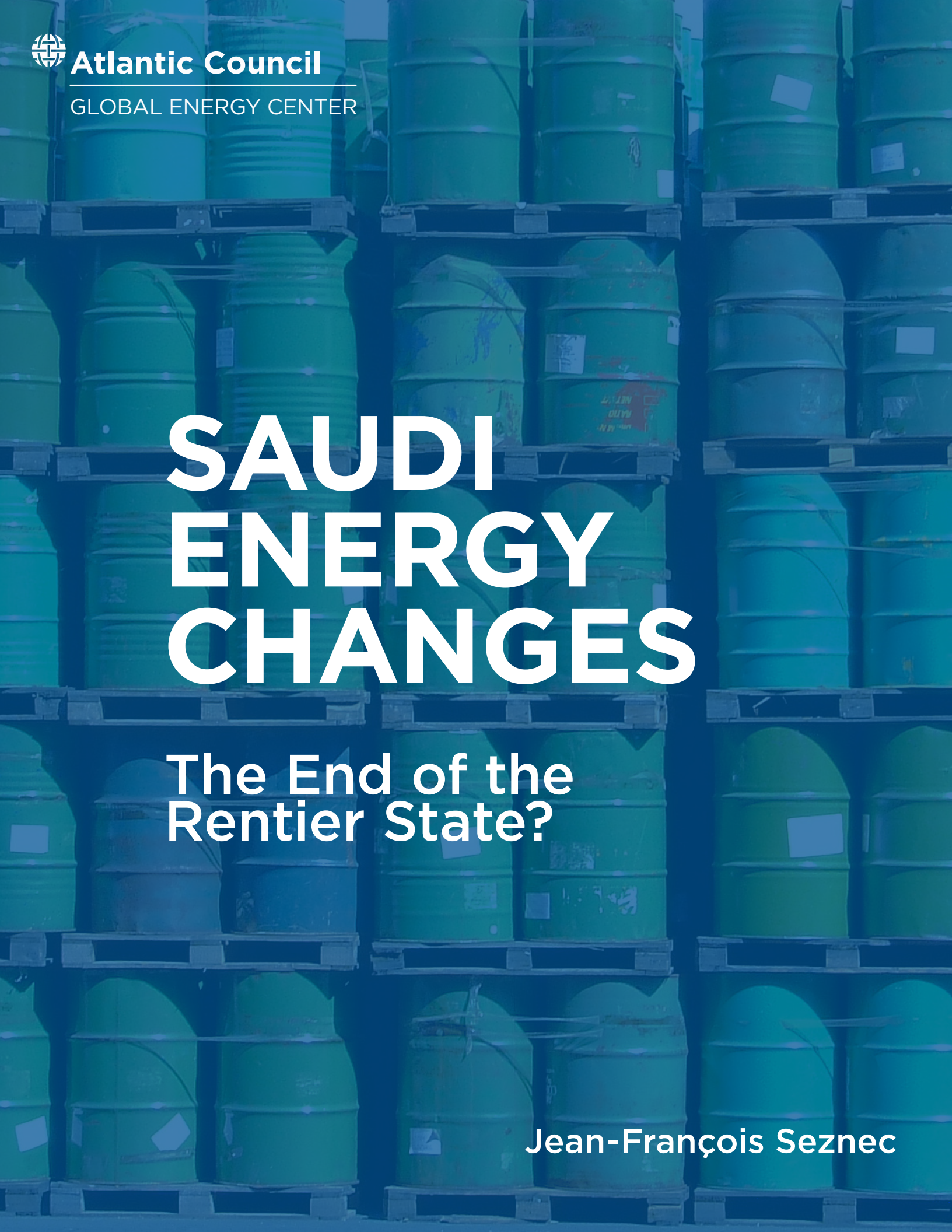

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SAUDI ENERGY CHANGES

The End of the Rentier State?

Jean-François Seznec

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Cover photo credit: Sergio Russo/Flickr.

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EXECUTIVE SUMMARY

The decline in income from crude oil is having a major impact on Saudi Arabia.[1] The official deficit for 2015 was $98 billion, though it is expected to decline to $87 billion in 2016.[2] These figures, however, do not even include some of the military expenses incurred by the war in Yemen or payments made to various proxies in Syria. Of course, the Saudi Arabian Monetary Agency (SAMA), the central bank of Saudi Arabia, has very substantial reserves and could easily finance the deficit for at least five years.[3] Nevertheless, the decline in income has prompted the kingdom's leadership to modernize the economy. Deputy Crown Prince Mohammed bin Salman, who is in charge of the economy, has announced that subsidies paid for by the state will be cut; has broached privatizing Saudi Aramco, the largest oil company in the world and main income provider to the state; and has announced that a Value Added Tax (VAT) of 5 percent will be introduced, the first tax imposed in the kingdom. In other words, Prince Mohammed has announced a series of measures that will change the relationship between the government and the governed. The state's dependence on crude oil is now severely constrained. Change to a more modern form of fiscal funding through taxes, and transparency in state revenues, is needed to continue managing the country's finances. Admittedly, complete change will not come overnight, but it is nonetheless being prodded on by the decline in income. It seems, therefore, that the country is moving away from being the epitome of a rentier state to resembling more closely the economies of the more developed nations of the G20, of which Saudi Arabia is a member. This paper will review the energy situation in the kingdom today, evaluate the potential impacts of low oil income on the industry and on the international relations of the kingdom, and explain how these impacts could change the rentier status of the Saudi state.

1 The author is grateful to Mr. Samer Mosis, a graduate student at Johns Hopkins School of Advanced International Studies, for his help with research and editing, as well as for his suggestions on improving this paper.

2 Jadwa Investments, "Saudi Arabia's 2016 Fiscal Budget," December 28, 2015, http://susris.com/wp-content/uploads//2015/12/151229-2016-Budget-EN.pdf.

