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BMI Industry View

BMI View: Saudi Arabia's continued to push to displace the role of gas in the kingdom's domestic energy mix will struggle will insufficient gas production growth. Deepwater and associated gas will remain the main drivers of production growth, with a lack of foreign involvement and the low domestic gas price cap undercutting unconventional and associated gas developments. Following the OPEC decision to reduce the collective production ceiling, crude production in Saudi Arabia looks set to remain relatively stable. We forecast a gradual ramp-up in output, across our forecast period to meet rising domestic demand and sustain export market share.

Table: Headline Forecasts (Saudi Arabia 2012-2018)

	2012e	2013e	2014f	2015f	2016f	2017f	2018f
Crude, NGPL & other liquids prod, 000b/d	11,717.3	11,582.0	11,649.2	11,803.3	12,058.2	12,138.4	12,300.8
Dry natural gas production, bcm	111.1	113.8	120.6	129.1	136.8	143.2	150.4
Dry natural gas consumption, bcm	111.1	113.8	120.6	129.1	136.8	143.2	150.4
Refined products production & ethanol, 000b/d	1,935.1	1,780.3	2,100.8	2,520.9	2,773.0	2,828.5	2,998.2
Refined products consumption & ethanol, 000b/d	2,861.0	2,925.0	3,027.4	3,133.3	3,258.7	3,389.0	3,507.6

e/f = BMI estimate/forecast. Source: EIA/BMI

- In an attempt to maintain crude oil export share, we expect Saudi output to remain stable over the coming year. This will see average production of about 11.8mn b/d of crude and other liquids in 2015, a marginal increase from 2014 levels.
- However, we forecast a small decline in crude exports as new refining capacity is brought online, absorbing forecast production growth.
- In order to support exports, the kingdom has looked to increase the role of gas in the domestic power and industrial sectors. However, domestic gas consumption remains heavily capped due to limited production growth.
- Despite Saudi Arabia's heavy focus on unconventional and onshore non-associated gas resources, we expect slow progress in developing these prospects. We see deepwater projects alongside associated gas projects as the main drivers of gas production growth across our 10-year forecast period. Production will likely remain insufficient to meet unrestrained demand.
- Despite inadequate domestic production, proposals to import LNG will face major roadblocks, due to concerns over the loss of the kingdom's energy self sufficient status, low domestic gas prices and risks to domestic gas development.

SWOT

Oil & Gas SWOT

SWOT Analysis

Strengths

- Saudi Arabia has the world's second largest proven reserves of conventional resources after Venezuela.
- It remains a pivotal player in global oil trade with the vast majority of the world's spare production capacity and leading role in OPEC.
- Significant untapped natural gas reserves.
- Large refining base which is set to grow over the coming years with major greenfield projects and petrochemicals base.

Weaknesses

- The poor quality of gas reserves and uncompetitive fiscal terms have undermined efforts to bring in the foreign expertise necessary to increase gas production.
- Reports that Saudi Arabia may turn to LNG imports reflects the scale to which subsidies have distorted consumption patterns of both oil and gas. Although plans are underway to burn less oil for power generation to reserve for export, a failure to bring online adequate gas capacity or reduce consumption levels may undermine this strategy.

Opportunities

- Much of the Kingdom remains underexplored, with offshore exploration in the Red Sea nascent, and enhanced oil recovery (EOR)-based activity in the Neutral Zone holding further upside potential.
- A large investment plan, potentially offering attractive terms to service companies, could unleash a wave of investment into targeting the country's unconventional resources.

Threats

- Risk of terrorist attacks on energy facilities.
- Rising OPEC production in the short-to-medium terms - led by Iraq - and non-OPEC volumes - led by North America - could reduce the demand for Saudi crude and force

SWOT Analysis - Continued

Riyadh to either cutback production with risks to own market share or allow a glut of oil that depresses global prices at a time when break-even prices have risen to finance new social spending.

Industry Forecast

Upstream Exploration

BMI View: Poor fiscal and licensing terms and the limited involvement of foreign players will weigh efforts to target the kingdom's non-associated gas base.

Table: Proven Oil and Gas Reserves (Saudi Arabia 2012-2017)

	2012	2013	2014f	2015f	2016f	2017f
Proven oil reserves, mn bbl	267,020.0	267,910.0	268,357.7	269,769.8	271,346.1	272,104.2
Proven oil reserves, bn bbl	267.0	267.9	268.4	269.8	271.3	272.1
Proven oil reserves, % y-o-y	1.7	0.3	0.2	0.5	0.6	0.3
Reserves to production ratio (RPR), years	62.4	63.4	63.1	62.6	62.2	61.8
Natural gas proven reserves, bcm	7,938.0	8,059.6	8,142.7	8,418.5	8,492.4	8,562.5
Natural gas proven reserves, tcm	7.9	8.1	8.1	8.4	8.5	8.6
Natural gas proven reserves, % y-o-y	2.8	1.5	1.0	3.4	0.9	0.8
Natural gas reserves-to-production ratio, years	71.4	70.8	67.5	67.8	67.3	65.9

f = BMI estimate. Source: Saudi Aramco, EIA, BMI

Table: Proven Oil and Gas Reserves (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Proven oil reserves, bn bbl	271.9	271.2	271.5	269.0	265.3	263.7
Proven oil reserves, mn bbl	271,925.9	271,229.3	271,517.8	268,991.5	265,261.5	263,727.8
Proven oil reserves, % y-o-y	-0.1	-0.3	0.1	-0.9	-1.4	-0.6
Reserves to production ratio (RPR), years	60.9	60.2	59.7	58.7	57.5	56.8
Natural gas proven reserves, tcm	8.5	8.4	8.3	8.2	8.1	7.9
Natural gas proven reserves, bcm	8,527.4	8,441.6	8,325.2	8,216.0	8,082.6	7,923.6
Natural gas proven reserves, % y-o-y	-0.4	-1.0	-1.4	-1.3	-1.6	-2.0
Natural gas reserves-to-production ratio, years	63.1	62.2	61.0	59.0	56.4	53.1

f = BMI forecast. Source: Saudi Aramco, EIA, BMI

The bulk of Saudi Arabia's oil and gas reserves are located in the country's east and north-eastern provinces. National oil company Saudi Aramco estimates total proven reserves of 260.2bn barrels (bbl) of oil and 8.2trn cubic metres (tcm) of gas, the bulk of which is associated. Estimates cover both Saudi Arabia and Aramco's equity share of the Saudi-Kuwaiti Neutral Zone. Reserves are spread across 121 fields, with over half concentrated in nine giant fields in the kingdom's northeast: Ghawar, Safaniya, Khurais, Manifa, Shaybah, Qatif, Khursaniyah, Zuluf and Abqaiq.

Exploration in Saudi Arabia is conducted by Saudi Aramco. The company drilled a total of 29 oil exploration wells in 2013 and reported three discoveries - Al-Haryd, Duhul and Salsal. Al-Haryd was discovered in the deepwater Red Sea; Duhul and Salsal were found in the eastern onshore. Aramco also drilled 21 wells targeting conventional gas and reported two finds - Turayqa and Mihwaz.

The focus of exploration has increasingly shifted towards emerging and frontier plays, including in the Red Sea and onshore unconventional. Aramco has been conducting geological and geophysical studies in the Red Sea since 2009. The initial targets were mostly in shallow water, but have expanded to include deeper and more technically challenging prospects. Exploration drilling began at the end of 2011 and has yielded two significant discoveries: Al-Haryd and Shaur, a shallow water gas find.

Aramco is funnelling increased investment into non-associated gas exploration and has plans to fast-track the development of its commercial discoveries. In contrast to oil and associated gas, Aramco has allowed foreign companies to partner it in non-associated gas exploration in the kingdom's Empty Quarter. The company entered four joint ventures (JVs) between 2003 and 2004.

- EniRepSa - with Eni and Repsol
- Luksar - with Lukoil
- South Robh Al Khali Company - with Royal Dutch Shell
- Sinopec-Aramco - with Sinopec

However, the companies have since withdrawn from their respective JVs. In 2010, Lukoil relinquished 90% of the stake in its block, which included two significant gas discoveries. Repsol, Eni and Sinopec exited the kingdom in 2012, followed by Royal Dutch Shell in 2014.

Drilling results were relatively positive, yielding a number of prospective finds. However, the companies believed the discoveries to be broadly uneconomic. Part of the problem was the high sulphur content in the gas, significantly raising the costs of development. Another factor was the low domestic gas price cap, set at USD0.75 per million British thermal units (/mnBTU). As all gas produced would have to be sold

domestically, the cap weighs heavily on projects' commercial viability. Aramco has looked to increase the cap to USD1.75/mnBTU, although the bulk of developments would remain sub-commercial at this level.

In the absence of adequate pricing reform, foreign involvement in the Saudi Arabian gas sector will remain limited. Aramco has the financial power to drive development of the country's non-associated gas independently, but in context of sustained lower oil prices, increasing strain on the company's resources may limit the speed at which new projects are developed.

The sector will also suffer from the lack of access to foreign technologies. A substantial portion of the prospective non-associated resource base is located in technologically challenging areas offshore or in unconventional (tight) reservoirs onshore. Aramco has limited experience in unconventional exploration and will struggle to meet its target of 2bn cubic metres (bcm) of shale gas production by 2018 without the involvement of international oil companies (IOCs).

Upstream Projects

Table: Upstream Project Database

Name	Field Name	Companies	Status	Est. Peak Oil/Liquids Output (b/d)	Est. Peak Gas Output (bcm)	Type of Project
Partitioned Neutral Zone Offshore (PNZ)	Khafji, Hout, Lulu, Dorra	Al-Khafji Joint Operations (KJO)	Production	300000		Oil
Marjan	Marjan	Saudi Aramco(100%)	Production	570000		Conventional
Qatif	Qatif	Saudi Aramco[Operator] (100%)	Production	500000		Oil and gas processing and separating facilities; expansion
Safaniyah	Safaniyah	Saudi Aramco[Operator] (100%)	Production	1200000		Heavy Crude Oil
Nuayyim	Nuayyim	Saudi Aramco[Operator] (100%)	Production	100000		Arab Extra Light crude
Khurais	Khurais	Saudi Aramco[Operator] (100%)	Production	1200000	3.3	Arabian Light crude oil
Shaybah	Shaybah	Saudi Aramco[Operator] (100%)	Production	1000000		Arabian Extra Light oil
Berri	Berri	Saudi Aramco(100%)	Production	1.15		Gas capture, output expansion

Upstream Project Database - Continued

Name	Field Name	Companies	Status	Est. Peak Oil/Liquids Output (b/d)	Est. Peak Gas Output (bcm)	Type of Project
Ghawar	Ghawar	Saudi Aramco[Operator] (100%)	Production	5	20.7	Conventional
Wasit	Arabiyah/Hasbah	Saudi Aramco[Operator] (100%)	Development		25.8	Gas processing
Karan	Karan	Saudi Aramco[Operator] (100%)	Production		18.6	Sour gas
Manifa	Manifa (Moneefa)	Saudi Aramco[Operator] (100%)	Production	900000	10.3	Heavy oil, sour gas
Zuluf	Zuluf	Saudi Aramco(100%)	Production	450000	118	Conventional
Khursaniyah	Khursaniyah (inc. Abu Hadriyah and al-Fadhili)	Saudi Aramco(100%)	Production	500000	5.8	Oil and gas processing facilities
Partitioned Neutral Zone (PNZ)	Partitioned Neutral Zone, Phase Two (Saudi Arabia 50%)	Chevron(40%), Saudi Aramco(30%), Koc Holding	Production	600000	0.35	EOR Application; Heavy oil
Abu Sa'fah	Abu Sa'fah	Saudi Aramco(100%)	Production	300000	3.8	Oil and gas processing and separating facilities; output expansion
Haradh	Haradh	Saudi Aramco(100%)	Production	300000	1.4	Gas capture, oil output expansion
Dammam	Dammam	Saudi Aramco	Mothballed	100000		Oil
Mushaib (Block A)	Mushaib	Lukoil, Saudi Aramco	Exploration			Gas and condensates
Duhul	Duhul	Saudi Aramco	Discovery			Oil
Salsal	Salsal	Saudi Aramco	Discovery			Oil
Turayqa	Turayqa	Saudi Aramco	Discovery			Gas
Mihwaz	Mihwaz	Saudi Aramco	Discovery			Gas
Al-Haryd	Al-Haryd	Saudi Aramco	Discovery			Oil

Source: BMI

Upstream Production - Oil

Table: Oil Production (Saudi Arabia 2012-2017)

	2012	2013e	2014f	2015f	2016f	2017f
Crude, NGPL & other liquids prod, 000b/d	11,717.3	11,582.0	11,649.2	11,803.3	12,058.2	12,138.4
Crude, NGPL & other liquids prod, % y-o-y	4.1	-1.2	0.6	1.3	2.2	0.7
Crude, NGPL & other liquids prod, mn bbl/year	4,276.8	4,227.4	4,252.0	4,308.2	4,401.3	4,430.5
Crude, NGPL & other liquids prod, USDbn	468.3	447.7	433.7	310.2	308.1	305.7
Crude, NGPL & other liquids prod, USDbn, % y-o-y	6.0	-4.4	-3.1	-28.5	-0.7	-0.8
Crude, NGPL & other liquids prod, USDbn at USD50/bbl	213.8	211.4	212.6	215.4	220.1	221.5
Crude, NGPL & other liquids prod, USDbn at USD100/bbl	427.7	422.7	425.2	430.8	440.1	443.1
Crude, NGPL & other liquids prod, USDbn at USD150/bbl	641.5	634.1	637.8	646.2	660.2	664.6

e/f = BMI estimate/forecast. Source: EIA/BMI

Table: Oil Production (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Crude, NGPL & other liquids prod, 000b/d	12,300.8	12,466.0	12,552.1	12,640.3	12,720.1	12,802.1
Crude, NGPL & other liquids prod, % y-o-y	1.3	1.3	0.7	0.7	0.6	0.6
Crude, NGPL & other liquids prod, mn bbl/year	4,489.8	4,550.1	4,581.5	4,613.7	4,642.9	4,672.8
Crude, NGPL & other liquids prod, USDbn	323.3	341.3	348.2	355.3	362.1	373.8
Crude, NGPL & other liquids prod, USDbn, % y-o-y	5.7	5.6	2.0	2.0	1.9	3.2
Crude, NGPL & other liquids prod, USDbn at USD50/bbl	224.5	227.5	229.1	230.7	232.1	233.6
Crude, NGPL & other liquids prod, USDbn at USD100/bbl	449.0	455.0	458.2	461.4	464.3	467.3
Crude, NGPL & other liquids prod, USDbn at USD150/bbl	673.5	682.5	687.2	692.1	696.4	700.9

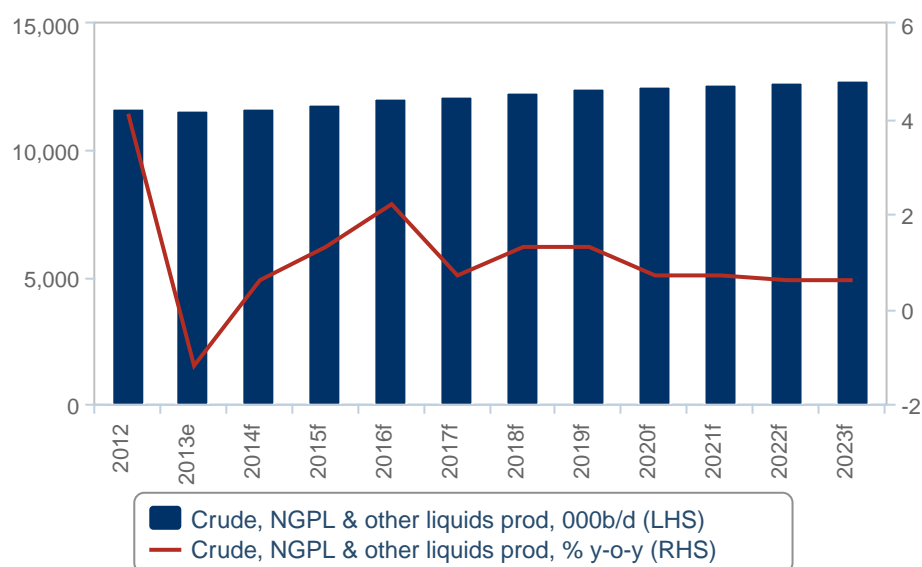
f = BMI forecast. Source: EIA/BMI

Saudi Arabia's crude oil production remained relatively stable in 2014, and following OPEC's decision not to lower its collective production ceiling, is set to increase in 2015. Over the longer term, we forecast a

gradual uptrend in production, as the kingdom moves to maintain export levels in the face of rising domestic demand.

Oil Production Forecast

(2012-2023)



e/f = BMI estimate/forecast. Source: Saudi Aramco, EIA, BMI

Plans to boost the country's productive capacity to 12mn barrels per day (b/d) were completed in 2010 and Aramco has indicated that the kingdom looks to maintain sustainable production at this level. The last major discovery to be brought online was the Manifa heavy oilfield; development of the field was completed in 2014. Peak output is expected at 900,000b/d of Arabian Heavy crude, 65,000b/d of condensate and 0.93bn cubic metres (bcm) of gas. Output from Manifa will not be exported, but will be used to supply the domestic refining sector.

Aramco has no plans to increase production capacity in the coming years. Efforts will be focused on drilling new wells at existing fields, to offset decline rates. Instead, the company's upstream activities have increasingly shifted to gas; expanding the use of gas in the domestic industrial and power sectors would allow the kingdom to meet rising demand from domestic refiners and to maintain current export volumes, without raising crude output.

However, slow development of the country's non-associated gas reserves has been limiting efforts at fuel-switching, and we forecast that Saudi Arabia will be forced to increase crude production in the coming years. Maintaining export market share in the face of rising competition from non-OPEC supply has been made a key strategic priority. And this, combined with strong demand growth in the domestic downstream and power sectors supports our forecast increases in crude output.

Risks to the forecast lie both to the upside and to the down. OPEC's decision not to cut the 30mn b/d collective production ceiling suggested the kingdom had eschewed its traditional role as swing producer. However, Saudi Arabia retains significant spare capacity, and has indicated that they would raise production in line with demand. Whilst global economic growth looks set to remain weak, supply outages amongst major producers such as Libya could see increased demand for Saudi crude.

The main downside risk to our forecast would be a decision by OPEC to cut production at the next meeting. Lower oil prices have put a number of OPEC producers under severe fiscal pressure, and prices are significantly below Saudi's estimated fiscal breakeven. We do not see Saudi Arabia cut production until sustained lower oil prices has brought offline sufficient non-OPEC supply. Prices are unlikely to impact production in this way, before mid-2015.

Upstream Production - Gas

BMI View: Gas production growth will be driven by non-associated offshore field developments; the role of unconventional will remain limited, due to technical and financial barriers to production.

