% to 38% by applying EOR methods. The Statoil data provides enough support to increase Saudi Arabia’s RF upper limit of 35% to 37% but not to 52%.
Figure 11
Increases in RF due to enhanced oil recovery (EOR) methods

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![Graph showing increases in RF due to enhanced oil recovery (EOR) methods.](image-url)
Saudi Oil Price Policy from “Dove” to “Hawk”?

- Over the past few years, Saudi Arabia has become increasingly more hawkish on oil prices. Since 2008, Saudi Arabia has been undergoing a strategic shift in its oil price policy from “dove” to “hawk” prompted by economic, demographic and security pressures. If the Saudis have indeed become much more hawkish, whether by necessity, design or a combination of both, it would signal they are no longer able to assume the role of a swing producer in the global oil market.

- Since the early 1970s Saudi Arabia as the *de facto* leader of OPEC has generally worked to keep oil prices relatively low normally in the $18-$22 per barrel range. Fearing that high oil prices could hurt global growth and reduce demand for oil, Saudi Arabia with a relatively small population compared to today, was generally able and willing to act as an oil price "dove." However, when the oil price hit $147/barrel in July 2008, the Saudis were unable to put more oil on the market to help get the situation under control.

- The lack of Saudi intervention then represented a sharp break with past Saudi oil policy. Many explanations have been proffered for the Saudi inaction.
Saudi Oil Price Policy from “Dove” to “Hawk”?

- One explanation is that the Saudis with a declining production capacity and rising domestic consumption are unable anymore to act as a swing-producer in moderating oil price volatility.

- Another is that the population of Saudi Arabia has nearly tripled since 1980. This puts tremendous pressure on the government to provide Saudis with jobs, cheap food and housing. At the same time Saudi real inflation-adjusted per capita oil export revenue fell sharply from a peak of about $23,000 per person in 1980 (in constant 2000 US$) to just $1,800 in 1998 and about $6,000 in 2010 (see Figure 12). In other words, the Saudis today need much higher crude oil prices in order to generate the revenue their burgeoning population requires. For Saudi Arabia, this is a vital security issue given the political upheavals and population unrest in the surrounding Arab countries.

- A third possible explanation is Saudi concern about Iran. With the demise of Saddam Hussein’s Iraq, Saudi Arabia and the other Arab Gulf countries lost the only bulwark against Iran. And with the Iranians apparently racing to build a nuclear capability, the Saudis have grown increasingly nervous. That is why the Saudi leadership might be looking to hedge its security by not antagonizing this large and powerful Persian neighbour. One way of appeasing Iran would certainly be to avoid doing anything to lower oil prices. The Saudis may now be reluctant to take an active stand against Iran with regard to OPEC oil output (and pricing) decisions.
Figure 12
Saudi Per Capita Net Oil Export Revenues (2000 $)

Source: Energy Information Administration
From “Dove” to “Hawk”?  
(Continued)

• Still, all these factors are not sufficient to explain this shift by the Saudis. It must be assumed, therefore, that they have less oil firepower than previously believed. This could be evidenced by the fact that US Energy Information Administration (EIA) has sharply scaled back its medium-and long-term Saudi oil production forecasts in recent years. In 2000, for instance, the EIA forecast for Saudi oil production capacity for 2010 was 14.7 mbd but by 2007 EIA had slashed its forecast to just 11.4 mbd. The EIA also slashed its projected outlook for Saudi oil production capacity in 2020 from 22.1 mbd to around 12-13 mbd. My research, however, indicates that there is no realistic prospect of Saudi Arabia ever again achieving a sustained production level of even 10 mbd.

• Other energy analysts seem to concur with the EIA. In its November 2008 World Energy Outlook, the IEA had previously dismissed notions that oil supplies might peak and projected that supplies would be adequate to meet growing demand until 2030. However, Mr Nobuo Tanaka, the head of IEA accepts now that conventional oil production peaked in 2006.

• Since 2003 global oil consumption has increased by 9 mbd while non-OPEC oil production has increased by only 1.75 mbd. As a result, OPEC has been forced to use most of its "spare capacity", pushing oil prices higher (see Figure 13).
Figure 13
Oil Prices vs. OPEC Spare Capacity, 1990-2011

Source: Energy Information Administration
The Impact on the Global Economy

- OPEC crude oil production has been stagnant or falling in recent years in the following countries: Algeria, Ecuador, Iran, Kuwait, Libya, Nigeria, Saudi Arabia, the UAE and Venezuela. To turn the situation around in the next few years OPEC countries will need to invest heavily not only to offset the natural "decline rates" in existing fields but also to explore for new oil and expand production capacity. This becomes less likely as one considers the growing budget needs and barriers to private investment that exist in many OPEC nations including Saudi Arabia.

- The truth of the matter is that the Saudis’ ability to act as OPEC “swing producer” appears to have significantly shrunk if not disappeared altogether. Today, as a result of oil production capacity decline, economic, strategic and demographic pressures, the Saudis appear to be acting more as a “hawk” than a “dove.”

- The pressure on the oil price will continue unabated in coming years. How far up will the oil prices go is anybody’s guess but a projected price of $150-$170/barrel by 2015 might not be out of place.
Conclusions

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• Saudi oil production peaked in 2005 and has been in steady decline since then with domestic oil demand rising at an alarming rate and accounting for 35% of crude production in 2011. As a result, Saudi crude exports have already declined by 30% between 2005 and 2011 and are projected to decline further by 10% in the next 3 years.

• The changing Saudi oil fundamentals are forcing the Saudis to become more hawkish on the oil price. Since 2008 Saudi Arabia has been undergoing a strategic shift in its oil price policy from “dove” to “hawk” prompted by economic, demographic and security pressures.

• As a result, the pressure on the oil price will continue unabated in coming years with a projected price of $150-$170/barrel by 2015 not out of place. This could precipitate a worse global economic crisis than the 2008 one from which the global economy has not yet fully recovered.
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