3 This forecast is based on the cash reserves available to SAMA plus assets available through Social Security and banks.

A SHORT SUMMARY OF SAUDI ENERGY RESOURCES AND POLICY

CRUDE OIL

The kingdom's oil and gas is produced by Saudi Aramco, the national oil company. Saudi Aramco is the successor to Aramco, which was created by five American oil companies to explore, extract, treat, and ship crude oil, mainly that of the Ghawar field. The state nationalized Aramco in the early 1980s. The American companies were compensated for their assets and, unlike in other countries where foreign oil companies were nationalized, the relationship remained excellent.[4] To this day, ExxonMobil's largest foreign investment is in Saudi Arabia—its fifty-fifty petrochemical joint venture with SABIC (Kemya Al Jubail Petrochemical Company).

Saudi Arabia has the world's largest proven reserves of conventional oil with 267 billion barrels in the ground and possible reserves of up to 900 billion barrels.[5] The main advantage of Saudi crude is the relative ease, and therefore low cost, of extraction and shipment. Most of the large Saudi fields are close to Ras Tanura, the largest oil export harbor in the world with a capacity of over 10 million barrels per day (b/d). The geological structures of the fields are relatively simple and allow for the wells to be very productive. The average Saudi well produces about 6,000 b/d; by comparison, the average US well produces 10.6 b/d.[6] The fields of Saudi Arabia are also extremely large. The single largest inland field in the world is Ghawar, a five-hundred-kilometer-long reservoir that has been tapped at the rate of 5 million b/d for over fifty years and which still has about 50 percent of its capacity left.[7] Saudi Arabia also has some large offshore fields, mainly the Safaniya field, which is one of the world's largest (see table 1).

Saudi Arabia has the world's largest proven reserves of conventional oil with 267 billion barrels in the ground and possible reserves of up to 900 billion barrels.

Ultimately, the kingdom's unit cost per barrel is most likely the lowest in the world. Production costs were reputed to be as low as $1.50 per barrel in the Ghawar field. However, the fields are aging somewhat and more extensive recovery techniques now must be used, so the cost may have climbed up to $6 per barrel in the newer fields and the older portions of Ghawar. For example, today Saudi Aramco has to pump about 6 million b/d of water into the Ghawar field to maintain the required pressure.

The kingdom has built a capacity to produce about 12 million b/d, plus another 500,000 b/d in the neutral zone between Kuwait and Saudi Arabia. In total, it is now producing about 10.3 million b/d, which, at this rate, would allow pumping for around eighty years. The type of oil produced runs the gamut from heavy crude (API 20) to ultra light (API 42), the latter of which comes from the Shaybah field on the border with the United Arab Emirates.[8] Oil is transported from the various fields to the town of Abqaiq where it is cleaned and conditioned and then shipped to either Ras Tanura, a few kilometers away, or by the East-West "Petroline" pipeline to Yanbu on the Red Sea.

NATURAL GAS

Saudi Arabia ranks as the eighth-largest gas producer in the world, yielding 108 billion cubic meters per year (bcm/y), but production is mostly associated

4 Ellis Goldberg, "Saudi Arabia and Aramco: Evolution of an Agreement," draft paper. Goldberg estimated the American companies received a total of about $2 billion, paid in oil over five years from 1980 to 1985.

5 "BP Statistical Review, 2015," BP, p. 6, http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html; Mahmoud M. Abdul Baqi and Nansen G. Saleri, "Fifty-Year Crude Oil Supply Scenarios: Saudi Aramco's Perspective," Saudi Aramco presentation at the Center for Strategic and International Studies, Washington, DC, February 2004, slide 9, http://csis.org/files/attachments/040224_baqiandsaleri.pdf.

6 "Saudi Production Laid Bare," *Oil Drum,* March 19, 2007, http://europe.theoildrum.com/node/2372; *Annual Energy Review 2011*, US Energy Information Administration (EIA), September 2012, https://www.eia.gov/totalenergy/data/annual/pdf. This figure has probably increased since it was published by the EIA given the large development of shale oil wells that can produce 504 b/d. See "Drilling Productivity Report," US EIA, February 8, 2016.

7 Baqi and Saleri, "Fifty-Year Crude Oil Supply Scenarios," op. cit., slide 20.

8 API refers to the American Petroleum Institute's inverted scale for measuring the density of crude oil, with higher numbers referring to lighter densities.

Table 1. Major Oil Fields in Saudi Arabia

Field	Location	Capacity as of 2012
Ghawar	Onshore	5.8 million b/d of Arab Light crude
Safaniya	Offshore	1.2 million b/d of Arab Heavy crude
Khurais	Onshore	1.2 million b/d of Arab Light crude. Plans to expand capacity by 0.30 million b/d by 2017.
Manifa	Offshore	0.90 million b/d of Arab Heavy crude after completion at end of 2014. Production will be used to offset declines in mature fields.
Shaybah	Onshore	0.75 million b/d of Arab Extra Light crude. Plans to expand capacity by 0.25 million b/d by 2017.
Qatif	Onshore	0.50 million b/d of Arab Light crude
Khursaniyah	Onshore	0.50 million b/d Arab Light crude
Zuluf	Offshore	0.50 million b/d of Arab Medium crude
Abqaiq	Onshore	0.40 million b/d Arab Extra Light crude

Source: Saudi Aramco; Oil and Gas Journal; Energy Information Administration.

with the extraction of crude oil.[9] Unlike its neighbors Qatar, the United Arab Emirates, and Oman, Saudi Arabia does not export any of its natural gas. The kingdom decided in the late 1970s to gather the gas from its oil production and use it only for its own needs, mainly to produce electricity, water through desalination, fertilizers, and petrochemicals, both basic and advanced. In spite of its endowment, the kingdom has found itself short of natural gas as demand has increased greatly, mainly due to a population increase from around 4.5 million in the 1970s to around 32 million today. Furthermore, the demand for electricity per capita has increased drastically as the kingdom's wealth has spread, and demand for air conditioning and water has increased with people's requirement for the amenities of the modern developed world.

Most of the water and electricity is produced in gas-fired co-generation plants, which desalinate water through a flash distillation process while producing steam to run electricity-generating turbines. The shortage of natural gas for the production of electricity and water has forced the kingdom to use large volumes of crude oil to run such plants. Today at peak demand the kingdom uses 890,000 b/d for direct crude burn, which of course is both polluting and inefficient (see figures 1 and 2). Hence, the country is now seeking new gas resources unrelated to oil.