Table: Gas Production (Saudi Arabia 2012-2017)

	2012	2013	2014f	2015f	2016f	2017f
Dry natural gas production, bcm	111.1	113.8	120.6	129.1	136.8	143.2
Dry natural gas production, bcm, % y-o-y	8.8	2.4	6.0	7.0	6.0	4.7
Dry natural gas production, USDbn	60.5	60.0	61.2	46.2	47.6	49.2
Dry natural gas production, USDbn, % y-o-y	10.8	-0.9	2.1	-24.5	3.1	3.2
Dry natural gas production, USDbn at USD6/mn btu	23.8	24.4	25.8	27.7	29.3	30.7
Dry natural gas production, USDbn at USD12/mn btu	47.6	48.8	51.7	55.3	58.6	61.4
Dry natural gas production, USDbn at USD18/mn btu	71.4	73.2	77.5	83.0	88.0	92.1
Dry natural gas production, % of domestic consumption	100.0	100.0	100.0	100.0	100.0	100.0

f = BMI forecast. Source: Saudi Aramco, EIA, BMI

Table: Gas Production (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Dry natural gas production, bcm	150.4	153.4	154.9	155.7	156.5	157.3
Dry natural gas production, bcm, % y-o-y	5.0	2.0	1.0	0.5	0.5	0.5
Dry natural gas production, USDbn	53.9	57.2	58.6	59.6	60.7	62.6
Dry natural gas production, USDbn, % y-o-y	9.6	6.3	2.3	1.8	1.8	3.1
Dry natural gas production, USDbn at USD6/mn btu	32.2	32.9	33.2	33.4	33.5	33.7
Dry natural gas production, USDbn at USD12/mn btu	64.5	65.7	66.4	66.7	67.1	67.4
Dry natural gas production, USDbn at USD18/mn btu	96.7	98.6	99.6	100.1	100.6	101.1
Dry natural gas production, % of domestic consumption	100.0	100.0	100.0	100.0	100.0	100.0

f = BMI forecast. Source: Saudi Aramco, EIA, BMI

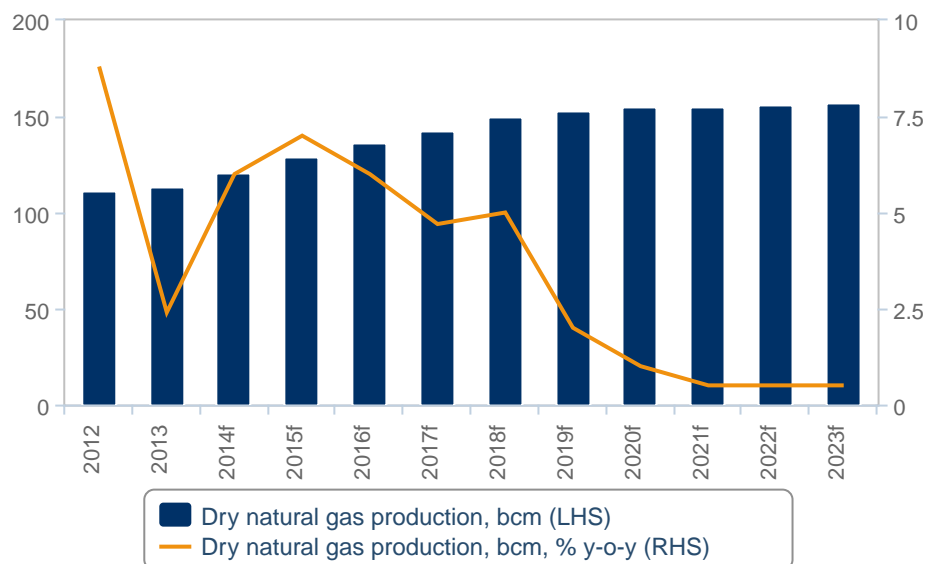
Saudi Arabia is targeting an aggressive ramp-up in gas production for use in the domestic industrial and power sectors, displacing the role of crude and releasing it for export. Ensuring a reliable supply of low cost ethane feedstock for the expanding petrochemical sector is also critical.

Historically, much of the kingdom's output was associated gas drawn from the giant Ghawar oilfield, feeding the Hawiya, Haradh and 'Uthmaniyah gas plants. In recent years, Riyadh has made gains in increasing production and diversifying away from its associated resources. Since 2013, there has been a 35% increase in the number of gas-directed rigs in the kingdom, and we expect this upward trend in gas-directed drilling to continue into 2015.

The offshore Karan gas field, which came online in 2012, was the first non-associated field to be developed in the kingdom. Karan added an additional 18.6bn cubic metres (bcm) at peak production levels, delivered to the Khursaniyah gas processing facility. Khursaniyah was brought on stream in 2010 to process associated gas from the Abu Hadriya, Fadhili, Khursaniyah, Marjan, Safiniyah and Zuluf fields. It was expanded to accommodate Karan, and associated production from the Manifa heavy oilfield, and has nameplate capacity of 29.8bcm.

Gas Production Forecast

(2012-2023)



f = BMI forecast. Source: Saudi Aramco, EIA, BMI

The Wasit gas plant, slated to come online in the first quarter of 2015, will be the second major non-associated gas development, processing output from the Arabiyah and Hasbah gas fields offshore in the Gulf. Wasit will have capacity to process up to 25.8bcm of gas. The project was due online in 2014, but the high sulphur content of the gas caused freezing in the pipes. The high cost and technically challenging nature of the project poses a risk of further delay. We do not forecast Wasit to reach peak production before 2016.

Aramco is also targeting production from offshore in the Red Sea from 2016, following an aggressive exploration drive in the area. Discoveries have been highly prospective and fast-tracked developments could see shallow-water resources brought online in the next two to three years. The company has substantial experience in offshore production and offshore resources will remain the key drivers of gas production growth across our 10-year forecast period. However, Aramco has a more limited background in deepwater developments and may struggle to bring online the more technically challenging Red Sea gas deposits, in the absence of foreign sector involvement.

Progress in developing the kingdom's vast unconventional resources onshore will be more limited.

Aramco had said the company would look to produce gas from unconventional formations using hydraulic fracturing (fracking) by 2020. In response to rising demand and tightening domestic supply, the company accelerated the timeline, targeting 2bcm of shale output by 2018.

Aramco's unconventional gas programme, which launched in 2011, became fully operational in 2013. The company is currently exploring for unconventional gas in three areas: the Northwest, South Ghawar and Rub al-Khali (the Empty Quarter).

Saudi Arabia's shale potential is substantial, with Baker Hughes estimating that the country could hold some 18.1tn cubic metres (tcm) of technically recoverable shale gas resources. However, there are major obstacles to shale gas development in Saudi Arabia:

- **Lack of infrastructure:** The bulk of Saudi Arabia's unconventional resources lie in remote areas, which lack existing infrastructure;
- **Geological complexity:** Saudi Arabia's tight gas resources lie deep in the ground, making them more technically challenging to tap;
- **Water scarcity:** The hydraulic fracturing technique used to produce shale resources requires large quantities of water, which Saudi Arabia lacks.

These factors combine to significantly raise the cost of production - problematic given the artificially low domestic gas prices in Saudi Arabia. Although the pricing framework is under review, we see little scope for improvement. In the absence of adequate pricing reform, and in light of major technical challenges, we predict slow progress towards development of unconventional gas production in the kingdom.

Within our forecast period, more significant upside risk stems from gas conservation efforts. Saudi Aramco is looking to cut the level of gas flaring, and the kingdom's flare gas recovery system has allowed an addition 50bcm of output to be connected to the gas network over the past decade.

Small-scale gas capture technology could offer a means to reduce flaring at smaller oilfields, where it would be uneconomic to develop a large gas processing plant. This involves mini gas-to-liquids (GTL) facilities that capture gas and deploy it at the source. Aramco's investment in US-based Siluria technologies, which is developing technologies to convert methane into gasoline and ethylene, could open opportunities, and offer alternative means to monetise flared or stranded gas.

Refining

BMI View: Refining capacity will rise to nearly 3.3mn b/d by the end of the forecast period, driven by the Jizan and Yanbu refinery projects. High refinery utilisation rates will see refined fuels production reach 3.1mn b/d by 2023.

Table: Refining Capacity and Refined Products Production (Saudi Arabia 2012-2017)

	2012	2013	2014f	2015f	2016f	2017f
Crude oil refining capacity, 000b/d	2,105.0	2,205.0	2,505.0	2,905.0	2,905.0	2,905.0
Crude oil refining capacity, % y-o-y	1.2	4.8	13.6	16.0	0.0	0.0
Crude oil refining capacity, utilisation, %	91.9	80.7	81.0	83.8	90.5	92.4
Refined products production & ethanol, 000b/d	1,935.1	1,780.3	2,029.6	2,435.5	2,630.3	2,682.9
Refined products production & ethanol, % y-o-y	0.0	-8.0	14.0	20.0	8.0	2.0
Refined products production, 000b/d	1,935.1	1,780.3	2,029.6	2,435.5	2,630.3	2,682.9
Refined products production, % y-o-y	0.0	-8.0	14.0	20.0	8.0	2.0

f = BMI forecast. Source: Saudi Aramco, EIA, BMI

Table: Refining Capacity and Refined Products Production (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Crude oil refining capacity, 000b/d	3,305.0	3,305.0	3,305.0	3,305.0	3,305.0	3,305.0
Crude oil refining capacity, % y-o-y	13.8	0.0	0.0	0.0	0.0	0.0
Crude oil refining capacity, utilisation, %	87.7	91.2	92.1	93.0	93.5	93.9
Refined products production & ethanol, 000b/d	2,897.5	3,013.4	3,043.6	3,074.0	3,089.4	3,104.8
Refined products production & ethanol, % y-o-y	8.0	4.0	1.0	1.0	0.5	0.5
Refined products production, 000b/d	2,897.5	3,013.4	3,043.6	3,074.0	3,089.4	3,104.8
Refined products production, % y-o-y	8.0	4.0	1.0	1.0	0.5	0.5

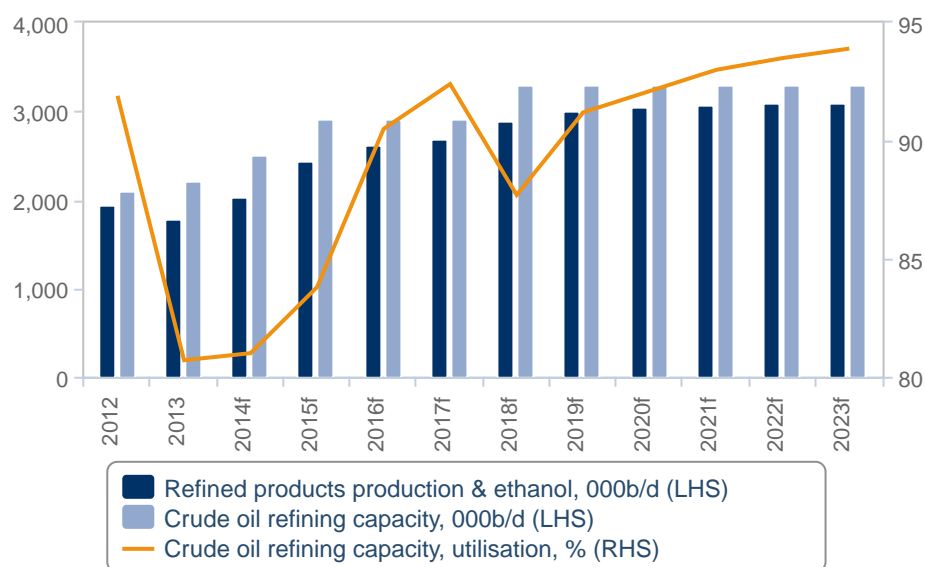
f = BMI forecast. Source: Saudi Aramco, EIA, BMI

In 2014, nameplate refining capacity increased to 2.5mn barrels per day (b/d), with the full inclusion of the 400,000b/d SATORP refinery complex at Jubail. The plant saw its first commercial shipments in September 2013, and has gradually ramped up production. The refinery is designed to produce high-grade fuels and the

complex also includes integrated petrochemical units to produce benzene, paraxylene and propylene. The feedstock is Arab Heavy crude oil from the nearby Safaniya and Manifa fields.

Refining Capacity Forecast

(2012-2023)



f = BMI forecast. Source: Saudi Aramco, EIA, BMI

In 2015, capacity will grow to 2.9mn b/d, as output from Yanbu comes on stream. In September 2014, Saudi Aramco and joint venture (JV) partner Sinopec began production testing at the 400,000b/d facility. The facility is in the final stage of commissioning and is slated to begin exports in the first quarter of the year.

We have delayed forecast first production at the 100% state-owned Jazan refinery until 2018, as cost overruns, contract disputes and major infrastructural headwinds continue to weigh on project development.

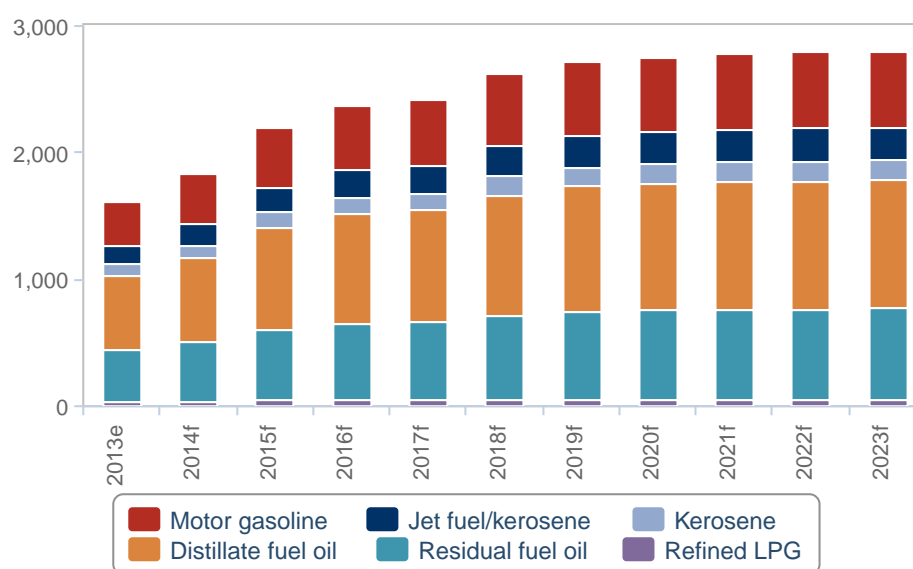
Located in the south-west, Jazan is amongst the most underdeveloped and remote provinces of Saudi Arabia. Infrastructure is critically lacking and materials for the project have to be shipped to the Jazan terminal on the Red Sea. Construction of the terminal has yet to be completed, preventing access by the large carriers needed to transport heavy equipment. The terminal will reportedly be complete by mid-2015,

allowing construction of the refinery to accelerate. However, given the scale of the project, the risks remain heavily to the downside.

Given the high specification of Saudi Arabia's refineries, a secure supply of low-cost crude feedstock and a strong domestic market we anticipate a high level of utilisation, averaging above 90% throughout most of our forecast period. The make-up of the new refineries is heavily geared towards high-grade, light-end products, and we see motor gasoline and middle distillates as the main source of production growth over the next 10 years.

High-End Products Driving Growth

Saudi Arabia Refined Fuels Production Forecast (000b/d)



e/f = BMI estimate/forecast. Source: Saudi Aramco, EIA, BMI

Refined Fuels Consumption

BMI View: While the development of nuclear power and ambitious renewables plans could ease tight power supplies over the long term, in the near term oil and gas are set to satisfy the majority of consumption needs. Given struggling gas production growth, failure to reduce oil subsidies and the unlikelihood of LNG imports in the coming years, oil will continue to play major role in meeting increasing power and petrochemical needs.

Table: Refined Products Consumption* (Saudi Arabia 2012-2017)

	2012e	2013e	2014f	2015f	2016f	2017f
Refined products consumption, 000b/d	2,861.0	2,925.0	3,027.4	3,133.3	3,258.7	3,389.0
Refined products consumption, % y-o-y	1.6	2.2	3.5	3.5	4.0	4.0

e/f = BMI estimate/forecast. Source: EIA/BMI

Table: Refined Products Consumption* (Saudi Arabia 2018-2023)

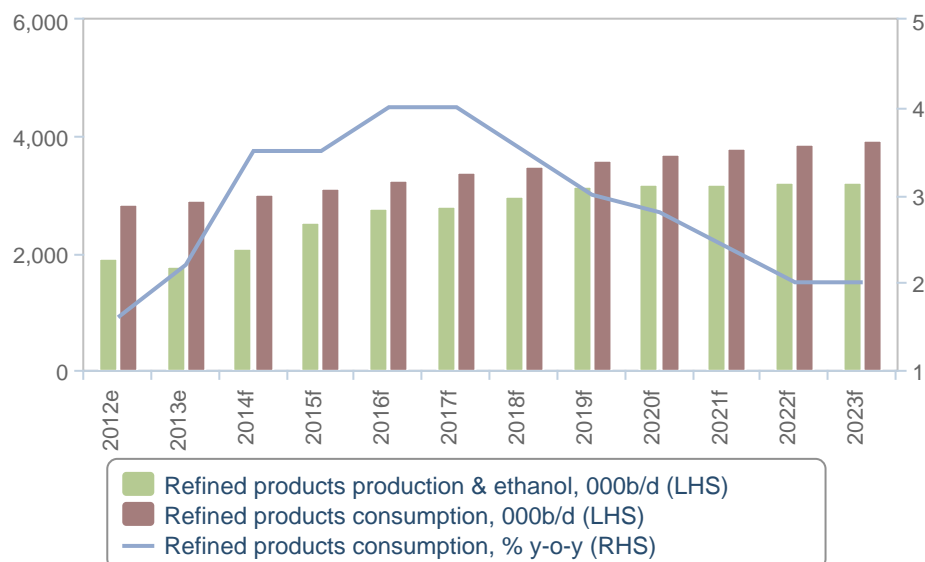
	2018f	2019f	2020f	2021f	2022f	2023f
Refined products consumption, 000b/d	3,507.6	3,612.9	3,714.0	3,803.2	3,879.2	3,956.8
Refined products consumption, % y-o-y	3.5	3.0	2.8	2.4	2.0	2.0

f = BMI forecast. Source: EIA/BMI

Saudi Arabia is the largest oil-consuming nation in the Middle East, with a consumption level of 2.9mn b/d of refined production in 2013 according to EIA data, almost double its consumption level in 2000. Strong consumption growth has been spurred by strong industrial growth, a large increase in power consumption and very heavily subsidised prices, which have resulted in a large increase in wasteful oil consumption patterns, as in several Middle Eastern countries. Indeed, the country has practically no public transport and car fuel demand is high because of the geographical size of the country and the extensive subsidy regime.

Refined Products Production and Consumption Forecast

(2012-2023)



e/f = BMI estimate/forecast. Source: EIA/BMI

A strong contributor to this increased consumption has been the increased use of crude oil burned for power generation and the increasing use of natural gas liquids (NGLs) for petrochemical production. Crude burn is particularly high in the summer months due to a spike in electricity need for air-conditioning. In addition, the transport sector is also a high consumer of refined products.

Reports that Saudi Arabia may turn to LNG imports reflects the scale to which subsidies have distorted consumption patterns of both oil and gas. Although plans are underway to burn less oil for power generation to reserve for export, a failure to bring online adequate gas capacity or reduce consumption levels may undermine this strategy.

Indeed, we expect the strong oil consumption growth to endure in the coming years. First, our Country Risk team does not expect a breakthrough in subsidy reform over the coming years. While officials have begun to raise this issue in public, the politically and socially sensitive nature of subsidy cuts make it unlikely for large cuts to occur in the coming years.

In addition, increasing power and petrochemical needs in a context of struggling gas production output (see 'gas production' section) will likely see a continued uptake of crude oil as a power source in the coming years.

Indeed, alternative sources of energy are limited at the moment. Saudi Arabia has ambitious renewable targets, setting the goal of generating half its power from renewable sources by 2020. Furthermore, Saudi Arabia aims to replace 50% of its dependence on traditional fossil fuel with atomic and renewable energy by 2032. While we do see prospects for a contribution from renewable power, namely solar towards the tail end of our forecast, its contribution will be small. We do not expect nuclear reactors to come online within our current 10-year forecast period altogether.

As such, while the development of nuclear power, not currently pencilled in, and ambitious renewables plans could ease tight power supplies over the long term, in the near term oil and gas are set to satisfy the majority of consumption needs. Given struggling gas production growth and the unlikelihood of LNG imports in the coming years, oil will continue to play major role in meeting increasing power and petrochemical needs.

We therefore currently forecast for oil consumption to grow from an estimated 2.9mn b/d in 2013 to 4.2mn b/d by 2023.

Gas Consumption

BMI View: Rising demand from the industrial and power sectors will support strong gas consumption growth. Limits on domestic supply and a lack of import alternatives will see production cap consumption across our forecast period, slowing growth from 2020.

Table: Gas Consumption (Saudi Arabia 2012-2017)

	2012e	2013e	2014f	2015f	2016f	2017f
Dry natural gas consumption, bcm	111.1	113.8	120.6	129.1	136.8	143.2
Dry natural gas consumption, % y-o-y	8.8	2.4	6.0	7.0	6.0	4.7
Dry natural gas consumption, USDbn	60.5	60.0	61.2	46.2	47.6	49.2
Dry natural gas consumption, USDbn % y-o-y	10.8	-0.9	2.1	-24.5	3.1	3.2

f = BMI forecast. Source: Saudi Aramco, EIA, BMI

Table: Gas Consumption (Saudi Arabia 2018-2023)

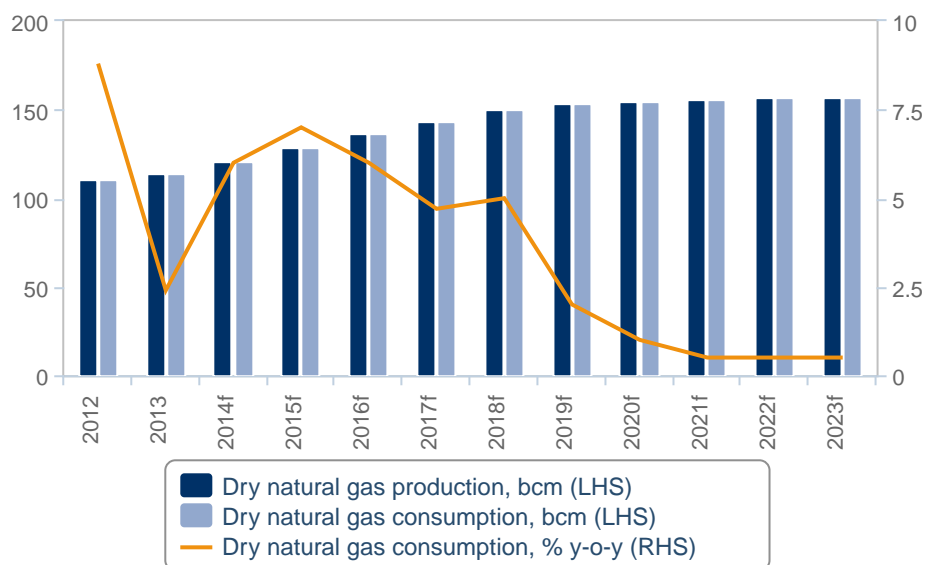
	2018f	2019f	2020f	2021f	2022f	2023f
Dry natural gas consumption, bcm	150.4	153.4	154.9	155.7	156.5	157.3
Dry natural gas consumption, % y-o-y	5.0	2.0	1.0	0.5	0.5	0.5
Dry natural gas consumption, USDbn	53.9	57.2	58.6	59.6	60.7	62.6
Dry natural gas consumption, USDbn % y-o-y	9.6	6.3	2.3	1.8	1.8	3.1

f = BMI forecast. Source: Saudi Aramco, EIA, BMI

In order to sustain crude exports in the face of rapidly rising domestic demand, Saudi Arabia has looked to gas to displace the role of crude in the industrial and power sectors.