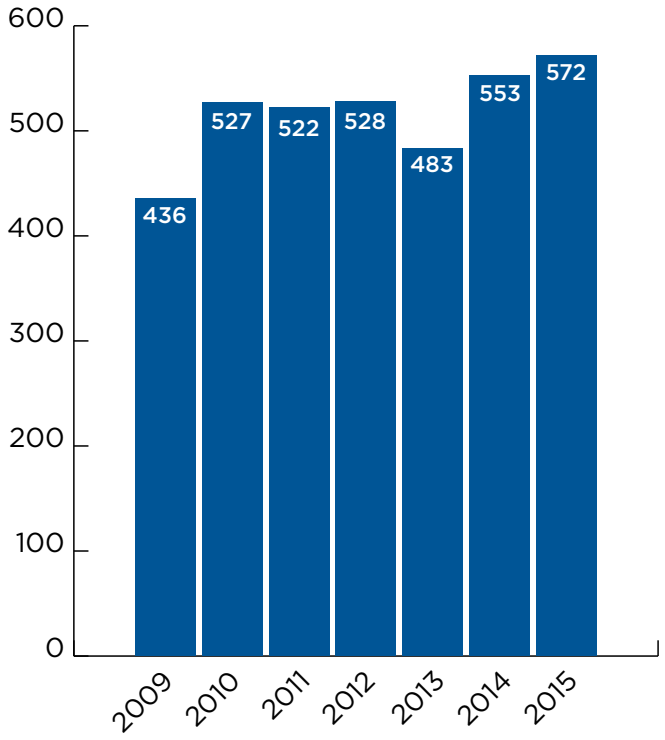
Saudi Aramco has developed two major nonassociated gas fields, the Khursaniyah onshore field and the Hasbah offshore field, which supply a combined 5.5 bcm/y and help reduce the shortage.[10] However, in both fields, the gas is quite sour and requires a great deal of processing. Nevertheless, the fields are being linked to two gas treatment plants: Wasit, which is slated to produce 27 bcm/y starting in 2016, and Fadhili, which is slated to produce 17 bcm/y in 2020. When operational, the plants will go a long way toward reducing the kingdom's need to burn crude. However, the new fields are difficult to operate. They are rich in hydrogen sulfide (H2S), which renders the drilling and extraction very difficult and therefore expensive. Furthermore, with the demand for electricity, water, and industrial development increasing rapidly, this new production capacity may quickly become insufficient. Moreover, the total cost of extracting and processing the H2S-rich gas is quite high, with reports that the cost is as high as $6 per million British Thermal Units (mmbtu). This is notably expensive when taking into consideration that, even after the January 2016 subsidy price revisions, Saudi Aramco charges its clients only $1.25/mmbtu for natural gas.

9 "BP Statistical Review, 2015," BP, op. cit., p. 23.

10 Saudi Aramco operates eight power plants that produce 1.9 gigawatts (GW) of electricity, most of which is used for the company's needs. The company is also building 6.4 GW of further capacity, two-thirds of which will be used in the new refinery in Jazan.

Saudi Aramco is also looking for shale gas in the north of the country, which would be used in the newly developing industrial city of Wa'ad Al Shammal, and offshore in the Red Sea. Both efforts are in process, but require very expensive technology and, in the case of the shale fields in the north, extensive amounts of water, which is available only through underground fossil aquifers, making it an environmental nightmare to extract. Hence, even though Saudi Aramco is increasing its methane capacity, it is doing so at a cost undoubtedly above the price it is now getting for its gas.

Figure 1. Saudi Arabia Annual Crude Burn (thousand b/d)



Sources: Middle East Economic Survey; Joint Oil Data Initiative.

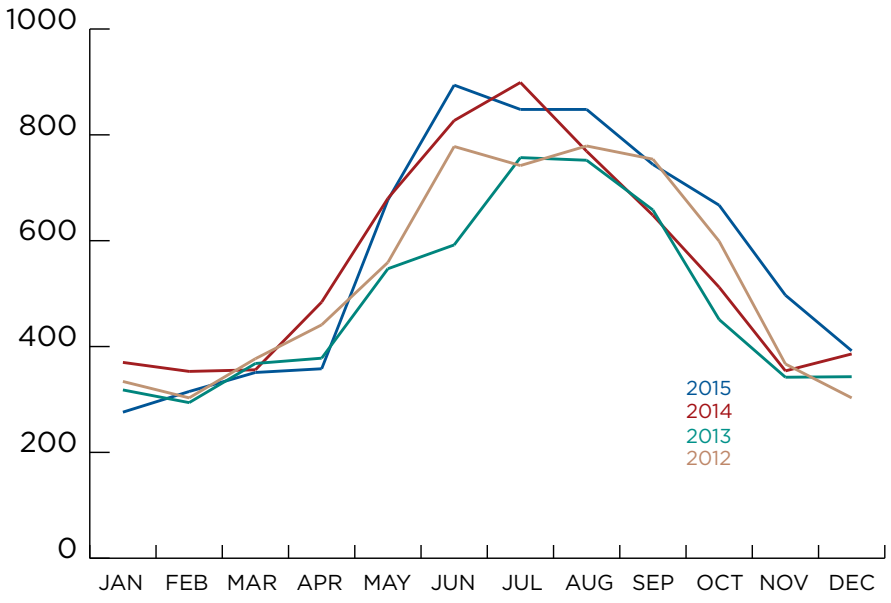
OTHER ENERGY SOURCES

In light of the kingdom's enormous fossil fuel endowment, it is unsurprising that renewable resources have not been developed. Nevertheless, the kingdom's leadership is aware that the locally used crude oil cannot be sold for export, and thus bears an opportunity cost. Accordingly, the kingdom has established the King Abdullah City for Atomic and Renewable Energy to research the development of nuclear energy. It has also established a number of research centers at the King Abdullah University for Science and Technology to conduct solar and other alternative energy research. Nonetheless, substantive results in the field of renewable energy have yet to manifest. Moreover, though the kingdom has made numerous agreements with France, Japan, the United States, and China to develop nuclear energy, no nuclear reactors have been built or are in the process of being built.

DOWNSTREAM

An overview of Saudi energy issues is incomplete without mentioning the industrial development downstream from oil and natural gas.[11] Since the mid-1970s the kingdom has pushed very hard to build an industry that would add value to crude oil and natural gas. Saudi Arabia today is home to SABIC, the second-largest chemical company in the world. SABIC has built its Saudi base using mainly natural gas, like methane and ethane, and liquid gases, like propane and butane. It is now the second-largest producer of methanol in the world and the largest producer of polyethylene. While the company often works in joint ventures with large foreign firms, which bring advanced technology to the kingdom, it is increasingly working on its own. It is now one of the largest providers of urea-based fertilizers, as well as of advanced plastics to the global

Figure 2. Saudi Arabia Monthly Crude Burn (thousand b/d)



Sources: Middle East Economic Survey; Joint Oil Data Initiative.

11 The downstream oil sector is a term commonly used to refer to the refining of crude oil, and the processing and purifying of natural gas, as well as the development and distribution of products derived from crude and natural gas.

automobile industry, and its line of very advanced chemicals based on acrylates is growing rapidly.

Saudi Aramco is also expanding its downstream presence. It has a $10 billion joint venture with Japan's Sumitomo, downstream from the refinery in Rabigh, which makes basic and advanced chemicals for sale mostly in the Far East. Saudi Aramco also has a $20 billion joint venture with Dow Chemicals, which is expected to start production of a large number of very advanced chemicals—like MDI-TDI—this year.[12] These chemicals will then be used by the kingdom's growing privately owned and run downstream sector, which aims to sell products in the region and in Asia.

Ma'aden, Saudi Arabia's national mining company, is also involved in taking ammonia and sulfur from SABIC and Saudi Aramco and using them to process large phosphate production from the mines in the north of the country. The ultimate product of Ma'aden is di-ammonium phosphate, of which it produces three million tons per year. It has also entered into a joint venture with Mosaic of the United States to double that production within a year or two. Ma'aden also produces aluminum in a joint venture with Alcoa using the bauxite from their mines, and cheap caustic soda and electricity generated with low-cost natural gas.

There are a number of private firms traded on the Tadawul stock exchange in Riyadh that take products from Saudi Aramco and SABIC and transform them into advanced chemicals mainly for export to the Far East. The total sales from chemical companies traded on the Tadawul stock exchange was over $80 billion in 2014, about 25 percent of the kingdom's oil sales that year, and was over $65 billion in 2015, about 43 percent of that year's total oil sales. The major relative increase in the kingdom's value-added downstream production is a sign that diversification away from producing just one commodity is accelerating.

12 Methylene diphenyl diisocyanate (MDI) and toluene diisocyanate (TDI) are used in the production of polyurethanes.

EARLY 2015 ENERGY MANAGEMENT CHANGES

Since King Salman bin Abdulaziz took the throne in December 2014, many important changes have been made to the government and economic structure, most notably in the oil sector, including the following:

- The Ministry of Petroleum and Minerals has been "separated" from Saudi Aramco, implying that the Minister of Petroleum, Ali Al Naimi, is no longer Chairman of Saudi Aramco.
- Saudi Aramco is now under the supervision of the Supreme Council of the Saudi Aramco Oil Company (SCSA), chaired by Minister of Defense Prince Mohammed bin Salman.
- The CEO of Saudi Aramco, Khalid Al Falih, was promoted to Minister of Health. However, he was also elevated to Chairman of Saudi Aramco and member of the SCSA.
- The SCSA has ten members, nine of whom have been publicly confirmed, including Prince Mohammed bin Salman as Chairman of the committee; Dr. Al Falih as Chairman of Saudi Aramco; Amin H. Nasser, President and CEO of Saudi Aramco; Dr. Majid Al-Moneef, Secretary General of the SCSA and Saudi Aramco Board Member—Dr. Al-Moneef is Saudi Arabia's former head representative at the Organization of the Petroleum Exporting Countries (OPEC); Ali Al Naimi as Minister of Petroleum and Minerals; Prince Abdulaziz bin Salman as Deputy Minister of Petroleum and Minerals; Economy Minister Adel Fakieh; Finance Minister Ibrahim al-Assaf, who is also a Board Member of Saudi Aramco; and Fahad al-Mubarak, Governor of the Saudi Arabian Monetary Agency.
- The Supreme Council for Petroleum and Minerals, which was headed by the King and placed oil policy under the aegis of the major Princes, has been canceled.

OIL POLICY AND THE MINISTRY OF PETROLEUM AND MINERALS

The cleaving of Saudi Aramco away from the direct influence of the Ministry of Petroleum and Minerals (MOPM) is underlined by the fact that the Minister of the MOPM, Ali Al Naimi, is no longer the Chairman of Saudi Aramco. For the past twenty years, Ali Al Naimi has been the main policy guru for oil in the kingdom. He was the Chairman of Saudi Aramco for twelve years, beginning in 1983, and served under two previous Oil Ministers; he has been the Minister of Petroleum and Minerals since 1995. The Ministers of Oil always had Saudi Aramco as their power base, especially under Al Naimi, who had risen through Saudi Aramco's ranks from Clerk to President, and eventually Chairman cum Minister of Oil.

As Minister he directs the kingdom's oil industry, and as the most highly qualified engineer on the Supreme Petroleum Council he has de facto established and implemented policy on behalf of three successive Kings. It is in great part due to his leadership that Saudi Arabia became the most respected and reliable oil producer among OPEC and other national oil producers.