Gas Production and Consumption Forecast

(2012-2023)

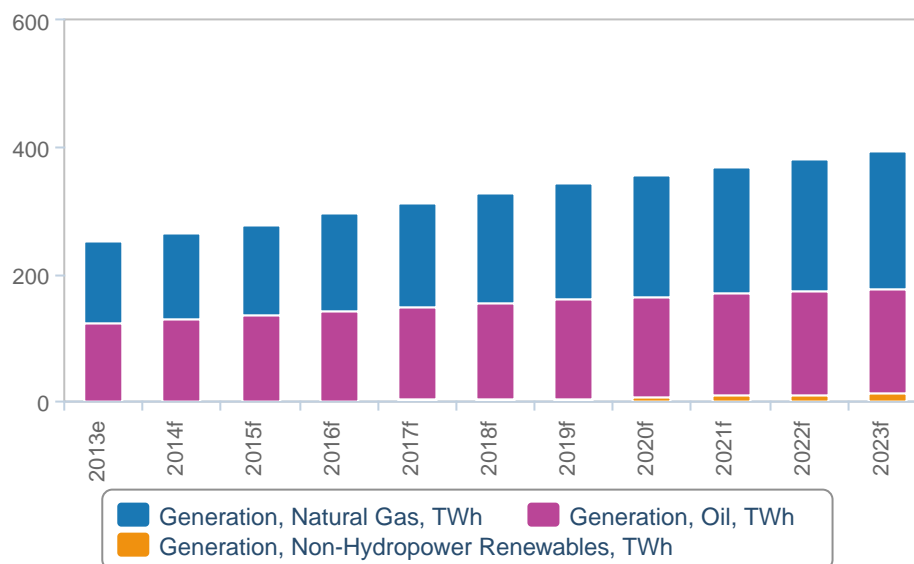


f = BMI forecast. Source: Saudi Aramco, EIA, BMI

According to our data, natural gas accounted for 51.1% of total electricity generation in the kingdom in 2014; by 2023, we forecast its share to rise to 55.2%, supporting a 7.2% decrease in the share of oil. The additional demand for gas will be a major driver of consumption growth up to 2020, when the pace of increase in gas-fired generation begins to slow.

Power Sector Driving Domestic Gas Consumption

Saudi Arabia Electricity Generation By Source (TWh), 2013-2023



e/f = BMI estimate/forecast. Source: National sources, BMI

Other drivers of growth include the water desalination sector and mining projects in Ras Al-Khair, which rely on gas and sulphur to produce aluminium and phosphate fertilisers. The petrochemicals industry is also a large consumer and securing a reliable flow of gas for domestic petrochemicals plants will remain a key priority given the sector's strategic importance. Petrochemicals companies in Saudi Arabia have benefited from access to cheap ethane feedstock, giving them a strong commercial advantage over producers in other countries, reliant on more expensive naphtha feeds.

An aggressive expansion of the Saudi Arabian petrochemicals sector has contributed to a tightening in domestic supply and demand. As discussed previously, the challenging nature of the resource base, poor pricing dynamics and a lack of foreign involvement in the sector have slowed the growth in gas production. Production is struggling to keep pace with consumption, and as a result consumption levels may be significantly below the level of unrestrained demand. This dynamic will deepen, as new capacity comes online over the next four years. In our view, tightness in the domestic gas supply will limit further opportunities for downstream expansion, beyond 2018.

Table: MAJOR DOWNSTREAM PROJECTS

Project Name	Value (US \$mn)	Capacity/Length	Timeframe	Status
Petrochemical Plant, Jubail	800	200 '000 tonnes	2010-2013	Operational (September 2013)
Polysilicon Plant, Jubail	1500	3.35 '000 tonnes	-2017	Under construction (First phase completed by Q114 and other two phases by 2017)
Sadara Petrochemical Plant	20000	3000 '000 tonnes	-2015	Under construction (November 2013)
Rabigh II Petrochemicals Expansion	7000		-2016	Contract Awarded (September 2013)
Ethylene Vinyl Acetate and Polyethylene Plant, Jubail	746.59	200 '000 tonnes	-	Contract Awarded (February 2012)
Fertilizer Plant, Jubail	53.33	3600 '000 tonnes	-	Contract Awarded (February 2012)
Fertilizer Plant, Ras Al Khair	599.9	3000 '000 tonnes	2014-2016	Contract Awarded (November 2013)

Source: BMI Infrastructure Key Projects Database

Limited opportunities domestically may see major Saudi Arabian companies look abroad for new opportunities. Saudi Aramco hinted that it may move to future demand areas such as China, India and other parts of the Middle East, while SABIC is reportedly in talks regarding mega-projects in North America and China.

Trade - Oil

BMI View: Saudi Aramco will act to maintain crude export share in the face of increased domestic demand and rising non-OPEC supply.

Table: Crude Oil Net Exports (Saudi Arabia 2012-2017)

	2012	2013e	2014f	2015f	2016f	2017f
Crude & other liquids net export, 000b/d	9,782.2	9,801.7	9,548.5	9,282.3	9,285.2	9,309.9
Crude & other liquids net export, % y-o-y	5.0	0.2	-2.6	-2.8	0.0	0.3
Crude & other liquids net export, USDbn	391.0	378.9	355.5	243.9	237.2	234.5
Crude & other liquids net export, USDbn, % y-o-y	6.9	-3.1	-6.2	-31.4	-2.7	-1.2
Crude & other liquids net export, USDbn at USD50/bbl	178.5	178.9	174.3	169.4	169.5	169.9
Crude & other liquids net export, USDbn at USD100/bbl	357.1	357.8	348.5	338.8	338.9	339.8
Crude & other liquids net export, USDbn at USD150/bbl	535.6	536.6	522.8	508.2	508.4	509.7

e/f = BMI estimate/forecast. Source: Saudi Aramco, EIA, BMI

Table: Crude Oil Net Exports (Saudi Arabia 2018-2023)

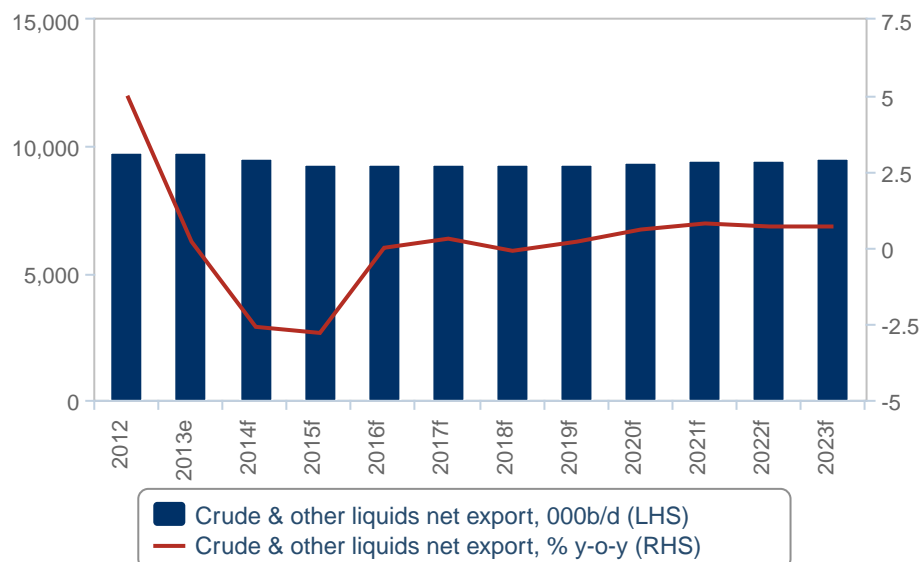
	2018f	2019f	2020f	2021f	2022f	2023f
Crude & other liquids net export, 000b/d	9,302.6	9,317.9	9,372.6	9,444.8	9,508.7	9,574.6
Crude & other liquids net export, % y-o-y	-0.1	0.2	0.6	0.8	0.7	0.7
Crude & other liquids net export, USDbn	244.5	255.1	260.0	265.4	270.7	279.6
Crude & other liquids net export, USDbn, % y-o-y	4.3	4.3	1.9	2.1	2.0	3.3
Crude & other liquids net export, USDbn at USD50/bbl	169.8	170.1	171.0	172.4	173.5	174.7
Crude & other liquids net export, USDbn at USD100/bbl	339.5	340.1	342.1	344.7	347.1	349.5
Crude & other liquids net export, USDbn at USD150/bbl	509.3	510.2	513.1	517.1	520.6	524.2

f = BMI forecast. Source: Saudi Aramco, EIA, BMI

Saudi Arabia was the largest exporter of petroleum liquids globally in 2013. According to the EIA, the kingdom exported an estimated 7.7mn b/d of crude oil in 2013, with Asia receiving about 68% of crude oil exports.

Crude Oil Net Exports Forecast

(2012-2023)



e/f = BMI estimate/forecast. Source: Saudi Aramco, EIA, BMI

The US is Saudi Arabia's largest crude importer, and Saudi is the largest petroleum exporter to the US after Canada. The next four largest importers of Saudi crude are all within Asia: Japan, China, South Korea and India.

We believe that Saudi Arabia will progressively switch its crude exports from the US to Asia, as rising Canadian heavy oil production backs out Saudi exports to North America. This dynamic already appears to be in play and Saudi Arabian exports to the US have dropped in recent months. The country has lowered also official selling prices (OSP) to Asia, attempting to preserve market share against rising competition from non-OPEC producers.

Struggling gas production and rising domestic crude demand, could strain export volumes over the coming years. However, we forecast export volumes to remain relatively stable across our forecast period, as Aramco increases production to crude exports.

Table: Refined Fuels Net Exports (Saudi Arabia 2012-2017)

	2012e	2013e	2014f	2015f	2016f	2017f
Refined products net exports, 000b/d	-925.9	-1,144.7	-926.6	-612.4	-485.7	-560.5
Refined products net exports, % y-o-y	5.1	23.6	-19.1	-33.9	-20.7	15.4
Refined products net exports, USDbn	-38.9	-45.8	-35.7	-22.5	-19.6	-22.6
Refined products net exports, USD, % y-o-y	8.1	17.7	-22.0	-37.1	-12.7	15.1
Refined products net exports, USDbn at USD50/bbl	-17.4	-21.1	-17.3	-15.0	-13.4	-15.7
Refined products net exports, USDbn at USD100/bbl	-34.8	-42.1	-34.6	-30.0	-26.9	-31.4
Refined products net exports, USDbn at USD150/bbl	-52.2	-63.2	-51.8	-45.0	-40.3	-47.1

e/f = BMI estimate/forecast. Source: EIA/BMI

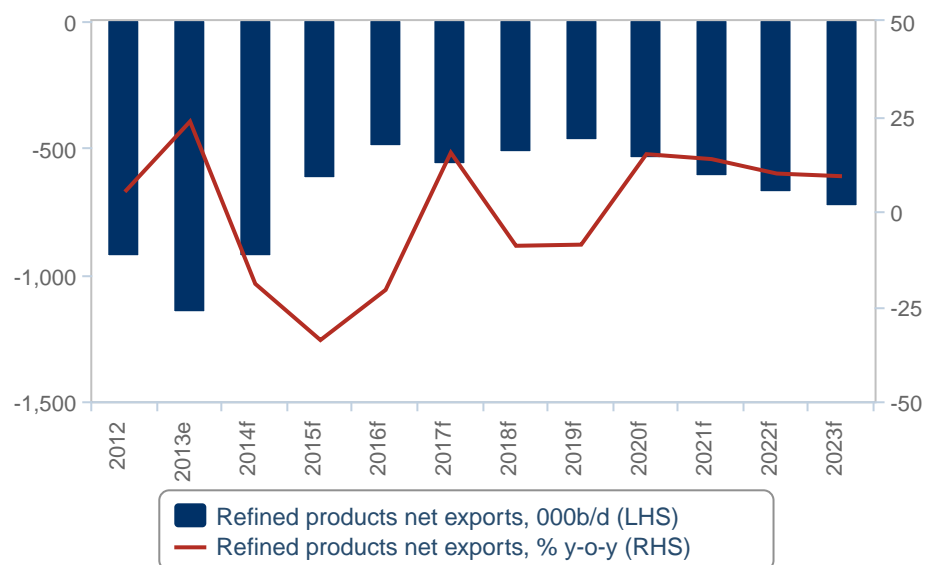
Table: Refined Fuels Net Exports (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Refined products net exports, 000b/d	-509.5	-464.8	-534.5	-607.7	-667.8	-729.3
Refined products net exports, % y-o-y	-9.1	-8.8	15.0	13.7	9.9	9.2
Refined products net exports, USDbn	-20.9	-19.3	-21.7	-24.3	-26.2	-28.3
Refined products net exports, USD, % y-o-y	-7.6	-7.7	12.9	11.9	7.6	8.0
Refined products net exports, USDbn at USD50/bbl	-13.9	-12.3	-13.8	-15.2	-16.2	-17.0
Refined products net exports, USDbn at USD100/bbl	-27.8	-24.7	-27.5	-30.4	-32.3	-34.0
Refined products net exports, USDbn at USD150/bbl	-41.7	-37.0	-41.3	-45.6	-48.5	-51.1

f = BMI forecast. Source: EIA/BMI

Refined Products Net Exports Forecast

(2012-2023)



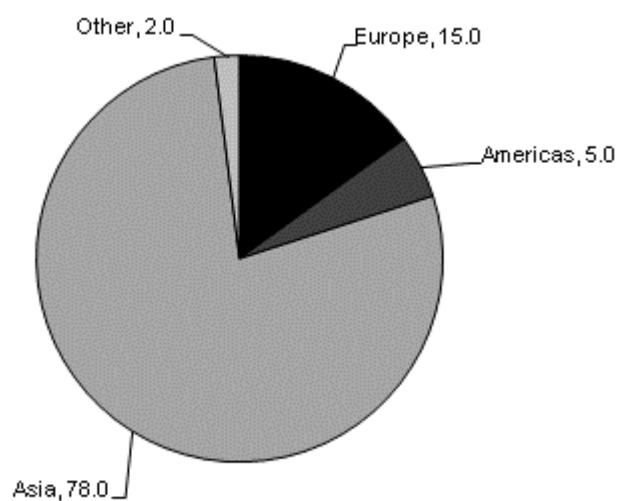
e/f = BMI estimate/forecast. Source: EIA/BMI

Saudi Arabia has become a net refined product importer since 2009 as domestic consumption increases steeply. However, its important downstream expansion will see its net imports of refined products diminish from 2017 onwards. Indeed, the country is aiming to turn heavy crudes into higher value added products destined for exports.

As we have seen, these changing dynamics will have significant implication for global oil and products markets. Saudi Arabia's increasing turn towards refined products production could see its ability to act as the world's swing producer curtailed as more of its exports take the form of refined products.

Refined Fuels Exports

Saudi Arabia Refined Products Exports By Destination, 2013



Source: EIA

Table: Total Net Oil Exports - Crude and Products (Saudi Arabia 2012-2017)

	2012e	2013e	2014f	2015f	2016f	2017f
Total net oil exports (crude & products), 000b/d	8,864.7	8,665.4	8,630.4	8,678.6	8,808.4	8,758.5
Total net oil exports (crude & products), % y-o-y	4.9	-2.2	-0.4	0.6	1.5	-0.6
Total net oil exports (crude & products), USDbn	352.1	333.1	319.8	221.4	217.6	211.9
Total net oil exports (crude & products), USDbn, % y-o-y	6.8	-5.4	-4.0	-30.7	-1.7	-2.6
Total net oil exports (crude & prod.), USDbn at USD50/bbl	161.1	157.8	157.0	154.4	156.0	154.2
Total net oil exports (crude & prod.), USDbn at USD100/bbl	322.2	315.6	314.0	308.8	312.0	308.4
Total net oil exports (crude & prod.), USDbn at USD150/bbl	483.3	473.4	470.9	463.2	468.0	462.7

e/f = BMI estimate/forecast. Source: EIA/BMI

Table: Total Net Oil Exports - Crude and Products (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Total net oil exports (crude & products), 000b/d	8,802.5	8,862.6	8,847.8	8,847.0	8,851.0	8,855.6
Total net oil exports (crude & products), % y-o-y	0.5	0.7	-0.2	0.0	0.0	0.1
Total net oil exports (crude & products), USDbn	223.6	235.8	238.3	241.1	244.5	251.3
Total net oil exports (crude & products), USDbn, % y-o-y	5.5	5.5	1.0	1.2	1.4	2.8
Total net oil exports (crude & prod.), USDbn at USD50/bbl	155.9	157.7	157.3	157.2	157.4	157.7
Total net oil exports (crude & prod.), USDbn at USD100/bbl	311.7	315.4	314.6	314.3	314.8	315.4
Total net oil exports (crude & prod.), USDbn at USD150/bbl	467.6	473.1	471.9	471.5	472.1	473.1

f = BMI forecast. Source: EIA/BMI

Trade - Gas (Pipeline and LNG)

BMI View: Strong domestic consumption growth and constraints on production will prevent Saudi Arabia from exporting natural gas within the next 10 years.

Table: Gas Net Exports (Saudi Arabia 2012-2017)

	2012	2013	2014f	2015f	2016f	2017f
Dry natural gas net exports, bcm	0.0	0.0	0.0	0.0	0.0	0.0
Dry natural gas net exports, USDbn	0.0	0.0	0.0	0.0	0.0	0.0
Dry natural gas net exports, at USD50/bbl USDbn	0.0	0.0	0.0	0.0	0.0	0.0
Dry natural gas net exports, at USD100/bbl USDbn	0.0	0.0	0.0	0.0	0.0	0.0
Pipeline gas net exports, bcm	0.0	0.0	0.0	0.0	0.0	0.0
Pipeline gas net exports, % of total	0.0	0.0	0.0	0.0	0.0	0.0
Pipeline gas net exports, USDbn	0.0	0.0	0.0	0.0	0.0	0.0
LNG net exports, bcm	0.0	0.0	0.0	0.0	0.0	0.0
LNG net exports, % of total gas exports	0.0	0.0	0.0	0.0	0.0	0.0
LNG net exports, USDbn	0.0	0.0	0.0	0.0	0.0	0.0

f = BMI forecast. Source: Saudi Aramco, BMI

Table: Gas Net Exports (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Dry natural gas net exports, bcm	0.0	0.0	0.0	0.0	0.0	0.0
Dry natural gas net exports, USDbn	0.0	0.0	0.0	0.0	0.0	0.0
Dry natural gas net exports, at USD50/bbl USDbn	0.0	0.0	0.0	0.0	0.0	0.0
Dry natural gas net exports, at USD100/bbl USDbn	0.0	0.0	0.0	0.0	0.0	0.0
Pipeline gas net exports, bcm	0.0	0.0	0.0	0.0	0.0	0.0
Pipeline gas net exports, % of total	0.0	0.0	0.0	0.0	0.0	0.0
Pipeline gas net exports, USDbn	0.0	0.0	0.0	0.0	0.0	0.0
LNG net exports, bcm	0.0	0.0	0.0	0.0	0.0	0.0
LNG net exports, % of total gas exports	0.0	0.0	0.0	0.0	0.0	0.0
LNG net exports, USDbn	0.0	0.0	0.0	0.0	0.0	0.0

f = BMI forecast. Source: Saudi Aramco, BMI

We forecast unrestrained gas demand to outstrip production across our forecast period, undermining the potential for exports. With delays to major gas projects creating the risk of near-term supply shortfalls, Saudi Arabia has also reportedly been considering construction of a liquefied natural gas (LNG) import terminal. LNG imports would improve the security of supply and could offer a flexible solution to meeting peak seasonal demand.