The world's press has extensively described the crude oil market as being oversupplied, with articles attributing the glut to two main factors: The first is that China's stellar annual growth has declined from 12 percent to well below 7 percent, thereby reducing the expected demand from the largest importer in the world. The second is that US crude production is now at 9.38 million b/d and its net imports are down to 5.99 million b/d, from over 14 million b/d in 2006.[13] Yet, in spite of the well-publicized glut, Saudi Arabia increased its production to 10.2 million b/d. This policy of maintaining production regardless of price declines has been implemented since December 2014 when Al Naimi said that Saudi Arabia would maintain production at over 9 million b/d. Prices responded by plummeting from $110 per barrel in June 2014 to as low as $46 per barrel seven months later in January 2015. Throughout 2015, Saudi Arabia increased production further and, by early 2016, had in essence driven prices down to or below $30 per barrel of Brent—the international benchmark for oil prices. Due to these price declines, the kingdom incurred a budget deficit in 2015 of $98 billion. Moreover, this deficit does not include undisclosed, but certainly large, expenses incurred by the wars in Yemen and Syria, resulting in a possible total deficit of about $120 billion.

The other major world producers are being impacted even more than Saudi Arabia by the low prices. Among the first to suffer were the shale oil producers of the United States, who have curtailed their investments in drilling and pumping in response. However, with strongly declining costs of fracking due to technological improvements in drilling and extracting, US shale oil producers could still maintain profitable production if prices rebound to over $40 per barrel, as their production costs are now closer to $35 per barrel. As a result, the oil producer most impacted by Saudi Arabia's production is Russia. One of the clearest indicators of this aim has been the word of Minister Al Naimi himself. In a December 2014 interview, Al Naimi noted that, in his opinion,

The other major world producers are being impacted even more than Saudi Arabia by the low prices.

> "it is illogical for a high efficiency producer like Saudi Arabia to lower their production to protect prices when the largest benefactor of high prices has been inefficient, high cost, producers such as Russia, who need continuous investment in new wells and . . . cannot shut in old wells, because if they do, they will not come back up . . . [which] is the opposite of fields in the Gulf, which are still young."[14]

Aside from Russia's higher production costs, the Russians are much more sensitive to price declines than Saudi Arabia due to the country's smaller cash

13 The United States imports close to 10 million b/d of crude oil and products but exports around 6 million b/d of refined products, and thus is a net importer of less than 6 million b/d. For detailed figures, please refer weekly to the *Oil and Gas Journal* Statistics page; "Statistics," *Oil and Gas Journal*, May 11, 2015, pp. 32-33.

14 "MEES Interview with Ali Al Naimi: 'OPEC Will Never Plan to Cut'," *Middle East Economic Survey*, vol. 57, no. 51/52, December 22, 2014.

Saudi Aramco oil tanks. In January 2016 Prince Mohammed bin Salman floated the possibility of privatizing Aramco, which would likely create the largest private company in the world. *Photo credit:* Reuters.

reserve cushion. Russia's cash reserves are about $320 billion, while Saudi Arabia's are almost double that at $616 billion, with the ability to raise another $250 billion from its internal institutions, like the local banks and social security funds.[15] It is therefore likely that Russia is most vulnerable to the Saudi effort to maintain market share.

Nonetheless, Saudi Arabia has been talking extensively with Russia about working together to bring the market back up to a more sustainable level. The Saudis, Russians, Venezuelans, and Qataris met in Qatar in February 2016 and agreed to not increase production in the near future. Iran welcomed the agreement, but until now has not committed to freezing its own oil output.[16] As a consequence of the meeting, oil prices rose by about 10 percent on February 20. However, the market rally was not sustained mainly because an agreement not to boost production does nothing to resorb the present glut. In this sense, the February Doha agreement will not provide a sustained boost in prices unless it is accompanied by a statement of cuts in production by the Saudis and the Russians of up to 1 million b/d. Prices did start increasing again later in the month though, as US shale producers showed a slight decline in production and the market feared lowered investments would cut production further in the near future.

15 Russian data provided by the Central Bank of Russia; Saudi Arabian data compiled using the SAMA Monthly Statistical Bulletin, December 2015, Tables 8A, 10, and 11A.

16 Barani Krishnin and Ron Bousso, "Oil Up 7 Percent as Iran Welcomes Output Freeze without Word on Cuts," Reuters, February 17, 2016, http://www.reuters.com/article/us-global-oil-idUSKCN0VO01K.

THE SUPREME COUNCIL OF SAUDI ARAMCO

The new SCSA, headed by Prince Mohammed, replaces the Supreme Petroleum Council (SPC), which used to be chaired by the King; co-chaired by the Crown Prince; and managed day-to-day by Prince Saudi Al Faisal, the Minister of Foreign Affairs. The SPC was supposed to define oil policy for the kingdom and make sure that Saudi Aramco implemented it. In reality, Saudi Al Faisal was busy with other matters and was not as familiar with detailed oil issues as Ali Al Naimi. As a consequence, Al Naimi essentially defined and implemented policy in place of the King. Even prior to the establishment of the SPC there had been a supervisory committee of Saudi Aramco also called SCSA. The SPC replaced this committee in 2000 in order to provide the royal leadership with more input into the formulation and implementation of oil policy. However, crude oil management and production are subject to many financial and technical variables that Princes are not truly familiar with; hence, the technocrats on the SPC, principally Ali Al Naimi, remained in charge of oil policy. Looking at the makeup of the new SCSA, it seems likely that limited royal intrusion on oil policy will continue, most notably because the new SCSA's members include a number of non-royal commoner technocrats, five of whom are members of the board of Saudi Aramco.

Many observers have speculated that the removal of Ali Al Naimi from the chairmanship of Saudi Aramco would signify that he would retire, leaving the ministry to Prince Abdulaziz, who for many years has been the Number Two to Al Naimi. However, now that the Minister is not automatically the Chairman of Saudi Aramco it means that even if Al Naimi were to retire, and Prince Abdulaziz were to become Minister, he would have no role at Saudi Aramco and thus, have much less of an influence on the daily operations and policy of Saudi Aramco than Al Naimi did.

WILL POLICY CHANGES RESULT?

The new management structure of the crude oil industry may not change the kingdom's oil policy as the new management recognizes the importance of letting technocrats and engineers manage the country's oil and natural gas endowment. The main difference between the old and the new structures is that the oil and natural gas industry of Saudi Arabia has been streamlined, with one less layer involved in policy and management.

Does the new structure mean that Saudi Arabia's new oil leadership will cut production to maintain prices? Most likely it does not. While the policy of high oil production and low oil prices started by Al Naimi is unpopular in some circles in the kingdom, there is no one with the credibility of Al Naimi who can change Saudi Arabia's present production policy or its relations with other crude producers.