However, imports could pose downside risk to domestic output. Poor pricing dynamics and technical barriers to production have already weighed on our forecast and the availability of import alternatives would dilute the need for domestic gas development. Other countries in the GCC, such as Kuwait and the UAE, which began seasonally importing LNG have struggled to wean themselves off the resource.

Importing LNG would also break Saudi Arabia's energy self-sufficient status, a status which the kingdom may be reluctant to cede. Further delays or disruptions to the domestic gas supply would see the project gain traction, but imported LNG will remain a last resort.

Industry Risk Reward Ratings

Middle East - Risk/Reward Ratings

BMI View: In spite of their vast below-ground potential, the major Middle East producers, such as Saudi Arabia and Kuwait, continue to trail in our upstream and downstream risk-reward ratings. A heavy state dominance, opaque regulatory environments and weak privatisation trends severely limit the returns open to investors. In contrast, Israel continues to outperform the region, due to its stable above-ground environment and greater openness to foreign investment.

The main themes from our overall Middle East Risk/Reward Ratings are:

- The Middle East outperforms every other region in our Oil & Gas Risk/Reward Ratings, supported by a substantial resource base and strong production profile.
- Despite vast proven reserves, Saudi Arabia and Kuwait continue to fall to the bottom of our upstream rankings. This illustrates the closed nature of both countries' oil and gas sectors, and the paucity of opportunities open to foreign investors.
- Israel continues to outperform the Middle East region in both upstream and downstream rating. The country boasts a stable operating environment, limited state participation and a diversely competitive landscape.
- As a region, the Middle East performs poorly in the downstream ratings, due to the high level of state involvement and the limited room for non-state competitors.

Table: BMI's Middle East Oil & Gas Risk/Reward Ratings (RRRs)

	Upstream R/R Ratings	Downstream R/R Ratings	Oil & Gas R/R Ratings	Rank
Israel	70.3	54.9	62.6	1
UAE	68.1	50.8	59.4	2
Qatar	65.8	40.1	52.9	3
Oman	60.8	44.2	52.5	4
Iraq	63.3	33.9	48.6	5
Saudi Arabia	45.3	50.8	48.1	6
Bahrain	51.7	39.8	45.8	7
Iran	42.5	42.8	42.6	8
Kuwait	46.9	35.9	41.4	9
Average	57.2	43.7	50.4	-

N.B. scores are out of 100. Source: BMI

Below-Ground Potential Boosting Ratings

The Middle East outperforms every other region in our Upstream Risk/Reward Ratings. This is due to an exceptionally high Industry Rewards score, reflecting the region's vast resource base and strong growth potential.

According to data from the US Energy Information Administration, the Middle East holds over 40% of the world's recoverable gas resources, and almost half of its recoverable oil. It also hosts several highly prospective resource plays. Large areas of the Middle East remain heavily underexplored, and in recent years there has been a growing interest in the region's unconventional resource potential.

Table: Middle East Upstream Oil & Gas Risk/Reward Rating

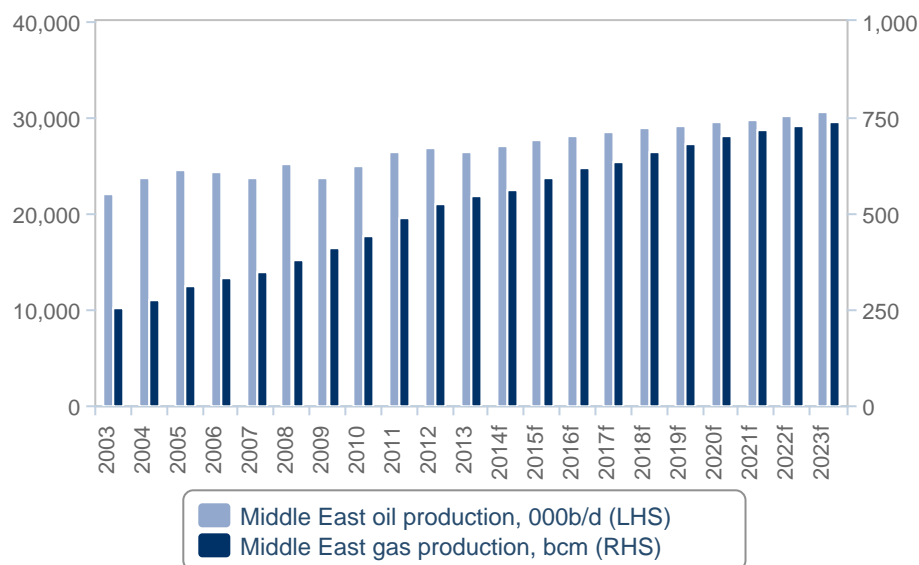
	Upstream Industry Rewards	Upstream Country Rewards	Upstream Rewards	Upstream Industry Risks	Upstream Country Risks	Upstream Risks	Upstream R/R Ratings	Rank
Israel	63.8	70.0	65.3	90.0	67.0	81.9	70.3	1
UAE	66.3	75.0	68.4	70.0	62.2	67.3	68.1	2
Qatar	63.8	85.0	69.1	55.0	64.0	58.1	65.8	3
Iraq	78.8	75.0	77.8	35.0	19.4	29.5	63.3	4
Oman	51.3	65.0	54.7	85.0	56.9	75.2	60.8	5
Bahrain	35.0	65.0	42.5	80.0	60.7	73.3	51.7	6
Kuwait	73.8	5.0	56.6	5.0	60.4	24.4	46.9	7
Saudi Arabia	71.3	10.0	55.9	5.0	49.3	20.5	45.3	8
Iran	61.3	27.5	52.8	10.0	34.0	18.4	42.5	9
Average	62.8	53.1	60.3	48.3	52.7	49.8	57.2	-

N.B. Scores out of 100. Source: BMI

The region also has an impressive production profile. According to a 2014 report by GEO ExPro, in 2012 global production averaged 30,515 barrels (bbl) per well. In the Middle East, the average was 452,459 bbl per well. The region's upstream sector continues to draw substantial investments internationally, and we are forecasting strong output growth for both oil and gas across our 10-year forecast period.

A Robust Growth Story

Middle East Oil and Gas Production

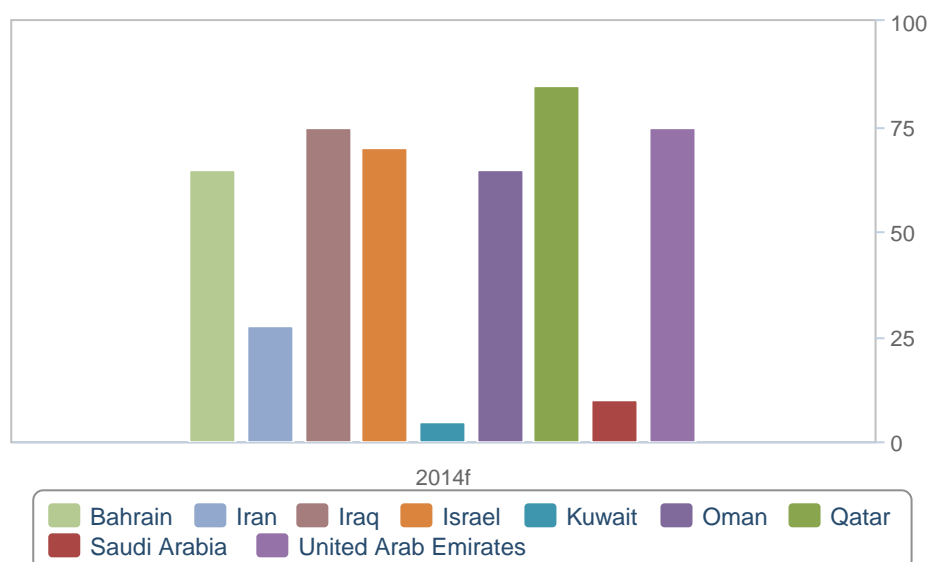


e/f = BMI estimate/forecast. Source: EIA/BMI

However, the countries at the top of our upstream rankings are not those with the greatest reserves or the strongest production profiles, but those with the best above-ground environments. In particular Israel, the UAE, Qatar and Iraq, which are all supported by strong Country Reward scores. This reflects the broad participation of non-state competitors and the comparatively low level of state ownership of assets in these countries.

Open Markets Gaining Advantage

Upstream Country Reward Ratings

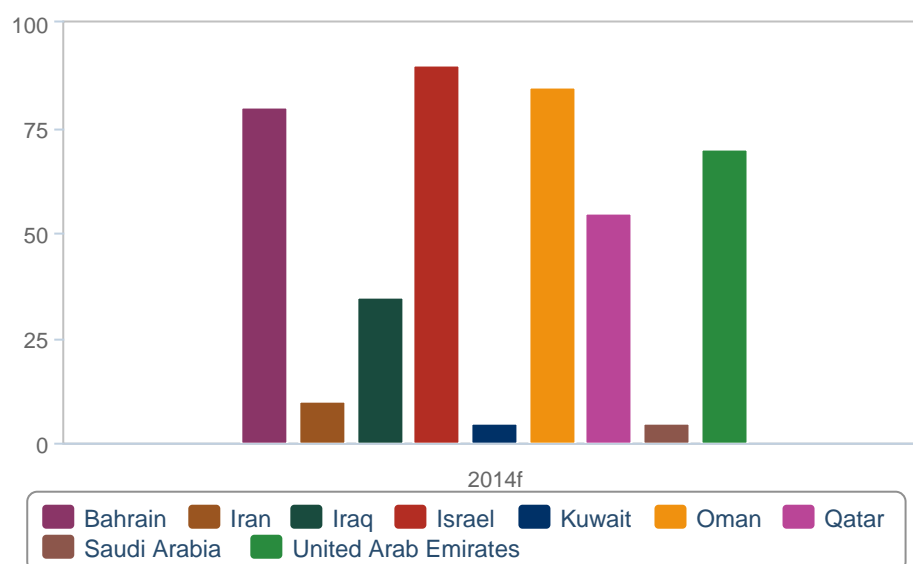


f= BMI forecast. Source: BMI

In contrast, those that fall to the bottom of the rankings, and in particular Saudi Arabia and Kuwait, suffer from both low Country Rewards and Industry Risk ratings. This is due to the closed nature of their upstream sectors, and the limited opportunities accruing to prospective investors. Licensing terms are unattractive, with both countries offering technical service contracts, as opposed to production sharing or concessional agreements. Opaque regulatory environments further weigh on the countries' scores.

Divergent Environments Above Ground

Upstream Industry Risk Ratings



f = BMI forecast. Source: BMI

Typically, the Middle East upstream rankings see little movement, due to the mature nature of the region's producers. However, we see some scope for change over the coming quarters.

- Although we do not anticipate any significant disruption to Iraqi output this year, we have downgraded the country's longer-term production forecast this quarter, as rising political and security risks deter and delay investments. This will impact the score over coming quarters.
- Despite comparatively stable political environments and openness to foreign participation, Qatar could see its ratings fall if the North Pars moratorium remains in place, limiting investment and growth opportunities.
- Easing of international sanctions would allow the return of foreign capital to Iran, bolstering the country's production outlook. However, given chronic underinvestment and a challenging operating environment, we view this as a longer-term play.
- Further escalation in the conflict with Gaza could undermine Israel's strong Country Risk rating. However, this is not our core view; the recent ceasefire has seen a marked improvement in the security environment, and the oil and gas sector has remained broadly insulated from the fighting.

Limited Opportunities Downstream

Table: Middle East Downstream Oil & Gas Risk/Reward Rating

	Downstream Industry Rewards	Downstream Country Rewards	Downstream Rewards	Downstream Industry Risks	Downstream Country Risks	Downstream Risks	Downstream R/R Ratings	Rank
Israel	34.4	60.0	40.8	100.0	69.1	87.6	54.9	1
Saudi Arabia	65.6	34.0	57.7	10.0	72.2	34.9	50.8	2
UAE	52.2	40.0	49.2	50.0	61.5	54.6	50.8	3
Oman	38.9	36.0	38.2	60.0	55.5	58.2	44.2	4
Iran	53.3	42.0	50.5	10.0	46.8	24.7	42.8	5
Qatar	45.6	26.0	40.7	20.0	67.0	38.8	40.1	6
Bahrain	30.0	32.0	30.5	60.0	63.7	61.5	39.8	7
Kuwait	40.0	28.0	37.0	15.0	61.2	33.5	35.9	8
Iraq	41.1	30.0	38.3	15.0	36.6	23.6	33.9	9
Average	44.6	36.4	42.5	37.8	59.3	46.4	43.7	-

N.B. Scores out of 100. Source: BMI

We hold a bullish view on the Middle East refining sector. The region's refining capacity is set grow, as governments target aggressive downstream expansions. We estimate total refining capacity in the region stood at over 8m barrels per day (b/d) in 2013, and forecast this to reach 11.3mn b/d by 2023.

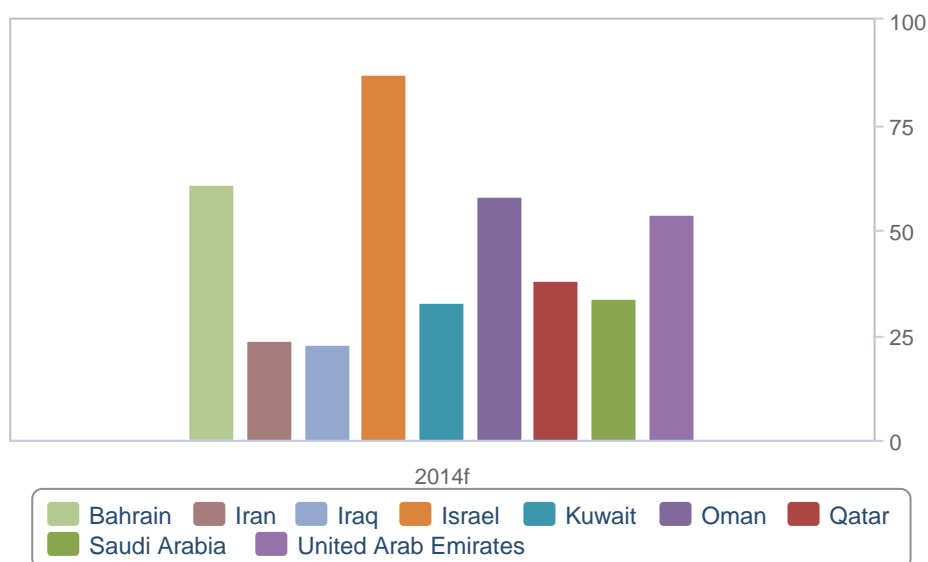
Nevertheless, the Middle East scores relatively poorly in our Downstream Risk/Reward Ratings (RRR), with an average score of 44 out of 100. This captures several key structural weaknesses in the region's downstream sector.

- The state is heavily dominant, having control over the bulk of downstream assets.
- There are limited numbers of non-state competitors and a weak privatisation trend restricts room for new entrants.
- The business environment can be challenging and sector regulation is often oppressive.

In combination, these factors severely limit the opportunities open to private sector investors.

Poor Risk Profiles Weakening Performance

Downstream Risk Ratings



f = BMI forecast. Source: BMI

The region scores highly on Industry Rewards, reflecting large and growing domestic markets for refined fuel products. We are forecasting refined fuel consumption to increase from 7.8mn b/d in 2013, to over 10.3mn b/d by 2023. However, the widespread use of fuel subsidies weighs heavily on the sector's overall profitability. Limited subsidy reforms notwithstanding, we expect this dynamic to remain largely unchanged throughout our 10-year forecast period.

The main exception in the region is Israel, which tops our downstream rankings. The Israeli downstream is competitive, it boasts a stable and transparent regulatory environment and there is no state ownership of assets.

Major capacity expansions in Saudi Arabia, Kuwait, Iraq and the UAE will lift our assessment of the region's downstream infrastructure and export potential, adding upside pressure to the ratings in each market. However, the new capacity will do little to alter the fundamentals of a sector largely closed to international participation.

Saudi Arabia - Risk/Reward Ratings

Saudi Upstream Rating - Overview

Contributing to Saudi Arabia's modest showing in the regional upstream Risk/Rewards Indices (RRIs) are high scores for oil and gas reserves, oil and gas reserves-to-production ratios and more modest rates of oil/gas supply growth. Industry privatisation is not making progress, and the country's mixed risk profile provides little investor protection.

Saudi Arabia performs badly in terms of risk. The country achieves a low score for Industry Risks due to its poor licensing terms and strong limits on foreign participation in the upstream oil sector.

Saudi Arabia's broader Country Risks environment is unattractive. The state's high score for long-term policy continuity across governments reduces the operational risks for private companies. Very low scores for rule of law, physical infrastructure and corruption undermine the overall performance.

Saudi Downstream Rating - Overview

Saudi Arabia has a relatively strong position in the downstream industry rankings, reflecting its considerable market size and large expansion plans. State influence remains high in the downstream segment, relatively little competition. Saudi's downstream rating suffers from some particularly high risk factors, such as rule of law. Scores are high for short-term policy continuity, short-term economic external risk and short-term economic growth risk.

Market Overview

Saudi Arabia Energy Market Overview

With oil revenues accounting for around 90% of total Saudi Arabian export earnings, up to 80% of state revenues and at least 44% of the country's GDP, Saudi Arabia's economy remains - despite attempts at diversification - dependent on oil. According to the Arab Petroleum Investments Corporation, the breakeven price for Saudi crude is USD94 per barrel (bbl). The elevated price is a reflection of rising social spending expenditures and commitments that have been made in the wake of the Arab Spring.

Another analysis conducted by the Jadwa Investment, based in Riyadh, determined the break-even price will reach USD118/bbl by 2020 and will result in rapid decline in the country's cash reserves which will see the break-even price rise further. A May 2013 analysis conducted by the Centre for Global Energy Studies found that at an average OPEC Basket price of USD100/bbl, Saudi Arabia would need to produce just 8.3mn barrels per day (b/d) to fund current spending plans, leaving room for a sizable theoretical cutback in capacity should it be justified.

Saudi Arabia has eased away from previous commitments to raise output capacity to 15mn b/d, with **Saudi Aramco** CEO Khalid Al Falih telling the Wall Street Journal in December 2011 that rising volumes elsewhere left the country with 'no need' to 'pursue output of 15mn b/d.' That sentiment was reiterated by officials more recently in May 2013, as the impact of the unconventional boom in the US was downplayed.

Rising non-OPEC production, alongside growing Iraqi volumes and the possible return of Iranian crude to markets is resulting in a shift in Saudi energy policy. Riyadh announced in late 2013 it would not cut production unilaterally, forgoing a long tradition of independently balancing markets. The new policy reflects a desire to manage to ensure a coherent response from the organisation to looming challenges and internal divisions but also to prevent other countries from gaining market share at the expense of any Saudi production cut-back.

However, the country is going forwarding with a large investment programme. In October of 2012, Al Falih confirmed a large capital expenditure programme of some USD35bn over the next five years targeting oil exploration and production (E&P) as part of an effort to maintain capacity in the world's key swing producer and top crude oil exporter. The large sum is an increase from previous pledges by Saudi Aramco to spend between USD20-30bn over five years to offset declining volumes from mature fields and sustain production capacity. Falling output from fields in decline has resulted in Aramco's aggressive strategy to increase output with enhanced recovery projects and new upstream exploration.

Despite being a prolific oil producer, much of Saudi Arabia remains underexplored, holding the potential of even greater hydrocarbons rewards. Further low lifting costs of USD3-5 per bbl, despite the heavy processing required from some heavy and sour grades, makes Saudi oil comparatively economical when assessed against deepwater plays, where breakeven prices can be upwards of USD50 per bbl. Yet, with the majority of Saudi oil production derived from a handful of major fields, several of which are in decline, the need for investment to simply maintain output levels is essential. Although the Ministry of Petroleum maintains official decline rates of just 2% annually, previous surveys have suggested the rate of decline may be in the range of 6-8% per annum, translating into a heavy burden on Aramco to maintain production.

Saudi Arabia has seven refineries, which had a combined crude distillation capacity of around 2.1mn b/d at the end of 2011. Plans call for up to 2.14mn b/d of extra capacity by 2014 through the construction of three new refineries and the expansion of one more. In April 2010, US oil major **ConocoPhillips** announced that it was exiting a joint venture (JV) with state-owned Saudi Aramco that would have seen the company take part in the construction of a new 400,000b/d refinery at the Red Sea port of Yanbu. In May 2011, Conoco was replaced at the project by state-run Chinese refiner **Sinopec**.

Saudi Arabia could become a net exporter of gasoline by 2014 following the completion of the new Yanbu and Jubail refineries, according to a Reuters interview with Saudi Aramco CEO Khalid al-Falih in December 2010. Although Saudi Arabia currently imports 60,000-70,000b/d of gasoline, according to traders cited by Reuters, Al-Falih said that the country only has a slight net deficit of the fuel. He said, however, that demand for the fuel was growing at 5.1% annually, leading the country to look at both increasing production and constraining demand through policies such as setting mileage-per-gallon standards for cars.