Moreover, the new Saudi crude oil management structure will not change many of the foundational factors driving Saudi Arabia's oil policy. For instance, the cash reserves in Saudi Arabia and Russia will remain the same. It will also not induce US shale producers to produce less from wells where they already have invested their capital, especially at a time when their costs are also declining. It would make some sense to think that sooner rather than later the Saudis and Russians will negotiate an agreement to decrease production marginally to let prices increase. Assuming the classical economics of oil as an inelastic commodity is still valid, if Saudi Arabia and Russia cut supplies by only 5 percent, prices could go up by as much as 20 or 30 percent. Further, as is happening in the United States, the shale producers will cut future investments, limiting future production.

STREAMLINING SAUDI ENERGY

The reorganization of the Saudi upstream sector has been accompanied by important changes in the downstream side of crude oil and natural gas production.[17] In particular, the state has substantially reduced subsidies on gasoline, diesel, propane, and ethane.

Prior to the changes, however, Saudi Aramco had already implemented major investments in its downstream sector, most notably in the chemical industry and in its domestic and overseas refining capacity. Saudi Aramco controls Petro Rabigh and SADARA, joint ventures with assets of over $30 billion. Saudi Aramco is also investing in the growth of its refining capability. Its capacity is now at 2.9 million b/d and will increase to 3.3 million b/d as the new integrated 400,000 b/d Jazan refinery comes on line in 2018 (see table 2).

It is important to note three salient themes of all projects undertaken by Saudi Aramco and SABIC, the chemical company:

1. The companies seek to maximize the value added to the energy resources of the kingdom with the ultimate goal of creating as many good manufacturing jobs for Saudis as possible.
2. They always seek to control the technology, even in their joint ventures.
3. They always seek to control the overall management of the ventures.

17 The upstream sector primarily refers to the part of the hydrocarbon industry responsible for the exploration and recovery of oil and natural gas reserves.

Table 2. Saudi Arabia Refining Capacity and Ownership

Refinery	Capacity	Opening Date	Saudi Aramco Ownership Share	Partner
Ras Tanura	550,000 b/d	1945	100%	-
Jiddah	90,000 b/d	1967	100%	-
Riyadh	120,000 b/d	1974	100%	-
Yanbu	240,000 b/d	1983	100%	-
Samref, Yanbu	400,000 b/d	1984	50%	ExxonMobil
Sasref, Jubail	305,000 b/d	1984	50%	Shell
Petro Rabigh, Rabigh	400,000 b/d	2009	37.5%	Sumitomo
Satorp, Jubail	400,000 b/d	2013	62.5%	Total
Yasref, Yanbu	400,000 b/d	2014	62.5%	Sinopec
Total Capacity	2,905,000 b/d			
Jazan (forthcoming)	400,000 b/d	2018	100%	-
End-2018 Capacity	**3,305,000 b/d**			

Sources: Saudi Aramco; Middle East Economic Survey.

POSSIBLE PRIVATIZATION OF SAUDI ARAMCO[18]

On January 4, 2016, Prince Mohammed bin Salman, in his interview with the *Economist*, mentioned that he was considering the privatization of Saudi Aramco.[19] This move has been mulled over for many years in Saudi Arabia, but has never been implemented. One can only speculate why this privatization has never taken place but it is likely that considerations of transparency have been paramount. Saudi Aramco has always kept most of its financial information very private. On the other hand, it releases much operational information, including on overall production, refinery outputs, shipments, and social responsibility. Hence, it is likely that the company actively seeks to hide from the public the exact flow of payments received and disbursed.

The company's operations are well-known. It is reputed to be very fiscally conservative. Its personnel policy is based on merit rather than cronyism and it is 89 percent manned by Saudi nationals. By and large, the company is reputed in the kingdom to be the best firm to work for and the best managed in the kingdom. This sentiment is not isolated to Saudi nationals. Indeed, most oil observers regard Saudi Aramco as the most reliable supplier in the region and the world's best-managed national oil company. In fact, over the years it has been tasked by various Kings to establish and manage nonoil-related projects, such as two universities and a very large sports complex in Riyadh, mainly to ensure that the projects would be developed efficiently and not plagued by corruption. Altogether, it makes little sense for Saudi Aramco to hide what it is so good at.

The most likely explanation for Saudi Aramco's lack of financial transparency is that it wants to hide how much money is siphoned off to the royal family. It is possible to compute a very rough estimate of how much money is received by the company from its exports of crude oil, products, and natural gas liquids. At the same time, the Ministry of Finance discloses how much money it receives from the kingdom's oil production. Much of the difference between the two figures can be explained by the amount kept by Saudi Aramco for the management of the company and the investments needed to maintain fields and production facilities. The rest is probably transferred to the Royal Diwan (the King's executive office) for use by the royal family.[20]

The most likely explanation for Saudi Aramco's lack of financial transparency is that it wants to hide how much money is siphoned off to the royal family.

It would be advantageous for Saudi Aramco to disclose how much money it uses to manage the company as it would most likely compare very favorably with the finances of most large international oil companies. Saudi Aramco's ability to operate without having to rely on the Ministry of Finance or the Council of Ministers—while other national oil companies depend on allocations from national budgets, which are often very difficult to obtain—goes a long way toward explaining why it is the best national oil company. The poor management of oil fields in Iran, Iraq, and Venezuela, among others, points to the possibility that these national oil companies have a hard time procuring the finances necessary for basic maintenance from their state-controlled regulators.

Today, Saudi Arabia's citizens are being asked to sacrifice some of the luxuries they have enjoyed in the past, such as heavily subsidized gasoline, gas, water, and electricity. They are also faced with the impending imposition of a Value Added Tax. Most Saudis will likely find it unfair that they have to help fund the state when the royal family continues to have unchecked access

18 This topic was covered in some detail in an Atlantic Council blog post: Jean-François Seznec, "Privatization of Saudi Aramco: A Path to Good Governance," *New Atlanticist*, January 11, 2016, http://www.atlanticcouncil.org/blogs/new-atlanticist/privatization-of-saudi-aramco-a-path-to-good-governance.