Saudi Arabia's proven natural gas reserves stood at 8,200bn cubic metres (bcm) in 2012, ranking the country fifth in the world, after Russia, Iran, Qatar and Turkmenistan. Almost two-thirds of Saudi Arabia's proven gas reserves consist of associated gas, mainly from the onshore Ghawar oil field and the offshore Safaniya and Zuluf fields.

The Ghawar oil field alone accounts for one-third of the total gas reserves. However, only 15% of Saudi Arabia has been 'adequately explored for gas', according to Saudi Aramco's Khalid al-Falih. Saudi Arabia claims vast unconventional gas reserves. In September 2010, Al-Falih said that the Kingdom potentially had around 5-6trn cubic metres (tcm) of shale gas and tight gas. There is limited foreign participation in Saudi Arabia's gas sector through exploration JVs; however, the results have been mixed to-date.

Luksar had made two gas discoveries at Tukhman and Mushayib/Faydah, but gave up rights to 90% of its concession in 2010 following mediocre results. Production from the remaining Lukoil concession is due to begin in 2014 according to press reports. Srak had been slightly more successful in its Kidan block, announcing gas flows from it in 2009. The sour nature of gas at Kidan, however, makes it an expensive development. EniRepSa pulled out of its concession in early 2012 after a disappointing drilling campaign. Meanwhile, Sinopec-Aramco as of August 2012 put further drilling programmes on hold in order to evaluate the commercial feasibility of its wells.

Aramco has outlined a major push to target both conventional and unconventional gas resources. New opportunities in shale gas could provide space for greater participation from the private sector, particularly from oilfields services companies which have the technical experience required to develop Saudi Arabia's potentially prolific shale gas resources.

In November 2012, OPEC Secretary General Abdalla Salem el-Badri, reiterated a warning in the organisation's 2012 Oil Outlook, which highlighted the medium-term risk posed to upstream investment by OPEC members from bullish forecasts for non-OPEC production growth. El-Badri told a London conference 14 November 2012, that 'if this message keeps coming, there will be no investment,' from OPEC members, in comments directed at the IEA's forecasts that US oil production was on track to exceed Saudi Arabia's by 2020.

Overview/State Role

Since the nationalisation of the Saudi energy industry in 1975, Saudi Aramco has effectively acted as the sole operator, although IOCs are now starting to participate in the development of natural gas reserves. Saudi Aramco is also the main refiner in the country, with around 75% of total capacity and at least 50% of the non-publicly traded shares of all JV refineries. This means that with the exception of the PNZ area, IOC involvement in Saudi Arabia is limited to gas production and downstream JVs, although service companies are regularly awarded construction and development contracts.

Saudi Aramco's equivalent in petrochemicals is state-owned **SABIC** group, which has been soliciting foreign investors in private petrochemical projects. **Saudi Petrochemical Company** (SADAF), a JV between SABIC and Shell, has completed a USD1bn expansion programme that included a 700,000tpa Methyl tertiary-butyl ether (MTBE) and an ethylene and polyethylene plant in Al-Jubail with **ExxonMobil**. SADAF also developed Saudi's first independent power plant (IPP) at its Jubail petrochemical complex, which came on stream in 2005. It is uncertain whether or not the Saudi government will sell off more of its stake in SABIC in the near future.

Licensing And Regulation

In early-2011, Saudi Aramco awarded two engineering contracts under a new type of contract, known as General Engineering Services Plus (GES+). Under the new-style deals, local companies can form JVs with international services companies as a way of developing the country's oil engineering sector and creating additional local jobs. Although the move will mainly boost local companies, it will also allow international service providers to become involved in smaller projects previously available only to Saudi companies.

Engineering work on Saudi Arabian projects has historically been divided into smaller, simpler projects, which were carried out by local, often family-run companies. The larger, more complex projects have tended to be awarded to international service companies. In order to change this situation and develop local expertise, Saudi Arabia had long been looking at the possibility of introducing GES+ contracts.

In preparation for the GES+ contracts, 10 international services companies submitted applications by the January 2010 deadline to be allowed to compete in consortia alongside local players. International services companies involved in these consortia reportedly included **Technip, Foster Wheeler, WorleyParsons, Jacobs Engineering Group** and **SNC-Lavalin**.

Government Policy

Saudi Arabia's role as swing producer within OPEC means that the government generally seeks to maintain 1.5-2mn b/d of spare capacity. For now, plan to boost production capacity are on hold, but so calls by some allow spare capacity to fall to support prices have also been disputed.

The Saudi government has been keen to beef up security at its major oil and gas facilities, particularly following the 2006 Abqaiq attack. The government has periodically announced arrests of hundreds of militants as well as arms seizures and terror cell disruptions, with local news media often reporting plots against energy infrastructure. In July 2007, then-Interior Minister Prince Nayef ibn Abdelaziz al-Saud, who has overall responsibility for security, announced the creation of a 35,000-strong security force dedicated to the protection of oil and industrial installations. By November 2007, the Interior Ministry stated that 9,000 personnel had already been deployed.

Saudi Aramco operates its own Industrial Security force, directed from its command and control centre in Dhahran. In addition to this, the Ministry of Interior operates several forces of its own, many of which have partial responsibility for energy infrastructure security provision. Finally, certain units of the Ministry of Defence and the National Guard also assist in oil and gas facility security provision. One Saudi analyst at a

Washington research institute has estimated the number of personnel guarding the country's oil & gas infrastructure at between 25,000 and 30,000.

International Energy Relations

As the world's largest oil producing nation by production capacity, and the unofficial leader of OPEC, Saudi Arabia plays a major role in global energy relations. On a local level it also works bilaterally with Kuwait and Bahrain over the distribution of shared oil resources. As Saudi Arabia expands its downstream involvement in other countries such as China and India, bilateral relations are set to play a bigger role in the country's energy relations.

Relations With India

Saudi Arabia signed a raft of deals with India in March 2010 aimed at strengthening bilateral relations. Immediately prior to the meeting, India's oil ministry said on its website that Saudi Arabia had agreed to almost double crude oil supplies to India from 25.5mn tpa (512,000b/d) to 40mn tpa (803,000b/d), equivalent to around a quarter of India's consumption.

International energy sanctions on Iran have led some Indian refiners to reduce imports of Iranian oil, replacing these volumes with Saudi oil. India's state-run refiners **Hindustan Petroleum, Mangalore Refinery and Petrochemicals** and **Bharat Petroleum (BPCL)** have all sought to increase term imports from Saudi Arabia in FY2012-13. BPCL, for example, is cutting Iranian imports by around 50% (to 10,000b/d) and is seeking a 27% increase in Saudi volumes to around 150,000b/d, Reuters reported in February 2012, citing unnamed industry sources.

Relations With Bahrain

Bahrain and Saudi Arabia share the offshore Abu Saafa field which has been developed by Aramco. Half of the field's 300,000b/d output is sold by Bahrain's **BAPCO** onto the international market. Saudi Arabia also exports crude oil from Abqaiq to Bahrain via the AB-1 pipeline, which is fed into Bahrain's Sitra refinery. Bahrain and Saudi Arabia plan to replace AB-1 with a new pipeline with a capacity of 350,000b/d. The FEED contract was to be awarded by end-2011 with construction scheduled to be complete by end-2013, but no updates had been released at the time of writing.

Relations With Iraq

Alongside rising unconventional production in North America, Iraq's resurgence as an oil producer has helped result in a glut of oil globally. Although Iraq has been outside the production quota since the 1990-1991 Gulf War, rising supplies, flat demand in Europe, and the US increasingly supplied by domestically produced volumes, have left OPEC members in growing competition for market share in Asia. Iraq's willingness to offer discounts for its crude, although small and as response for quality variance, underscores the jostling for Asian customers, who are also absorbing volumes from West and North Africa previously destined for the US. As the de facto leader of OPEC and holder of the majority of the world's spare capacity, Saudi Arabia may be forced to take the lead in bringing Iraq back into the quota system as prices remain depressed on growing oversupply.

Relations With Kuwait

The main area of cooperation between Saudi Arabia and Kuwait is through the onshore Partitioned Neutral Zone (PNZ), an area that is shared between the two countries. Because of the area's ambiguous status, the PNZ was the only concession that was not nationalised in the 1970s. **Chevron** has held the licence since its purchase of the original operator, **Texaco**, in 2001. Although Texaco has managed to retain the licence since before the nationalisation, the extension has not been granted routinely. The form of contract, with a production share as high as 40% over a 30-year period, is generous and atypical even on a wider global scale.

In September 2008, Saudi Arabia's cabinet approved an extension of the PNZ contract. Chevron's extension came after lengthy negotiations and wrangling, although the results it was able to show from EOR technology tests over 2008 appear to have been behind the decision by Saudi Arabia and Kuwait to grant a 30-year extension to the licence, which had been set to expire in 2009. In addition to Chevron's EOR pilot scheme, the award meant Saudi Arabia and Kuwait avoided complex political and legal negotiations over a new way of dividing the Neutral Zone's riches.

Relations With China

Unsurprisingly, China's economic growth and concomitant rise in oil consumption have seen it strengthen relations with Saudi Arabia. In November 2009, China overtook the US as the main buyer of Saudi oil and is expected to hold on to that status. In addition to increasing amounts of crude, Saudi Arabia has been exporting its heavy oil refining expertise to China as well. Saudi Aramco holds stakes in two major refining

projects in Qingdao in northern China and Quangzhou in Fujian province. Saudi Arabia has also helped China build a 30mn bbl strategic reserve facility.

Saudi Aramco and Sinopec will develop a refinery in Saudi Arabia at a cost of as much as USD10bn and are in talks to build another in China, their second in the country. The 400,000b/d plant in the western city of Yanbu is likely to be operational in 2014, Aramco CEO Khalid al-Falih told reporters in January 2012 after signing the deal with Sinopec.

Sinopec is in talks with Aramco and ExxonMobil, its partners in the Fujian refinery in China, on plans to build a 240,000 to 300,000b/d refinery, al-Falih and Sinopec chairman Fu Chengyu said at a press conference in Dhahran, Saudi Arabia. The partners also plan to expand capacity at the Fujian plant.

The announcement was made during a visit to Saudi Arabia by then Chinese Premier Wen Jiabao, aimed at deepening ties between the world's largest crude exporter and second-largest importer. Aramco is participating in oil-processing and storage projects in China and elsewhere in East Asia to take advantage of the region's growing consumption of fuel and crude.

The Fujian expansion includes upgrading of the refinery's crude processing unit with 'debottlenecking' and expanding the ethylene cracker from 800,000tpa to 1.2mn tpa, al-Falih said. The companies will make an investment decision on the expansion in the coming months, he said.

At the September 2012 China-League of Arab States Energy Cooperation Conference held in Yinchuan, in China's Ningxia Hui autonomous region, Abdul-Fattah Dandi, director of the Organisation of Arab Petroleum Exporting Countries' economic department, emphasised that China's growing consumption of oil and gas provides an opportunity for its member states. Dandi's view was echoed by other Arab officials, according to the China Daily. The League of Arab States (LAS)' counsellor in Beijing, Ahmed Mustafa Hafez, urged China to 'make the first step' towards strengthening cooperation with Arab states, as the latter also seek to expand their presence in the Chinese market.

Table: Saudi Arabia - Upstream Project Database

Name	Field Name	Companies	Status	Est. Peak Oil/ Liquids Output, (b/d)	Est. Peak Gas Output, (bcm)	Type of Project	Onshore/ Offshore
	Marjan	Saudi Aramco (100%)	Producing; Partially mothballed	570,000	-	Conventional	Onshore
	Qatif	Saudi Aramco (100%)	Producing	500,000	-	Oil and gas processing and separating facilities; expansion	Onshore
	Safaniyah	Saudi Aramco (100%)	Producing; Partially mothballed	1.2mn	-	Heavy Oil	Offshore
	Nuayyim	Saudi Aramco (100%)	Producing	100,000	-	Conventional	Onshore
	Khurais	Saudi Aramco (100%)	Producing 1mn b/d in Feb 2011	1.27mn	3.3	Conventional	Onshore
	Shaybah	Saudi Aramco (100%)	Producing; expansion	750,000	-	Conventional	Onshore
	Berri	Saudi Aramco (100%)	Producing	1.15mn	-	Gas capture, output expansion	Onshore
	Ghawar	Saudi Aramco (100%)	Producing 6mn b/d in Feb 2011; Partially mothballed	5mn	20.7	Conventional	Onshore
Wasit	Arabiyah/ Hasbah	Saudi Aramco	Offshore work contract awarded in Feb 2011	-	25.8	Gas processing	Onshore
	Karan	Saudi Aramco (100%)	Development	-	18.6	Sour gas	Onshore
	Manifa (Moneefa)	Saudi Aramco (100%)	Producing	900,000	10.3	Heavy oil, sour gas	Onshore
	Zuluf	Saudi Aramco (100%)	Producing	500,000	-	Conventional	Onshore
	Khursaniyah (inc. Abu Hadriyah and al-Fadhili)	Saudi Aramco (100%)	Oil field producing; gas plant operational Oct 2010	500,000	5.8	Oil and gas processing facilities	Onshore
	Partitioned Neutral Zone, Phase Two (Saudi Arabia 50%)	Chevron (40%), KOC (30%), Saudi Aramco (30%)	Producing; Development drilling and workover scheduled for 2010-11	300,000-600,000	0.35	EOR Application; Heavy oil	Onshore

Saudi Arabia - Upstream Project Database - Continued

Name	Field Name	Companies	Status	Est. Peak Oil/ Liquids Output, (b/d)	Est. Peak Gas Output, (bcm)	Type of Project	Onshore/ Offshore
	Abu Sa'fah	Saudi Aramco (100%)	Producing	300,000	3.8	Oil and gas processing and separating facilities; output expansion	Onshore
	Haradh	Saudi Aramco (100%)	Producing	600,000	1.4	Gas capture, oil output expansion	Onshore

na = not available/applicable. Source: BMI

Oil And Gas Infrastructure

Oil Refineries

Aramco owns four refineries outright (Ras Tanura, Jeddah, Riyadh and Yanbu) and equity shares in a further three (Rabigh, Sasref and Samref). Two new joint venture (JV) refineries are currently under construction at Jubail (SATORP) and Yanbu which are predicted to come on stream in 2013 and 2014 respectively.

In addition, Aramco hopes to increase its own capacity through three additional refinery projects which are currently underway. Aramco has five foreign partners in JVs, three of which are in existing refineries. The international oil company (IOC) with the greatest involvement in Saudi Arabian refining is **ExxonMobil**, which operates the 400,000b/d Samref refinery in Yanbu through a 50:50 partnership with Aramco. Lubricating base oils are produced at the Lubref facilities in Jeddah and Yanbu, which is a 30:70 JV between ExxonMobil and Aramco.

Table: Refineries In Saudi Arabia

Refinery	Capacity, b/d	Owner	Completed	Details
Ras Tanura	550,000	Aramco 100%	1945	na
Yanbu (Samref)	400,000	Aramco 50%, Total 50%	1984	na
PetroRabigh	385,000	Aramco 37.5%, Sumitomo	2009	na
Al Jubail (Sasref)	305,000	Aramco 50%, Shell 50%	1985	na
Yanbu	237,000	Aramco 100%	1979	na

Refineries In Saudi Arabia - Continued				
Refinery	Capacity, b/d	Owner	Completed	Details
Riyadh	122,000	Aramco 100%	1975	Supplied by East-West pipeline
Jeddah	85,000	Aramco 75%, 25% private	1968	na
Planned additional capacity (* expansion)				
Yanbu Expansion	100,000	Aramco 100%	2011	na
Jubail Satorp	400,000	Aramco 37.5%, Total 37.5%	2013	USD8.5bn raised for capex
Yanbu JV	400,000	Aramco 62.5%, Sinopec 37.5%	2014	na
Jizan	400,000	Aramco 100%	2016	na
Ras Tanura*	400-440,000	Aramco 100%	na	Delayed USD8bn expansion

na = not available/applicable. Source: BMI

Ras Tanura Refinery

The Ras Tanura refinery is Saudi Aramco's biggest, oldest and most complex refinery. Originally founded in 1945, the refinery has undergone many upgrades and expansions. As well as a 550,000b/d crude distillation unit, the refinery has a 305,000b/d NGL processing unit and a 960,000b/d crude stabilisation unit. The refinery is the only one in the Kingdom to include a visbreaker. The refinery mainly supplies the domestic market through the Dhahran bulk plant, although some of the products are exported.

An USD8bn project to nearly double the capacity of the refinery to 950,000b/d but by 2012 had been delayed, according to an Aramco statement in April 2009. The project had been expected to include the construction of a new crude distillation unit and vacuum distillation unit, as well as a diesel hydrotreater, a continuous catalyst regenerator and a sulphur unit. The expansion of the refinery was intended to supply feedstock to a petrochemical plant JV between **Dow Chemical** and Aramco.

In September 2013, Aramco extended the deadline for companies to bid for construction of a clean fuels and aromatics project at its largest Ras Tanura according to industry sources. The Ras Tanura clean fuels and aromatics project due on line by 2016 is part of Aramco's second phase of its refineries upgrade. However based on delays at Ras Tanura and elsewhere, we have yet to pencil in any additional capacity for now pending greater clarity.

Yanbu (SAMREF) Refinery

The Aramco-ExxonMobil SAMREF refinery JV is located in the port of Yanbu on the Red Sea Coast. With a capacity of 400,000b/d, it is the second largest refinery in the Kingdom and the largest single-train refinery in the world. According to Aramco, around half of the refinery's output is consumed domestically and it is the largest supplier of gasoline to the domestic market in the west of the country. The refinery's slate is divided into gasoline (35%), jet (15%), diesel fuel and heating oil (30%), fuel oil (15%) and LPG (15%). As well as the refinery's 13 different processing units, the facility has an oil storage capacity of 13.2mn bbl. Aramco reports the facility is due to come online Q314 and produce around 3,000b/d of benzene, 263,000b/d of diesel, 90,000b/d of gasoline and 6,200 tonnes per day of petroleum coke with another 1,200 tonnes per day of sulphur.

PetroRabigh Refinery

Japan's **Sumitomo Chemical** owns 37.5% of the **Petro Rabigh JV**, which owns a refinery at Rabigh that commenced operations on May 19 2009 and produces 400,000b/d. The remaining 62.5% of the company is owned by Saudi Aramco (37.5%) and private shareholders (25%). Under a deal agreed in May 2004, Aramco agreed to supply the project with 400,000b/d of crude, as well as ethane and butane, while Sumitomo provided petrochemical technology and its extensive marketing base. The project is thought to have cost USD10.1bn, divided equally between the Japanese company and Aramco. In November 2009, the plant was officially inaugurated and it was announced that it would achieve 100% of its production capacity during December 2009.

In April 2010, PetroRabigh issued solicitations of interest to contractors for the planned USD6.67bn second phase of the petrochemicals complex. An expansion of the facility's ethane cracker is being considered to increase feedstock throughput by 850,000 cubic metres per day, as is the construction of a new aromatics complex with annual naphtha feedstock of 3mn tonnes per annum (tpa). Aramco is considering an expansion of the facility in line with its broader petrochemical plans.

Jubail SASREF Refinery

Shell's assets in Saudi Arabia include the 305,000b/d Saudi Aramco Shell Refinery (Sasref) in Jubail, a 50:50 JV between Shell and Aramco. May 2005 saw Sasref announce plans to invest over USD267mn in modernising its refining unit. Sasref's plans included building an LPG production unit at the site and

installing technology to reduce the sulphur content of its diesel. Aramco and Shell inaugurated a new 100,000b/d low-sulphur diesel unit at SASREF in March 2010.

Jubail SATORP Refinery (Under Construction)

SATORP, which is jointly owned by Saudi Aramco and Total, has raised USD8.5bn for the Jubail refinery. The company secured USD4.01bn from the Public Investment Fund and Export Credit Agencies and the remaining USD4.49bn from commercial financial institutions. The 400,000b/d full conversion refinery began operations in 2013.

The refinery will be able to produce 700,000tpa of paraxylene, 140,000tpa of benzene and 200,000tpa of polymer-grade propylene. Initially, the costs for the JV were estimated at USD6bn, but by November 2008 the projected cost had risen to around USD10bn. The Jubail refinery will process Arabian Heavy crude. SATORP has started testing at the USD14bn refinery in Jubail. The refinery is set to be fully online in 2014 and is expected to export large volumes of diesel and gasoline to Asia and Europe.