19 "The Saudi Blueprint," *Economist*, January 9th, 2016, http://www.economist.com/news/leaders/21685450-desert-kingdom-striving-dominate-its-region-and-modernise-its-economy-same.

20 For details on how the oil payments are made, see Jean-François Seznec, "Politics of Oil Supply," chapter 4, in Robert E. Looney, ed., *Handbook of Oil Politics* (London: Rutledge International, 2012).

Salman bin Abdulaziz Al Saud, King of Saudi Arabia (left), and his son Mohammad bin Salman, Minister of Defense and Deputy Crown Prince of Saudi Arabia. *Photo credit:* Associated Press.

to the kingdom's main asset. Thus, the privatization of Saudi Aramco would change the relationship of the royal family with the rest of society, in that the country would know how much is being paid to the Royal Diwan and whether or not the Diwan, i.e., the Princes, are making sacrifices along with the rest of the country.

Naturally, the royal family is unlikely to find itself cut off from any of the oil benefits to which it is accustomed. However, what is likely to change is that the family will no longer see itself as able to access funds without being held responsible by the Saudi public.

Privatization could take a number of forms. Prince Mohammed and Khalid Al Falih have mentioned that the downstream assets of Saudi Aramco could be separated from the company and privatized. These assets would include the refineries in Saudi Arabia, which are 100 percent owned by Saudi Aramco; the Saudi share of the refineries owned in joint ventures between Saudi Arabia and the United States, China, and Korea; and the two large petrochemical joint ventures with Sumitomo and Dow Chemical. These assets would total over $100 billion, not including good will or capital gains. Privatization of these assets could be done one asset at a time or through the establishment of a separate holding company for each of Saudi Aramco's interests in the assets—somewhat like what SABIC, the Saudi chemical giant, does with its thirty-four separate ventures. It is very unlikely that Saudi Aramco would accept losing management or financial control of the assets and would therefore likely sell only a minority interest of the assets in each holding company.

A Saudi Aramco stripped of its downstream assets would still be large, and it would not be any more transparent than it is now. The true change would come when the core company starts issuing shares and sells a percentage to the public. An important point to remember is that the actual crude oil reserves do not belong to Saudi Aramco but to the state. Hence, unlike ExxonMobil or Chevron, which own the oil in the ground on their balance sheets, Saudi Aramco would have only a long-term lease from the state for exploring, extracting, and selling the crude oil and gas, albeit a very valuable one. Saudi Aramco would then be more like an investment company owning a controlling interest in a large downstream company and an operating company, granted the largest in the world as it would manage a capacity of about 12 million b/d.

How the royal family would get compensated for letting go of its present ability to take a portion of the country's oil income is difficult to imagine. But, somehow, the Royal Diwan could buy a portion of the shares issued by Saudi Aramco in both the operating company and the downstream holding company. The

Table 3. Impact of Changes in Subsidies Regime (Saudi Fuel Prices ($/mmbtu))

Fuel	2015	2016	Increase
Heavy Fuel Oil	0.43	^0.86	100%
Gas	0.75	*1.25	67%
Diesel	0.67	^2.18	225%
Crude Oil	0.73	^1.012	40%

* Saudi Finance Ministry, ^ MEES Estimates
Sources: Middle East Economic Survey; Electricity Cogeneration Regulatory Authority

state itself could also, as is done in most countries, get funded by taxing the net revenues of both companies, thus replacing the amount Saudi Aramco presently provides the Ministry of Finance, but doing so in a much more transparent, i.e., audited and publicized, manner.

The investment bank Jadwa forecasts Saudi energy subsidies will fall from $107 billion in 2014 to $61 billion in 2016.[21] The International Monetary Fund has mentioned many times that subsidies are a drain on the kingdom's finances and should be removed. On the other hand, with fiscal surpluses every year since 2003, except for 2009, Saudi Arabia has built substantial cash reserves, and thus the sense of urgency to cut subsidies has been minimal. Many Saudis feel that it is their birthright to have cheap gasoline or gas. In other words, just as the royal family has access to funds from oil, they too could benefit from the country's bounty. With surpluses making way for massive deficits, subsidies are no longer a privilege and, until now, the changes have not provoked noticeable discontent or outcry among the population.

On the other hand, the December 2015 changes in the prices of methane and ethane, which rose from $0.75/mmbtu to $1.25/mmbtu and $1.75/mmbtu, respectively, are having an immediate effect on the industrial users of these two gases (see table 3). The main users are SABIC, which claims that the new price will cost it $1.4 billion in 2016, and Ma'aden, the mining, fertilizer, and aluminum company, which estimates its costs will increase by $32 million this year.

The electricity and water companies, who are major users of natural gases, will see their costs increase as well, and will be permitted to pass on some of the added cost increases to the main industrial users. The rate for industrial, government, and large corporate users of water rose on December 16, 2015, to 9 riyals ($2.40) per cubic meter, up from 4 riyals.[22] Electricity for household use will be charged at a minimum of 0.05 riyals per kilowatt hour (kWh) up from an estimated 0.04 riyals/kWh, and commercial customers will face a minimum charge of 0.16 riyals/kWh. The average price for industrial customers will be 0.18 riyals/kWh.[23]

Hence, subsidies have not totally been cancelled as private households will still benefit from low water and electricity prices. Nonetheless, the changes are a major first step in modernizing the economy, improving the finances of the kingdom, and ultimately getting the country to view energy riches as less of a right and more as a resource that must be reasonably managed.

21 "Saudi Arabia's 2016 Fiscal Budget," Jadwa Investments, op. cit.

22 Angus McDowall and Reem Shamseddine, "Hurt by Cheap Oil, Saudi Government Will Make Water More Expensive," Reuters, November 2, 2015, http://www.reuters.com/article/us-saudi-water-idUSKCN0SR1PR20151102.

23 "Saudi Fuel Price Hikes Hit Generators But Make Gas Exploration More Economic," *Middle East Economic Survey*, January 8, 2016, vol. 59, no. 1, p. 8.