Jizan Refinery (Planned)

The decision to build a refinery in Jizan was announced in 2006 as part of the Jizan Industrial City project. Saudi Aramco's Jazan Refinery will process 400,000 barrels per day (bpd) of Arabian Heavy and Arabian Medium crude oil to produce gasoline, ultra-low sulfur diesel, benzene and paraxylene. A marine terminal on the Red Sea coast will accommodate Very Large Crude Carriers (VLCCs) for the supply of crude oil to the new refinery.

The refinery project aims to industrialise the undeveloped Jizan province in south-western Saudi Arabia, close to the border with Yemen. The refinery project has been delayed many times, pushing the completion deadline from 2013 to 2016 and now 2017.

The tender for the project, which was offered in 2009, attracted only two bids, both from local companies, and former Aramco executive Sadad al-Husseini was quoted by Reuters as saying that neither of the two bidders was in a position to execute a project of the size of Jizan. After a new tender, a FEED deal was finally awarded in February 2011, with the contract awarded to **KBR**.

The Jizan and Yanbu refineries are linked to the Manifa oil field redevelopment programme. Both refineries are designed to process the sour heavy crude from the field into refined products for export. One of the

reasons for delay in the construction of the refineries has been Aramco's desire to drive down costs, which has fed back into the Manifa project's timeframe.

Yanbu Aramco Sinopec Refining Company (YASREF) (Under Construction)

In late-July 2010, Aramco awarded several contracts to international companies to build the new 400,000b/d Yanbu refinery. Former JV partner US major ConocoPhillips pulled out of the project in April 2010 and was replaced in March 2011 by China's Sinopec.

Announced in 2006, Yanbu is designed primarily as an export refinery focusing on the European market, which has historically needed to import gasoil because of a structural deficit of gasoil-producing capacity in its own plants. Located on the Red Sea, it is well placed to supply the Mediterranean Basin, the Arabian Gulf and even the Rotterdam hub, providing good opportunities for Sinopec's new oil trading team in Europe, which was set up in December 2010. As the refinery will be fed from the redevelopment of the giant Manifa heavy sour crude project, it will also give Sinopec access to additional Saudi crude volumes as soon as they come on stream.

According to an Aramco press release on July 28 2010, contracts for major processing units at the plant were awarded to seven companies. South Korea's **SK Engineering** and **Daelim** won a USD560mn crude unit and a USD1.7bn gasoline and hydrocracker package respectively, while Spain's **Tecnicas Reunidas** won a USD770mn coker package. Egypt's ENPPI was awarded a USD400mn contract to build a tank farm. Three Saudi Arabian firms, **Saudi Services**, **Dayim Punj Lloyd** and **Rajeh H Al-Marri** won the remaining three contracts, but did not disclose the value of their winning bids.

YASREF will produce refined products that meet demand from emerging markets of Asia, the Middle East and Africa, as well as markets in Europe and the United States. The construction is expected to be completed in June 2014, with start-up commencing in September 2014 and the first commercial shipment of refined products expected in the fourth quarter of 2014.

Oil Processing Facilities

Oil is processed at the Abqaiq crude stabilisation plant complex, also known as Buqayq, currently the largest in the world. The complex, which is the main location for the processing of Arabian Light and Arabian Extra Light crude, has a capacity of around 7mn b/d. The facility is divided into three general parts: an oil processing area that converts sour crude into sweet crude, an NGL area and a utilities area that provides power and support for the other two areas. Because of its important role in processing much of the

country's crude oil and NGL and its location at the hub of the country's pipeline network, Abqaiq has been a target for terrorist attacks.

The failed attack on the facility in February 2006 highlighted the dangers posed by Islamic militants to Saudi energy infrastructure. Responsibility for the attacks on Abqaiq was claimed by a group calling itself 'al-Qaeda in the Arabian Peninsula'. In the statement, the group vowed to continue mounting such attacks in the Kingdom. However, although militant activity is a major risk, the government's campaign against extremist threats has been broadly successful.

Service Stations

With relaxed laws making the establishment of fuels retail stations extremely easy, Saudi Arabia has seen a boom in the number of service stations. In 2007 the number was estimated at 70,000, although it is estimated that at least a quarter of these were not built according to safety regulations. More recently, pressure seems to have increased to close the stations. A particular example has been the move to close any petrol station deemed too close to a pharmacy.

Oil Terminals/Ports

Saudi Aramco operates oil export terminals at Duba, Jeddah, Jizan, Jubail, Ju'aymah and Ras Tanura, while PetroRabigh operates a terminal at Rabigh. The most significant of these are the Ras Tanura facility on the Persian Gulf and the Yanbu facility on the Red Sea.

Ras Tanura

The Ras Tanura oil terminal complex is located in the east of the country close to major producing fields, and is linked by subsea pipeline to the Ju'aymah offshore oil terminal. The terminal comprises three separate sections, known as the North Pier, South Pier and the Sea Islands. According to the Energy Information Administration (EIA), the Sea Islands terminal has a capacity of around 6mn b/d, with an additional 2.5mn b/d of capacity available at the two port terminals. In 2008 the facility transported around 75% of the country's crude oil exports.

Yanbu

Saudi Arabia's second major export route is located at the Red Sea port of Yanbu. According to the EIA, the terminal has a capacity of around 4.5mn b/d of oil and 2mn b/d of NGL and refined products, and accounts

for around a quarter of Saudi Arabia's oil exports. The terminal, which was completed in 1982, was designed to reduce the country's strategic dependence on export routes that passed through the Straits of Hormuz. An additional attraction of the location was its relative proximity to European markets, allowing tankers to cut around 7,000km off the journey distance to Europe compared with transporting oil from the Persian Gulf.

The Yanbu terminal is linked to the East-West oil pipeline and its parallel NGL pipeline, both of which transport liquids from production centres further east. Oil can be processed at Aramco's refinery in the city, or stored in one of the company's 11 floating roof crude oil storage tanks, each of 1mn bbl. The facility also has two 250,000bbl cone roof storage tanks for bunker fuel.

Ras al-Ju'aymah

The Ras al-Ju'aymah oil terminal is located 11km offshore, close to the Ras Tanura oil terminal, to which it is linked by subsea pipeline. According to the EIA, the facility has a capacity of up to 3.6mn b/d.

Rabigh

The Rabigh oil terminal is operated by the PetroRabigh refining company under a five-year deal with Saudi Aramco signed in March 2006. The facility, which according to Aramco has a maximum offloading hourly rate of 110,000bbl, was historically used to source crude oil from Yanbu for the PetroRabigh refinery, although since 2005 the East-West pipeline spur to Rabigh has reduced pressure on the port.

Oil Pipelines

According to the EIA, Saudi Arabia has around 15,000km of oil pipelines, operated by Saudi Aramco. Although the country has several oil export pipelines, none are currently operational, meaning that all oil exports are sent via tanker terminals. The domestic pipeline network does play a role in the country's exports, however, by transporting oil to the country's west coast to the export terminal at Yanbu.

East-West Oil Pipeline

The 1,202km East-West pipeline, also known as the Petroline, transports crude oil from the Abqaiq processing plants in the east of the country to refineries and export terminals in the west. The pipeline, which has a capacity of 5mn b/d, is operated by Saudi Aramco and transports mainly Arabian Light crude. A 146km spur from the pipeline to the refinery and oil terminal at Rabigh was completed in 2005, allowing

600,000b/d to be transported and reducing the need to transport oil to the Rabigh refinery by sea. The pipeline runs alongside a 290,000b/d NGL pipeline which provides feedstock for petrochemical plants in Yanbu.

Shaybah-Abqaiq Pipeline

The Shaybah-Abqaiq pipeline runs north from the Shaybah oil field at the edge of the Rub al-Khali to Saudi Aramco's major oil processing centre at Abqaiq. The 638km pipeline has a capacity of 660,000b/d.

Saudi Arabia-Bahrain Pipeline

Saudi Arabia exports about 230,000b/d of crude oil from Abqaiq to Bahrain via the AB-1 pipeline. All the crude is refined at Bahrain's Sitra refinery. To boost export capacity, Bahrain is planning to replace the ageing pipeline with a new, wider one. The new pipeline project was originally announced in January 2009. Mirza said on May 24 2010 that the design and route planning for the pipeline would be completed by end-2010, although this did not prove to be the case. A FEED contract was expected to be awarded by end-2011 with construction to be completed by end-2013, according to Bahrain's National Oil and Gas Authority (NOGA)'s most recent estimate. The larger pipeline would increase Bahrain's oil import capacity, but actual flows are likely to vary in the coming years should domestic oil output increase.

Trans-Arabian Oil Pipeline (Closed)

The Trans-Arabian oil pipeline, also known as the Tapline, was Saudi Arabia's longest pipeline until its closure in 1990, with a total length of 1,214km. The pipeline, which was completed in 1950, had a theoretical capacity of 500,000b/d. It originally transported oil from Saudi Arabia's east coast through Jordan and Syria to the Lebanese port of Sidon. Following the Six Day War in 1967 the pipeline only supplied Jordan. Although the pipeline is currently unusable, negotiations have been started several times over reopening it.

IPSA Pipeline (Closed)

The 1.65mn b/d Iraq Petroleum Saudi Arabia (IPSA) pipeline, which transported oil from Iraq through Saudi Arabia for export, was mothballed in 1991 following the Gulf War. Although Iraq is looking at ways of increasing its crude oil export capacity, there are currently no plans to reopen the IPSA pipeline.

Gas Pipelines

Saudi Arabia currently has no gas export pipelines and a relatively limited domestic gas distribution network, known as the Master Gas System (MGS). Construction work started on the MGS in 1975 as a way of reducing flaring of associated gas and the bulk of the network was completed by the mid-1980. The pipeline network is fed by 64 gas separator plants and is linked to three gas processing plants at Shedgum, Uthmaniyah and Berri. NGLs from the MGS system are fed into the East-West NGL pipeline at Shedgum, from where they are transported to Yanbu on the Red Sea.

Competitive Landscape

Competitive Landscape Summary

- Saudi Aramco has pledged to spend USD35bn over the next five years in oil exploration and production (E&P) as part of an effort to maintain capacity. The sum is an increase from previous pledges by Aramco to spend between USD20-30bn over five years to offset declining volumes from mature fields and sustain production capacity. Aramco's investments in the downstream sector will be more than USD100bn over the coming decade as the global oil demand increases 25% in the coming 25 years, reports the Saudi Gazette.
- Aramco has announced that Saudi Arabia's natural gas reserves increased to 8.15trn cubic metres (tcm) of gas in 2013, up from 8.07tcm in 2012, reports Zawya. The company said that the rise came as new sources of the fuel in the Red Sea were explored, and as the country capitalised on shale gas to free up larger quantities of crude oil for exports. The company said it was exploring for potentially large-scale unconventional gas resources.
- Four companies, including South Korea's **GS Engineering and Construction**, Italy's **Maire Tecnimont**, Japan's **JGC** and Canada's **SNC-Lavalin**, have shown interest in bidding for contracts on Saudi Aramco's unconventional gas project in Saudi Arabia, reports Reuters. The project includes construction of processing facilities, wellheads and pipelines for the gas in Turaif in Saudi Arabia, where mining project Waad al-Shamal is under development. To supply the Waad al-Shamal project and a power plant, Aramco plans to produce around 5.66mn cubic metres a day of unconventional natural gas by 2018
- US major **Chevron** operates three onshore fields in the Partitioned Neutral Zone (PNZ) shared with Kuwait. **Chevron Phillips Chemical** operates a 50% JV at the S-Chem plant, alongside **Saudi Industrial Investment Group** at Jubail. The company's 35%-owned **Saudi Polymers Company** has been building a petrochemicals facility in Jubail, which was completed in late 2011.
- Shell has sizeable petrochemicals exposure but has decided to exit an E&P gas consortium in the Empty Quarter. Saudi-based SABIC and Shell have abandoned plans to expand their petrochemical joint project SADAF in Jubail. 'The results of the feasibility studies were not encouraging to carry out the project,' said SABIC in a statement. The expansion was aimed at adding polyols, propylene oxide (PO) and styrene monomer.
- **ExxonMobil** has a 50% stake in the 400,000b/d SAMREF refinery JV with Aramco, shares in two lubricating base oils plants in Jeddah and Yanbu and operates petrochemicals sites in Yanbu and Al Jubail. SAMREF has completed construction of major desulphurisation facilities, including a new hydrotreater, that dramatically cuts sulphur levels in gasoline and diesel.
- In April 2010, **ConocoPhillips** announced that it had exited a JV with Aramco to build a new 400,000b/d refinery at the Red Sea port of Yanbu. Aramco has indicated that it will push ahead with the project on its own and awarded several construction and engineering contracts in late July 2010.
- Castrol-branded lubricants are distributed by the **Al Khorayef Group**.
- **BP** has a 25% stake in the PASCO venture, which provides aviation refuelling services in Jeddah, Medina and other airports.
- Sinopec is a partner in a new USD10bn JV refining and petrochemicals project with Aramco. It has confirmed a deal with Aramco to build the 400,000b/d Yanbu refinery on the Red Sea.
- Dubai-based **Emirates National Oil Company** (ENOC) has been awarded the right to operate and maintain additional fuel service stations along Saudi Arabia's roads and highways. The company is one of

only three companies to win the certification from Saudi Arabia's Ministry of Municipal and Rural Affairs, which is seeking to upgrade service stations in the country. ENOC recently opened its 'first fully-fledged' service station in Dammam, on Khaleej Road next to Dareen Mall.

- Russia's **Lukoil** is planning to drill for unconventional gas in Saudi Arabia's Empty Quarter in 2015, reports Reuters. The company, along with Aramco, is planning to spud two very deep evaluation wells at depths of up to 5,791 metres in the Mushaib tight gas field in the Empty Quarter, according to two industry sources. The joint venture will drill the first well in Q115 and the second in H215, according to a Lukoil Overseas official.

Table: Key Players In Saudi Arabia's Oil & Gas Sector

Company	2012 sales, USDmn	% of total sales	No. of employees	Year est.	Ownership
BP	na	na	na	1983	100% BP
Chevron	na	na	na	1984	100% Chevron
Petro Rabigh (Sumitomo/Aramco)	na	na	2,000	2009	37.5% Sumitomo, 37.5% Aramco, 25% public
Samref (Mobil/Aramco)	na	na	na	1984	50% ExxonMobil, 50% Aramco
Sasref (Shell/Aramco)	na	na	na	1980	50% RD/Shell, 50% Aramco
Saudi Aramco	na	100	54,000	1933	100% state

na = not available/applicable. Source: Company data/BMI

Company Profile

Saudi Aramco

Strengths	<ul style="list-style-type: none">▪ Near-monopoly over domestic oil and gas supply▪ Unrivalled access to exploration acreage▪ Dominant position in downstream oil▪ Newly formed gas partnerships with IOCs
Weaknesses	<ul style="list-style-type: none">▪ Restricted financial and operational freedom▪ Cost and efficiency disadvantages▪ Rising investment requirement
Opportunities	<ul style="list-style-type: none">▪ Considerable untapped oil and gas potential▪ Scope for rising refined products exports▪ Large areas of under-explored territory▪ Significant shale gas potential
Threats	<ul style="list-style-type: none">▪ Need for ongoing, high-level investment▪ Changes in OPEC/national energy policy

Company Overview	<p>Saudi Aramco is the world's largest oil company in terms of crude oil reserves and production, with monopoly rights over the production of oil in Saudi Arabia. Downstream, Aramco operates four wholly owned refineries and has three JVs with IOCs for an installed capacity of 1.54mn barrels per day (b/d). The wholly owned plants are Ras Tanura (550,000b/d), the smaller of the two Yanbu plants (237,000b/d); Jeddah, with 88,000b/d capacity and private investors that own 25% of the project; and Riyadh with capacity of 122,000b/d. The 400,000b/d Samref facility is a 50:50 JV with ExxonMobil, while Shell has a 50% stake in the 305,000b/d Sasref refinery. Aramco</p>
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has announced that Saudi Arabia's natural gas reserves increased to 8.15trn cubic metres (tcm) of gas in 2013, up from 8.07tcm in 2012.

Strategy

Aramco's CEO Khalid A. Al-Falih has called for prudent and timely investments in the oil and gas industry to meet future energy requirements, as rising costs and global turmoil may affect oil supplies. The oil sector needs to add about 40mn barrels per day (b/d) of new capacity in the next two decades to meet projected demand growth and to offset decline, stated Al-Falih. 'To put that figure into perspective, that's equivalent to approximately 30 Norways or 15 times America's current unconventional oil production', said Al-Falih (Zawya). Aramco plans to invest more than USD40bn per annum in the next decade to sustain oil production capacity at 12mn b/d and to double gas output.

Saudi Aramco is seeking to reduce the production cost of tight gas to USD2-3 per 28.31 cubic metres, a similar level to the US, reports Bloomberg, citing Adnan Kanaan, the manager of the company's gas reservoir managing department. Saudi Arabia is seeking to develop its shale and tight gas deposits to ease the use of crude oil and other liquid fuels at power plants and free more oil for exports. The country is estimated to hold around 18.26trn cubic metres of technically recoverable shale gas, the fifth largest deposits globally.

Aramco has cancelled plans to conduct oil and gas exploration activities in the northern region of the Red Sea after taking into consideration the results of a recent study, reports Arabian Oil and Gas. The company asked the Marine Studies department of King Fahd University for Petroleum and Minerals to research the impact of petroleum exploration activities in the area. The study showed that many sites are biologically rich and contain a variety of species that could be harmed by exploration operations. The company accepted its recommendations and abandoned its exploration plans.

Aramco's investments in the downstream sector will be more than USD100bn over the coming decade as the global oil demand increases 25% in the coming 25 years, reports the Saudi Gazette. CEO Khalid al-Falih attributed the global rise in oil demand to both global demographic growth and rising living standards in the developing countries. He added that the company's total refining capacity will be around 8-10mn barrels a day (b/d) in the upcoming years, a figure which is more than the company's earlier estimate of 8mn b/d cited in 2012.

In October 2012 Aramco pledged to spend USD35bn over the next five years in oil E&P as part of an effort to maintain capacity. The sum is an increase from previous pledges by Aramco to spend between USD20-30bn over five years to offset declining volumes from mature fields and sustain production capacity. Falling output from fields in decline has resulted in Aramco's aggressive strategy to increase output with enhanced recovery projects and new upstream exploration.

Having succeeded in expanding oil production capacity to 12.0mn b/d, Aramco is now part way through a programme to increase the Kingdom's refining output. Aramco's

investments in the downstream sector will be more than USD100bn over the coming decade as the global oil demand increases 25% in the coming 25 years, reports the Saudi Gazette. CEO Khalid al-Falih attributed the global rise in oil demand to both global demographic growth and rising living standards in the developing countries. He added that the company's total refining capacity will be around 8-10mn b/d in the upcoming years, a figure which is more than the company's earlier estimate of 8mn b/d cited in 2012.

Aramco's large-scale investment in raising oil production capacity has also made additional supplies of gas available. Although Aramco's extra oil capacity - for the time being - is likely to be confined to strategic purposes, extra gas capacity will be fed straight into the domestic market. Riyadh has made some gains in diversifying its sources of gas, with large volumes of non-associated gas produced from the Ghawar field feeding the Hawiyah and Haradh gas plants. Growing consumption, however, continues to put pressure on gas supplies.

Saudi Aramco and Sinopec will develop a refinery in Saudi Arabia at a cost of as much as USD10bn and are in talks to build another in China, their second in the country. The 400,000b/d plant in the western city of Yanbu is likely to start output in 2014, al-Falih told reporters in January 2012 after signing the deal with Sinopec.

Saudi Arabia and Kuwait have put their joint project to develop the Dorra gas field on hold, reports Reuters, citing a senior Kuwaiti energy source. The move follows disagreements between the two over transport of gas from the field, which is located between the countries. Saudi Arabia's demand that gas be piped to Khafji on the Saudi side of the border, before being piped to Kuwait, goes against the initial plan of sharing the gas at an offshore facility and pumping via separate pipelines to the project partners. Saudi Arabia's proposed route has raised security concerns for Kuwait's share of supply. However, the original plan to pump its share direct to a Kuwaiti beach is also stuck due to land disputes between energy companies. Saudi Arabia's plans to raise its gas production capacity rely heavily on LNG imports expected to come from Dorra, while the failure of the project is likely to raise Kuwait's costly LNG imports from the global market.

The Shaybah oil field in Saudi Arabia's Empty Quarter can pump 750,000b/d for 70 years due to Aramco's innovative management of the site, reports Zawya. The oil field is located 800km southeast of Dhahran and is one of the most prominent landmarks in the Rub Al-Khali desert. By end 2013, the oil field had pumped 1bn barrels of oil and added 2bn barrels of reserves. Shaybah's output resulted in an increase in Arabian Light Crude from 500,000 to 750,000b/d. Shaybah's production also led to the expansion of gas compression, injection and power generation facilities.