PROSPECTS FOR REGIONAL ENERGY COOPERATION

As income from its energy sources declines extensively, the kingdom may want to ration its production somewhat. Of course, Saudi Arabia has the largest conventional oil reserves in the world and is the second- or third-largest producer of crude oil. It is also the eighth-largest producer of natural gas, most of which is associated with oil extraction. However, gas, which is the best fuel for the production of electricity due to its efficiency and energy density, is in short supply. In order to satisfy demand for electricity, which is increasing between 7 percent and 8 percent per year, Saudi Arabia has had to resort to burning crude oil and heavy fuel oil. This practice is inefficient and quite polluting, and limits the amount of crude the kingdom can put on the market. Saudi Arabia burned an average of 572,000 b/d of crude in 2015—up to as much as 899,000 b/d in just July 2015, when there was peak demand for air conditioning.[24] The Saudi leadership is keenly aware of its deficiency in natural gas and has been trying to supplement its existing resources by extensively searching for unconventional natural gas resources.

It would make sense for Saudi Aramco, and the kingdom in general, to obtain its natural gas, especially its methane, from lower-cost producers like Qatar and Iran. Of course, relations between these countries and Saudi Arabia have been poor in the past. Unfortunately, relations between Iran and Saudi Arabia seem to be sinking to new lows every day. While not a cause for optimism, the two countries' economic interests could conceivably converge, and the two could develop mutually beneficial strategies with or without political agreements. As argued in a previous paper, Iran and Saudi Arabia could consider taking gas from the South Pars field in Iran and piping it to Saudi Arabia, which is quite close to the field, an arrangement which would be greatly advantageous to both parties.[25]

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Certainly for the past two years relations between Qatar and Saudi Arabia have greatly improved: The leaders of both countries meet often and policies are increasingly harmonized. Qatar, whose liquefied natural gas is now netting back approximately $3/mmbtu, could easily build a short pipeline to the main industrial areas of Saudi Arabia and sell gas profitably to the kingdom.[26]

24 "Saudi Product Exports at Record High; Crude Volumes Crimped," *Middle East Economic Survey*, October 23, 2015, vol. 58, no. 43, p. 8.

25 Jean-Francois Seznec, *Crude Oil for Natural Gas: Prospects for Saudi-Iranian Reconciliation*, Atlantic Council, October 15, 2015, http://www.atlanticcouncil.org/publications/issue-briefs/crude-oil-for-natural-gas-prospects-for-iran-saudi-reconciliation.

26 On a cost-insurance-freight sale price of $9/mmbtu to Japan, Qatar nets approximately $3/mmbtu after paying for transport ($4/mmbtu) and processing ($2/mmbtu).

CONCLUSION: THE END OF THE RENTIER STATE

Observers of Saudi Arabia could view the country's dramatic decline in oil revenues as either a glass half empty or half full. From the half-empty perspective, one can see that the cash reserves of the country are depleting rapidly. At the going rate of expenditures, and in light of the massive military expenses in Yemen and Syria, cash reserves could be exhausted in five years. As a consequence, the state has to find alternative sources of income, reduce expenses through subsidy cuts and tax increases, and impose curbs on the royal family's ability to access what should be state funds earned from oil. These changes potentially carry heavy social risks, which could lead to instability. When the pressures from large swaths of unemployed youth and from groups within and especially outside the kingdom who are seeking to overthrow the present Saudi system are added to the mix, the world could end up facing a volatile situation in a land that provides 10 percent of the world's crude oil and a large volume of chemicals and fertilizers that are in great demand in the Asian markets. Upheavals in the political system in Saudi Arabia could lead to a massive disruption in the flows of oil from other countries as well, which would translate to astronomical price increases worldwide, economic depression, and possibly even the direct military involvement of the major world powers.

On the other hand, from the glass-half-full perspective, Saudi Arabia's income problems, as well as those of other Gulf countries, could be viewed as a great opportunity, one that the kingdom's younger leadership has already embraced by reforming a political and economic system that was based mostly on the rent received from crude oil and natural gas. Saudi Arabia is already transforming from being merely a producer of a single commodity to becoming a major producer of chemicals, fertilizers, aluminum, cement, and other value-adding, energy-based products. The great progress achieved in the industrialization and development of the kingdom has been masked by the run-up in oil prices in the early twenty-first century. Today, industrial products based on Saudi Arabia's natural advantage in energy, capital, and geography amount to about 43 percent of the oil sales, while creating a large number of jobs and spreading the income through the economy in the normal economic fashion of most countries: Producers buy machinery and services and pay employees, who in turn buy goods, an increasing number of which are made locally, build homes, and otherwise engage in the domestic economy. Nonetheless, a major problem for the kingdom's treasury is that, while it has direct access to funds from oil, it does not tax sales of manufacturing companies. Relatedly, the present weakness of industrial development in the kingdom is that the state has little incentive to promote diversification since it gets little cash income from it in the absence of taxes.

Thus, the introduction of a VAT, the privatization of Saudi Aramco, the subsidy cuts, and any further changes in the taxation of profits would provide proper funding to the state, in turn making it increasingly resemble most modern economic states. With access to new funds, Saudi Arabia's dependence on oil would decline, as would its patrimonial approach to policymaking. However, it would be naive to expect that taxation will bring representation. After all, many dictatorial countries now, and in the past, have taxed their citizens without introducing democracy. Still, funding state expenditure through taxes as opposed to with oil revenues, coupled with the privatization of Saudi Aramco, collectively hold the potential to limit the ability for certain elites to effortlessly benefit from oil revenues, while also providing for a more efficient system of government.

It has become commonplace to say that there is a social contract in Saudi Arabia between the people and the royal family, whereby the royals provide sustenance in exchange for political and economic control. If this were ever the case, it will now change. The royal family will now become dependent on the state rather than the other way around. The state will be less interested in depending on oil, and instead, provided it can get taxes out of the new economy through a VAT or perhaps more likely through income taxes from the large manufacturing companies, if not from the people, it will seek to encourage entrepreneurship and industrial development much more than it has already done. In other words, the new reforms forced upon the country by the decline in oil prices spell the end of the rentier state.

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