Aramco is ready to use shale gas for power generation, making it one of the first countries outside of North America to supply gas to a major power plant project. The gas will feed a massive power plant in Jazan, northern Saudi Arabia, which in turn will supply gas to a large phosphate mining and manufacturing centre in the region,

according to Saudi Aramco's CEO Khalid Al-Falih. However, Al-Falih declined to disclose the details of the quantity of gas Aramco plans to supply to the power plant or the time when the company will start the gas supply.

The company is planning to start exploration for shale gas in Saudi Arabia. The company is in talks to acquire 40 extra rigs to boost its shale gas exploration work. Despite the fact that there has been no official confirmation of the country's shale gas reserves, studies have confirmed Saudi Arabia has shale reserves to attract significant investment. Details of the company's shale exploration are unclear, but recent developments indicate it is engaged in large scale production in Saudi Arabia.

Development of a pipeline extension through the 2,890sq km Khurais oil field in Saudi Arabia is reportedly under way. The 150km extension will increase the country's oilfield capacity from 11.3mn b/d to 12.5mn b/d. The Khurais Megaproject comprises the Abu Jifan, Khurais and Mazalij oilfields and is coordinated by Aramco. The extension is expected to be completed in 27 months.

Aramco has received numerous front-end engineering and design tenders for its shale gas scheme in the country. The presence of untapped shale resources in the country is encouraging petrochemicals producers and other heavy industrial sectors to build facilities nearby the largest shale formations. Aramco's foray into shale gas exploration will also provide an opportunity for Saudi nationals to gain knowledge on how to tap unconventional gas.

Four companies, including South Korea's **GS Engineering and Construction**, Italy's **Maire Tecnimont**, Japan's **JGC** and Canada's **SNC-Lavalin**, have shown interest in bidding for contracts on Saudi Aramco's unconventional gas project in Saudi Arabia, reports Reuters. The project includes construction of processing facilities, wellheads and pipelines for the gas in Turaif in Saudi Arabia, where mining project Waad al-Shamal is under development. To supply the Waad al-Shamal project and a power plant, Aramco plans to produce around 5.66mn cubic metres a day of unconventional natural gas by 2018.

Aramco's industrial project at Jizan is scheduled for completion by 2017, following the most recent delays. The project includes construction of a refinery with a capacity of up to 400,000b/d. The refinery will be the last of the three refineries to be opened in the country between 2013 and 2018. The company's initial plans to start operations at the refinery and oil tanker terminal in late 2016 were delayed due to infrastructure projects that were lagging behind their scheduled dates.

Market Position

Saudi Aramco is the world's largest oil company in terms of crude oil reserves and production, with monopoly rights over the production of oil in Saudi Arabia. Downstream, Aramco operates four wholly owned refineries and has three JVs with IOCs for an installed capacity of 1.54mn b/d. The wholly owned plants are Ras Tanura (550,000b/d), the smaller of the two Yanbu plants (237,000b/d); Jeddah, with 88,000b/d

capacity and private investors that own 25% of the project; and Riyadh with capacity of 122,000b/d. The 400,000b/d Samref facility is a 50:50 JV with ExxonMobil, while Shell has a 50% stake in the 305,000b/d Sasref refinery.

Aramco is heavily involved in downstream projects overseas, many of which it supplies with crude feedstock. In the US, Aramco operates through the Motiva JV and provides energy services through Aramco Services Company. Motiva operates three refineries, with a combined capacity of 690,000b/d, supplies nearly 13,000 service stations and operates a network of oil product terminals.

Aramco has announced that Saudi Arabia's natural gas reserves increased to 8.15trn cubic metres (tcm) of gas in 2013, up from 8.07tcm in 2012, reports Zawya. The state-owned company said that the rise came as new sources of the fuel in the Red Sea were explored, and as the country capitalised on shale gas to free up larger quantities of crude oil for exports. The company said it was exploring for potentially large-scale unconventional gas resources.

In South Korea, Aramco holds a 35% interest in refiner S-Oil, which operates a 580,000b/d refinery complex at Onsan and a distribution and marketing network that includes seven product distribution terminals and over 1,300 branded retail stations. In the Philippines, Aramco holds a 40% interest in the country's largest refining and marketing company Petron - operator of the 180,000b/d Bataan refinery, over 1,000 service stations, 120 LPG dealerships, 32 bulk plants and three sales offices. In China, the company is part of a JV with Fujian Refining Company (a subsidiary of Sinopec) which owns the 240,000b/d Fujian Refining and Petrochemical complex, which is designed to process primarily sour Arabian crude imported by Saudi Aramco. It has also been involved in long-running talks with Sinopec over taking a stake in the Qingdao refinery.

A new Saudi Aramco subsidiary for trading refined products started commercial operations on January 1 2012, the state company reported. Saudi Aramco Products Trading Co (Aramco Trading) will replace the Product Sales and Marketing Department (PSMD) in importing and exporting refined petroleum products, it said in a statement posted on its website. Aramco Trading will start with 80 employees and be based in Dhahran, the site of the state company's headquarters.

Aramco has selected contractors to build its refinery in the province of Jazan. The contractors will be responsible for the engineering, procurement and construction of the refinery. The 400,000b/d refinery will process heavy and medium crude oils and produce paraxylene, benzene, gasoline and ultra-low sulphur diesel. Contracts were awarded to Hitachi Plant Technologies, JGC Corporation, Tecnicas Reunidas, SK Engineering & Construction, Hanwha Engineering and Construction, Hyundai Arabia and Petrofac Saudi Arabia.

Saudi Arabia's new oil refinery, the Satorp complex, reached its design capacity in August 2014, reports Bloomberg. The plant, which is a joint venture between Total and

Aramco reached its full capacity of 400,000b/d on August 1, according to Total's President of refining and chemicals Patrick Pouyanne.

Yanbu Aramco Sinopec Refining Company (Yasref) has begun trial runs at its 400,000b/d refinery complex in Yanbu, reports Reuters, citing industry sources. Yasref is a joint venture between Sinopec and Saudi Aramco. The test runs are in line with Yasref's plan to export the first commercial shipment of refined products by November 2014. The refinery will process Arab heavy crude from Saudi Arabia's Manifa oilfield and will produce 90,000 b/d of gasoline and 263,000 b/d of ultra-low sulphur diesel among other products, according to the company.

Aramco has announced that the Jizan plant will be delayed by six to 12 months. Work on associated infrastructure has fallen behind schedule and the contract to set up a plant to supply the refinery with power has not been awarded yet, resulting in a delay to the project, according to unnamed industry sources. The firm had signed deals worth around USD6bn for the refinery project. The complex was originally scheduled to be completed by late 2016.

The Saudi Ministry of Petroleum and Mineral Resources has announced the discovery of a new gas field in the Red Sea, located 26km north west of the port city of Dhaha. Aramco, which made the discovery, declared a flow rate of 0.28mn cubic metres per day (Mcm/d) at a water depth of 5,395 metres (m). The company will now drill more exploratory wells in order to ascertain the size of the field. The Red Sea's gas potential remains largely underexplored, much like the onshore Empty Quarter, which is also receiving increasing E&P investment.

Italy-based Saipem secured three engineering, procurement and construction (EPC) contracts from Aramco for onshore projects in Saudi Arabia. Of the three onshore EPC contracts, two contracts are for the Jazan Integrated Gasification Combined Cycle project near Jizan. Both contracts include the pre-commissioning, assistance to commissioning and performance tests of several facilities. The third onshore EPC contract is for the Loops 4 and 5 of the Shedgum-Yanbu' Gas Pipeline. Work under the contract includes detailed design, installation, commissioning and start-up assistance for the two pipelines, which is expected to be completed in H217.

Saipem has secured a new engineering and construction (E&C) contract from Aramco for a project onshore Saudi Arabia. The contract is related to the expansion of the onshore production centres at the Khurais, Mazajili and Abu Jifan fields. The project includes building new facilities that will enable the processing of an additional 300,000b/d from the Khurais field and installation of new satellite facilities to restore production of 200,000b/d from the Abu Jifan and Mazalij fields.

German engineering conglomerate Siemens has signed a USD966mn contract with Aramco under which it will supply key components for the 4,000MW Jazan combined cycle power plant - the latest development in the Kingdom's bid to bring online what will be the world's largest regasification-based power plant. The facility, which will be designed to utilise synthetic gas (syngas - extracted from gasified refinery residues), as

well as diesel fuel, will power the Jazan Industrial City and the 400,000b/d Jazan refinery in south-western Saudi Arabia. Utilising this technology could prove an important component of Saudi Arabia's wider aim of preserving its precious oil reserves for export. This will be increasingly important in the short-term as domestic demand for electricity grows at a rapid pace - although we note that utilising syngas in power generation will likely be dependent on the price of producing syngas relative to the price of simply burning domestic oil.

Aramco has entered into an agreement with Singapore-based engineering firm SembCorp Marine and National Shipping Company of Saudi Arabia (Bahri) to carry out a feasibility study for a maritime yard project in Saudi Arabia. A final decision on whether to advance with the project will be taken in the coming 15 months. The proposed maritime yard would provide engineering, production and repair services for rigs, platforms, commercial vessels and offshore service vessels.

Aramco intends to construct a new gas plant at the al-Fadhili oilfield in the Eastern Province of Saudi Arabia, reports Reuters, citing three unnamed industry sources. It will have a capacity to process 28.32mn standard cubic metres of sour gas per day, the sources said. The plant, which will process gas coming from the Khursaniyah and Hasbah oilfields, is expected to come on stream in 2018, with capacity to supply 14.72 standard cubic metres of gas per day to the market.

Aramco has begun construction of a gas plant in the Midyan gas field in northern Saudi Arabia, reports Zawya. The project is a joint venture with Larsen and Toubro Arabia and is expected to be completed by 2016. The plant will be able to process 2.1mn cubic metres of gas and 4,500 barrels of condensate a day. The project includes a 98km pipeline will allow the transfer of hydrocarbons from the facility to a plant in Duba, where it will be used for power generation.

US rig provider Rowan Companies has awarded a 10-year extension for one of its drilling units with Aramco in the Middle East. The Bob Keller rig is expected to start operations in May 2014. Under the terms of the new deal, the day rate will increase from USD127,500 to USD177,500 a day.

The National Shipping Company of Saudi Arabia or NSCSA (Bahri) and Aramco's subsidiary, Vela International Marine, have completed their USD1.3bn merger, Saleh N. Jasser, Bahri's CEO, said in June 2014. Aramco will own 20% of NSCSA shares, he added. Under the merger, Aramco is transferring its entire Vela fleet - 14 double-hull very large crude carriers (VLCCs); one VLCC used as floating storage; five refined products carriers; all Vela's ship-based cadres and some of its land-based personnel; and a part of its operations systems - to Bahri, which would then have a 77 vessel fleet.

Switzerland-based engineering company Foster Wheeler has secured a front-end engineering and design (FEED) contract from Aramco to work on its unconventional gas programme. The expected five-year contract involves the development of tight gas fields in the Kingdom's Empty Quarter, South Ghawar, and Jalamid regions.

French geoscience specialist CGG's local arm Arabian Geophysical and Surveying company (ARGAS) has secured a three-year contract from Saudi Aramco for an extensive, high-density land seismic programme across Saudi Arabia. CGG's equipment division Sercel will supply all the seismic equipment deployed on this survey programme. The three-year contract provides for two optional extension periods of one year each. The seismic work is expected to start by end of 2014.

Operational Data

Crude oil production:

- 9.51mn b/d (2012)
- 9.1mn b/d (2011)
- 7.9mn b/d (2010)

Condensate production:

- 1.3mn b/d (2011)
- 1.1mn b/d (2010)

Gas production (incl. ethane):

- 111.2bcm (2012)

Refining capacity:

- 2.4mn b/d (2012)

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Shell Saudi Arabia

Strengths	<ul style="list-style-type: none"> ▪ Major domestic oil refiner ▪ Substantial share of lubricants market ▪ Good relationship with state energy company ▪ Significant role in petrochemicals segment
Weaknesses	<ul style="list-style-type: none"> ▪ No producing oil or gas interests ▪ No oil exploration or development exposure ▪ Poor returns on gas investment project
Opportunities	<ul style="list-style-type: none"> ▪ Great untapped oil and gas potential ▪ Scope for rising products/petchem exports ▪ Large areas of under-explored territory
Threats	<ul style="list-style-type: none"> ▪ Need for ongoing, high-level investment ▪ Changes in national energy policy

Company Overview **Shell** has invested over USD7.8bn in the Kingdom's downstream sector and holds interests in five major JVs, including a 50% interest in **Saudi Arabia Petrochemical Company** (Sadaf) and a 50% holding in **Saudi Aramco Shell Refinery** (Sasref).

Strategy Shell has halted gas exploration efforts in Saudi Arabia with Saudi Aramco. The news continued a string of disappointments following Aramco's opening of its upstream for foreign participation in the hunt for gas. Between 2003 and 2004, Saudi Aramco entered into four JVs with international companies to explore for gas in the Empty Quarter, located within the Rub' al-Khali basin, south east of the Kingdom - **EniRepSa** (with **Eni** and **Repsol**), **Luksar** (with **Lukoil**), **South Robh Al Khali Company** (SRAK, with Shell) and **Sinopec-Aramco** (with Sinopec).

Exploration failed to yield the significant commercial discoveries that Aramco had hoped for, with the fiscal terms on offer presenting a further challenge to ambitious gas plans. In 2010, Lukoil relinquished 90% of its rights to an exploration block. The Russian oil giant decided not to conduct a second phase of exploration following initial appraisal wells at the Tukhman and Mushayib/Faydah discoveries. Press reports cited at the time indicated that unattractive state-set gas prices - some USD0.75 per million British thermal unit (/mnBTU) - meant that discoveries would only be commercial if development included the recovery of sizable condensate volumes alongside gas.

In 2012, Eni and Repsol also ended their hunt for gas, with the poor quality of gas, the need to discover condensate alongside gas to make development economical and a ban of any potential exports all suggesting limited commercial prospects for Saudi gas. Sinopec also announced in 2012 a halt to exploration, citing the 'uncertain economics' of the current joint venture. Now, with Shell's exit, Aramco's most ambitious efforts to draw foreign players into the quest to develop the Kingdom's gas reserves seems set to fail.

SABIC and Shell have abandoned plans to expand their petrochemical joint project SADAF in Jubail. 'The results of the feasibility studies were not encouraging to carry out the project,' said SABIC in a statement. The expansion was aimed at adding polyols, propylene oxide (PO) and styrene monomer. 'Shell and SABIC have agreed not to pursue this investment further but have agreed to continue to have constructive discussions to explore other opportunities for expansion,' a Shell spokesperson said (Gulf Daily News).

Market Position

Shell has invested over USD7.8bn in the Kingdom's downstream sector and holds interests in five major JVs, including a 50% interest in Saudi Arabia Petrochemical Company (Sadaf) and a 50% holding in Saudi Aramco Shell Refinery (Sasref).

Shell and Total became the first IOCs to enter Saudi Arabia's upstream sector since nationalisation in the 1970s, following the official signing of a shareholders' agreement for the USD2.5-5.0bn gas exploration and development project in the Empty Quarter. Since Total's withdrawal from the project, Shell and Saudi Aramco have operated the South Rub'i al-Khali (SRAK) JV, each holding a 50% share.

Assets include the 305,000 barrels per day (b/d) Sasref in Jubail - a 50:50 JV between Shell and Aramco. Saudi Arabian Markets & Shell Lubricants Company (Saslubco) manufactures and markets Shell Super Plus and Rotella TX-branded lubricants at its blending plant in Jeddah. The Al-Jomaih and Shell **Lubricating Oil Company** (Josloc) venture blends and markets a wide range of Shell lubricants. Shell claims that its branded lubricants have captured 30% of the local market.

Shell also has a 25% interest in Peninsular Aviation Services Company (Pasco), an aviation refuelling JV. Other shareholders in Pasco include BP (25%) and local concerns SAM (20%), Sheikh Ashmawi (22%) and the Kamal Adham family (8%).

In the petrochemicals sector, Shell holds a 50% interest in the Sadaf, together with SABIC. The two partners recently completed a major upgrade of the facility, which is now capable of producing 1.1mn tpa of ethylene, 1.1mn tpa of styrene, 840,000tpa of ethylene chloride, 700,000tpa of methyl tertiary butyl ether (MTBE), 670,000tpa of caustic soda and 300,000tpa of ethanol.

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ExxonMobil Saudi Arabia

Strengths	<ul style="list-style-type: none"> ▪ Major domestic oil refiner ▪ Share of lubricants market ▪ Significant role in petrochemicals segment
Weaknesses	<ul style="list-style-type: none"> ▪ No producing oil or gas interests ▪ No exploration or development exposure ▪ Rising investment requirement
Opportunities	<ul style="list-style-type: none"> ▪ Considerable untapped oil and gas potential ▪ Scope for rising products/petchem exports
Threats	<ul style="list-style-type: none"> ▪ Need for ongoing, high-level investment ▪ Changes in national energy policy

Company Overview **ExxonMobil** has invested over USD5bn in Saudi Arabia and its main assets include a number of refining and petrochemicals JVs with **Aramco** and **SABIC**. Through a 50:50 partnership with Aramco, ExxonMobil operates the 400,000 barrels per day (b/d) Samref refinery in Yanbu. Lubricating base oils are produced at the Luberef facilities in Jeddah and Yanbu, which is a 30:70 JV between ExxonMobil and Aramco. November 2007 saw Exxon agree to sell its 30% stake to **Jadwa Investment Company**.

Strategy ExxonMobil is the world's largest refiner, and access to the Saudi downstream segment enables it to benefit from higher-value product generation and sales. So long as Saudi Arabia's oil upstream segment is closed to foreign investment, ExxonMobil's presence in the Kingdom will remain limited to downstream activities.

Saudi Basic Industries Corporation (SABIC) and Exxon Mobil said in July 2013 that they would borrow USD1.2bn from banks for expansion of their joint venture petrochemicals project in the kingdom, two people familiar with the deal said. Al-Jubail

Petrochemical, known as Kemya, will raise a total of USD2.2bn through a mix of shareholder loans and bank debt, said the people.

Kemya is building a specialty-elastomer plant on the kingdom's Persian Gulf coast that will produce 400,000 tonnes of rubber products a year, which will be sold in Saudi Arabia and exported to the Middle East and Asia. Construction contracts were awarded in June 2012 with production expected to begin in the second half of 2015.

A USD900mn loan from 10 local and international banks will be backed by SABIC, while Exxon Mobil will guarantee a USD100mn facility from non-Saudi banks. Kemya will also borrow about USD200mn in Saudi riyals in a non-guaranteed loan, the people said. As part of the financing, Exxon Mobil will also provide a shareholder loan of USD900mn, while SABIC will contribute USD100mn, one of the people said.

Market Position

ExxonMobil has invested over USD5bn in Saudi Arabia and its main assets include a number of refining and petrochemicals JVs with Aramco and SABIC.

Through a 50:50 partnership with Aramco, ExxonMobil operates the 400,000b/d Samref refinery in Yanbu. Lubricating base oils are produced at the Luberef facilities in Jeddah and Yanbu, which is a 30:70 JV between ExxonMobil and Aramco. Samref has completed construction of major desulphurisation facilities, including a new hydrotreater, that dramatically cuts sulphur levels in gasoline and diesel.

Petrolube refines, markets, distributes and transports oil and lubricants, holding a 40% share of the domestic market and exporting products to over 40 countries. It is a 29:71 JV between ExxonMobil and Aramco. Arabian Petroleum Supply Company (Apsco) produces and markets Mobil-branded lubricants, aviation fuels, operates marine bunkers and offers aviation refuelling services. Petrochemicals ventures include the Yanpet facility in Yanbu, capable of producing 1.7mntpa, making it the largest PE producer in the Middle East. Additional ethylene and PE facilities are located at the Kemya Al-Jubail complex, which is a 50:50 JV with SABIC.

ExxonMobil was the leader of the USD15bn South Ghawar and USD5bn Red Sea gas projects, which involved the development of gas reserves, power plants, petrochemicals and water desalination plants. Negotiations between the US major and the government broke down in mid-2003, with the two sides unable to agree on the rate of investment returns.

Saudi Aramco and Exxon in May 2013 restarted its Red Sea Yanbu refinery, after nearly two months of maintenance. With the restart, the refinery is bringing a new clean fuels project online. During maintenance, which started in March, SAMREF boosted the reliability of the fluid catalytic cracker, which helps turn crude oil into gasoline, and upgraded the refinery to produce cleaner fuels. The clean fuels project is expected to reduce sulphur levels by more than 98% in diesel by 2016. A similar reduction has already been achieved with gasoline.

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Chevron

Strengths	<ul style="list-style-type: none">▪ Share of upstream oil production▪ Role in lubricants and aviation fuel market▪ Good relationship with state energy company▪ Significant position in petrochemicals segment
Weaknesses	<ul style="list-style-type: none">▪ Little upside potential from oil interests▪ No gas exploration or development exposure▪ Absence from oil-refining segment
Opportunities	<ul style="list-style-type: none">▪ Considerable untapped oil and gas potential▪ Scope for rising petrochemicals exports▪ Large areas of under-explored territory
Threats	<ul style="list-style-type: none">▪ Changes in OPEC/national energy policy

Company Overview **Chevron** has a concession agreement, with Saudi Arabia to operate the kingdom's 50% interest in the hydrocarbon resources of the onshore area of the Partitioned Zone (PZ) between Saudi Arabia and Kuwait. The agreement was extended and amended in 2009; it now expires in 2039. During 2013, development drilling, well maintenance and numerous facility-enhancement programmes were under way in the onshore PZ and are scheduled to continue in 2014. The work is expected to partially offset declines in overall production from the Humma, South Fuwaris, South Umm Gudair and Wafra fields.

Strategy During 2013, development drilling, well maintenance and numerous facility-enhancement programmes were under way in the onshore PZ and are scheduled to continue in 2014. The work is expected to partially offset declines in overall production from the Humma, South Fuwaris, South Umm Gudair and Wafra fields.

In 2009, steam injection began at the Large-Scale Steamflood Pilot (LSP) Project for the carbonate First Eocene reservoir at the Wafra Field. Steamflooding involves injecting steam into heavy oil reservoirs to heat the crude oil underground, which reduces its viscosity and allows its extraction through wells. This project was preceded by steam stimulation of some wells, followed several years later by a small-scale test. The entire development project is designed to determine the technical and economic viability of thermal-recovery projects in the Eocene reservoirs of the Wafra Field.

In 2013, work continued on the steam injection pilot project in the target reservoir and achieved thermal maturity, which means steam was injected into the reservoir, and a steam zone developed, resulting in significant recovery of oil. This is the first time a carbonate reservoir has successfully recovered heavy oil using a conventional continuous steam injection concept.

The LSP project required drilling injection wells, producing wells and observation wells while installing facilities for water treatment, steam generation and distribution.

In September 2013, front-end engineering and design began for expansion of the LSP Project to the Second Eocene carbonate reservoir. Start up is expected by the end of 2014.

Development planning also continued on a full-field steamflood application in the Wafra Field. Front-end engineering and design work for the first area of the Wafra Steamflood Project is expected to begin in late 2015. This area is expected to reach maximum total production of 80,000b/d of crude oil. This would mark the first commercial application of conventional steamflooding in a carbonate reservoir anywhere in the world.

A carbonate reservoir is an oil or gas trap formed in reefs, dolomite and certain types of limestone. Typically, carbonate reservoirs are highly fractured and not conducive to steamflooding on a large scale. However, the carbonate Eocene reservoirs at Wafra have favourable properties that are promising for successful steamflooding.

Front-end engineering and design continued on the Central Gas Utilisation Project in 2013. The project is intended to make the use of natural gas more efficient and eliminate natural gas flaring at the onshore PZ fields.

Market Position

Through its subsidiary Saudi Arabian Chevron, the company has an agreement with Saudi Arabia to operate the Kingdom's 50% interest in the hydrocarbon resources of the onshore area of the Partitioned Zone (PZ) between Saudi Arabia and Kuwait. The agreement was extended and amended in 2009; it now expires in 2039. Total onshore PZ oil production reached 3bn bbl in late 2004, with production from four fields. During 2013, development drilling, well maintenance and numerous facility-enhancement programs were under way in the onshore PZ and are scheduled to continue in 2014. The work is expected to partially offset declines in overall production from the Humma, South Fuwaris, South Umm Gudair and Wafra fields.

The Saudi Chevron Phillips Company petrochemical plant in Al-Jubail is designed to produce 790,000tpa of benzene and 360,000tpa of cyclohexane. The plant uses CPChem's Aromax catalyst to convert naphtha feedstock. Naphtha is used in making high-octane gasoline.

CPChem's 50%-owned Jubail Chevron Phillips Company has a styrene production facility in Al-Jubail. The plant, which began operations in 2008, is one of the world's largest. A third petrochemical project, Saudi Polymers Company, shares facilities on the same site in Al-Jubail. The joint venture, of which ACP owns 35%, began construction in 2008. The project includes one of the world's largest olefins units. CPChem and Saudi Industrial Investment Group share a 50-50 ownership in a fourth project, Petrochemical Conversion Company. The project includes construction of a nylon 6,6 polymer manufacturing facility and a number of polymer conversion projects.

Under contract with Saudi Aramco, Chevron purchases Saudi crude oil for its own refining system and ranks among the kingdom's larger purchasers of crude. The Chevron AlBakri Lubricants Company markets Caltex lubricants and specialty products, such as coolant, to the consumer, commercial and industrial sectors in the kingdom. The joint venture is headquartered in Jeddah.

Operational Data **Net oil production from Saudi/Kuwait Neutral Zone:**

- 88,000b/d (2011)
- 94,000b/d (2010)
- 101,000b/d (2009)

Net gas production (Neutral Zone):

- 0.21bcm (2011)
- 0.23bcm (2010)

- Company Details**
- Saudi Arabian Texaco
 - PO Box 6
Mina Saud (Mina Al-Zour)

66051

Kuwait
 - Tel: +965 395 0444
 - www.chevron.com

Other Summaries

Total

In July 2003, **Total**, as part of a **Shell**-led consortium, was awarded exploration and production (E&P) rights for 200,000sq km of Saudi's Empty Quarter, under the strategic gas initiative. In February 2008, however, Total withdrew from the project. The move may jeopardise the company's future involvement in Saudi Arabian upstream operations. Failure to find gas has been cited as the reason for the move.

In the downstream segment, Total signed a deal to build a USD6bn, 400,000 barrel per day (b/d) refinery in the industrial city of Jubail in a JV with **Saudi Aramco** in May 2006. The JV, known as the **Saudi Aramco-Total Refining and Petrochemical Company** (SATORP), will initially be majority owned by Aramco with a 62.5% interest, with Total holding the remaining 37.5%.

The SATORP refinery reached its design capacity in August 2014, reports Bloomberg. The plant achieved its full capacity of 400,000b/d on August 1, according to Total's President of refining and chemicals Patrick Pouyanne.

Sabir

A unit of Saudi Arabia-based petrochemicals producer **Saudi Basic Industries Corporation** (SABIC) has entered into a JV with **SK Global Chemical**, a Korean petrochemical manufacturer, to establish a refined oil products plant in Singapore, according to a statement from SABIC on May 26. The USD595mn deal will give the two companies equal ownership in the JV. The plant is expected to have a production capacity of 230,000 tonnes annually. The agreement is awaiting regulatory approval, Reuters reported.

SABIC expects its planned oil-to-chemicals plant at Yanbu, Saudi Arabia to start operations by end 2020, reports Reuters. An estimated 10mn tonnes per annum or 200,000b/d of crude oil will be used as feedstock for the plant. Development of the Kingdom's petrochemical sector is in line with Saudi Arabia's strategy to diversify the economy away from heavy dependence on crude export revenues.

SABIC is evaluating opportunities to enter the shale gas sector in North America, reports Asharq Al Awsat, citing CEO Mohamed Al Mady. The company is expected to announce plans for participation in the North American shale gas industry in coordination with Saudi Arabia's Capital Market Authority in the beginning of 2015. Details about the planned investments have not yet been disclosed.

SABIC and Royal Dutch Shell have abandoned plans to expand their petrochemical joint project SADAF in Jubail, Saudi Arabia. 'The results of the feasibility studies were not encouraging to carry out the project,' said Sabic in a statement. The expansion was aimed at adding polyols, propylene oxide (PO) and styrene monomer. 'Shell and Sabic have agreed not to pursue this investment further but have agreed to continue to have constructive discussions to explore other opportunities for expansion,' a Shell spokesperson said (Gulf Daily News).

- Enoc** Dubai-based **Emirates National Oil Company (ENOC)** has been awarded the right to operate and maintain additional fuel service stations along Saudi Arabia's roads and highways. The company is one of only three companies to win the certification from Saudi Arabia's Ministry of Municipal and Rural Affairs, which is seeking to upgrade service stations in the country. ENOC recently opened its 'first fully-fledged' service station in Dammam, on Khaleej Road next to Dareen Mall.
- Conocophillips** **The Saudi Chevron Phillips Company** petrochemical plant in Al-Jubail is designed to produce 790,000 tonnes per annum (tpa) of benzene and 360,000tpa of cyclohexane. Benzene is an industrial solvent and precursor in the production of medicines, plastics, synthetic rubber and dyes. Cyclohexane is used in the production of nylon, solvents, paint and varnish remover. The plant uses CPChem's Aromax catalyst to convert naphtha feedstock. Naphtha is used in making high-octane gasoline.
- CPChem's** 50%-owned **Jubail Chevron Phillips Company** has a styrene production facility in Al-Jubail. The plant, which began operations in 2008, is one of the world's largest. Styrene is a precursor to polystyrene, which is used to make plastic dinnerware, CD cases, insulation and foam drink cups, among other products.
- Bp** **BP** currently retails lubricants and aviation fuel in Saudi Arabia. Castrol-branded lubricants are distributed by the Al Khorayef Group and the British major holds a 25% stake in the PASCO venture, which provides fuel refuelling services in Jeddah, Medina and other airports. Group subsidiary BP Solar operates a JV solar panel manufacturing plant in Riyadh, with its output distributed locally and through the Gulf. BP was a participant in the failed South Ghawar core gas project, and remains interested in pursuing gas E&P activities.
- Sinopec** In January 2004, Saudi Arabia awarded China's **Sinopec** an E&P contract for natural gas in a 40,000sq km area in the Empty Quarter. A new company, 80% owned by Sinopec and 20% by Saudi Aramco, has been set up for the Contract Area B project. In June 2009, the company started drilling its seventh and final well after the previous six were all found to be dry. The final well was expected to be completed in October 2009, although no results have been released. In spite of the disappointing early exploration results, it was reported in October 2010 that Sinopec agreed to a second 18-month exploration period.
- Yanbu Aramco Sinopec Refining Company (Yasref)** has begun trial runs at its 400,000b/d refinery complex in Yanbu, reports Reuters, citing industry sources. Yasref is a joint venture between Sinopec and Saudi Aramco. The test runs are in line with Yasref's plan to export the first commercial shipment of refined products by November 2014. The refinery will process Arab heavy crude from Saudi Arabia's Manifa oilfield and will produce 90,000 b/d of gasoline and 263,000 b/d of ultra-low sulphur diesel among other products, according to the company.

Sinopec is in talks with Aramco and **ExxonMobil**, its partners in the Fujian refinery in China, over plans to build a 240,000 to 300,000b/d refinery, al-Falih and Sinopec Chairman Fu Chengyu said at a press conference in Dhahran, Saudi Arabia. The partners also plan to expand capacity at the Fujian plant.

The Fujian expansion includes upgrading the refinery's crude processing unit, 'debottlenecking' and expanding the ethylene cracker from 800,000tpa to 1.2mn tpa, al-Falih added. The companies will make an investment decision on the expansion in coming months.

Lukoil

Russia's **Lukoil** is planning to drill for unconventional gas in Saudi Arabia's Empty Quarter in 2015, reports Reuters. The company, along with state oil company Saudi Aramco, is planning to spud two very deep evaluation wells at depths of up to 5,791 metres in the Mushaib tight gas field in the Empty Quarter, according to two industry sources. The joint venture will drill the first well in Q115 and the second in H215, according to a Lukoil Overseas official.

Sumitomo

Japan's **Sumitomo Chemical** owns 37.5% of the Petro Rabigh JV, which owns a refinery at Rabigh that commenced operations on May 19 2009 and produces 385,000b/d. The remaining 62.5% of the company is owned by Saudi Aramco (37.5%) and by private shareholders (25%). Under a deal agreed in May 2004, Aramco agreed to supply the project with 385,000b/d of crude, as well as ethane and butane, while Sumitomo provided petrochemical technology and its extensive marketing base. The project is thought to have cost USD4.3bn, divided equally between the Japanese company and Aramco.

Regional Overview

Middle East Regional

***BMI View:** Middle East oil production will post strong growth across our 10-year forecast period, although ongoing political and security risks will see continued volatility in the supply. Oil export capacity will also come under increased strain, as spiralling domestic demand and an aggressive downstream expansion soaks up the bulk of forecast production growth. We hold a bullish outlook on the Middle East refining sector, although flag tightening gas supply-demand dynamics as a potential bottleneck on the industry.*

To highlight the key themes that will unfold in BMI's Middle East oil and gas forecasts, we have compared the region through the following key indicators:

- Oil Production
- Oil Consumption
- Refining Capacity
- Gas Production
- Gas Consumption

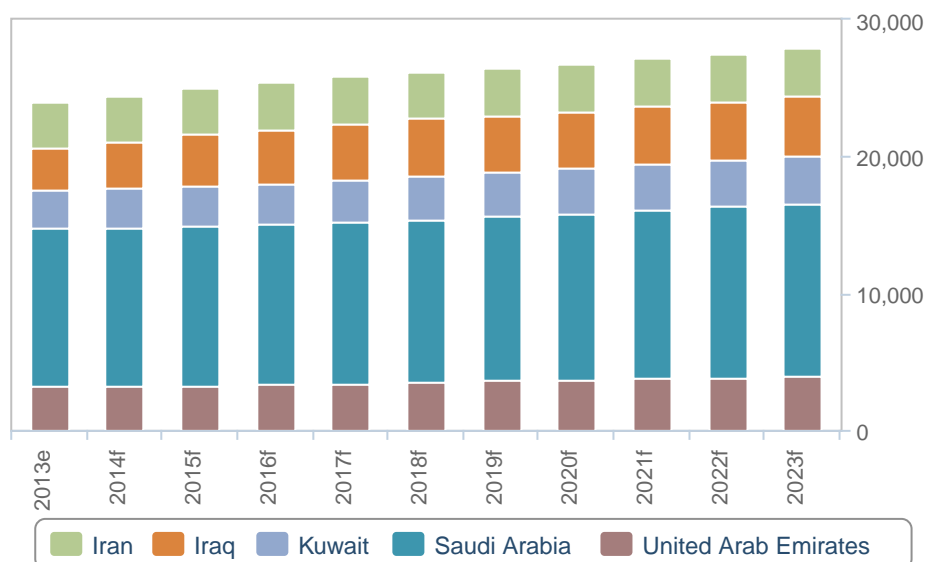
Middle East Oil Production - Risks Dampening Iraqi Outlook

We forecast strong oil production growth for the Middle East region, from an estimated 26.6mn barrels per day (b/d) in 2013, to 30.5mn b/d by 2023. Several of the region's producers - including Saudi Arabia, Kuwait and the UAE - are battling production decline at major maturing fields. However, we see this offset by high level investment, both in enhanced oil recovery (EOR) techniques and field redevelopments, and in new production.

Saudi Arabia will remain the dominant producer across our 10-year forecast period, although Iraq, Kuwait and the UAE are the key drivers of production growth.

Saudi Retains Regional Dominance

Oil Production from Major Middle East Producers



e/f = BMI estimate/forecast. Source: EIA, BMI

Iraq remains a regional wildcard, with an impressive but volatile growth story. The current incursion of the Islamic State in the north, growing instability in the west and a stalemate in the dispute over oil export revenue sharing with the Kurdistan Regional Government (KRG) illustrate some of the broader challenges here.

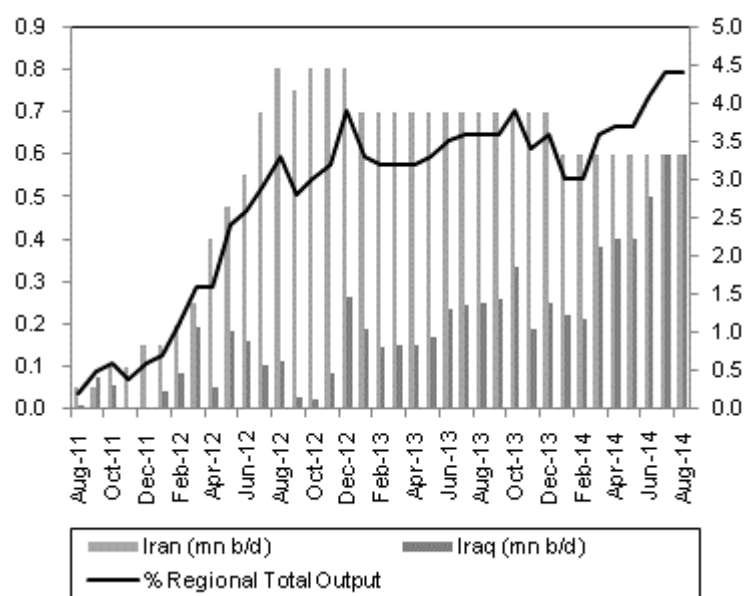
This quarter we have downgraded the country's long-term oil production forecast, from 6.5mn b/d to 4.3mn b/d, by 2023, as mounting political and security risks deter investment. Phased expansion projects at major producing fields are particularly vulnerable to delay, and in September 2014 we saw major cuts to production targets at the Halfaya and Rumaila oilfields. The Kurdistan region has strong potential for growth; however, we see limited export capacity significantly constraining output. The KRG has also been struggling to find buyers, amidst strong opposition from the Iraqi central government.

Iran is another wildcard, as the removal of international sanctions could restore around 1mn b/d of oil to market and allow the return of international capital to develop new oil and gas discoveries. However, we see major political roadblocks delay progress in negotiations. Chronic underinvestment in the country's oil and

gas infrastructure would also slow the return of production, were sanctions to be lifted. Currently we forecast only modest output growth, from an estimated 3.3mn b/d in 2013, to 3.6mn b/d by 2023.

Political Risk

Iran and Iraq Unplanned Supply Disruptions (000b/d - LHS and % Total - RHS), 2011-2014



Source: EIA, BMI

Middle East Oil Consumption - Demand Continues Unrestrained

Heavy fuel subsidies have led to wasteful consumption patterns across the Middle East. Several governments are in the process of enacting subsidy reform, but given the politically sensitive nature of fuel subsidies, there is limited room for manoeuvre.

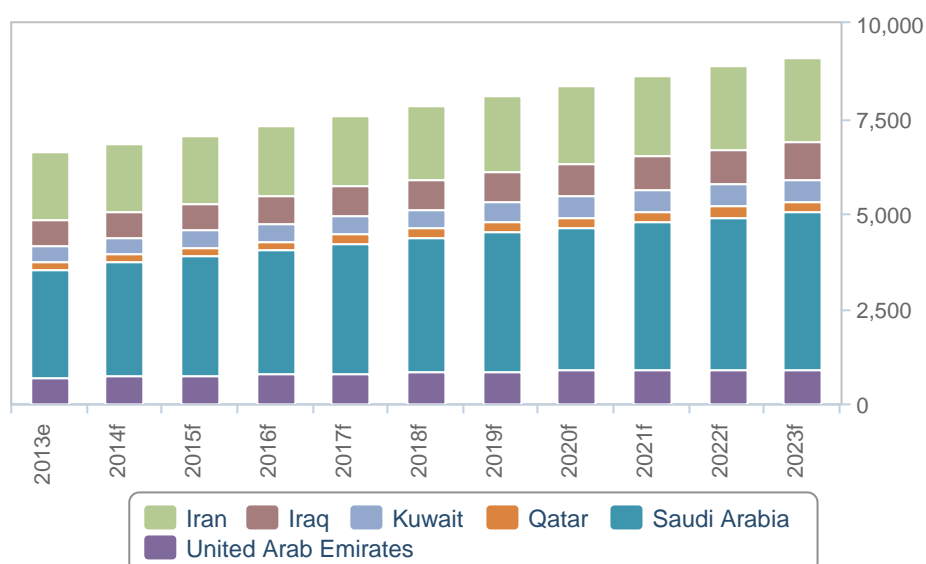
Mounting fiscal pressure may offer some impetus to reform - as in Iran - but the threat of social unrest will likely temper progress. As such, we see subsidies inflating consumption levels across our 10-year forecast period. Sustained economic expansion and growing populations will also drive demand, and we forecast Middle East refined product consumption to increase from an estimated 7.8mn b/d in 2013, to 10.3mn b/d by 2023.

Consumption growth is fairly uniform across the region, averaging 2% year-on-year (y-o-y). Israel is the notable exception, with oil consumption set to decline. We see this trend emerge as the major Tamar and

Leviathan gas fields are brought online and the country reorients its power and transport sectors away from liquid fuels, towards gas-fired generation.

Subsidies Fuelling Demand Growth

Middle East Oil Consumption (000b/d), 2013-2023



e/f = BMI estimate/forecast. Source: EIA, BMI

Middle East Refining Capacity - Soaking Up Domestic Crude Output

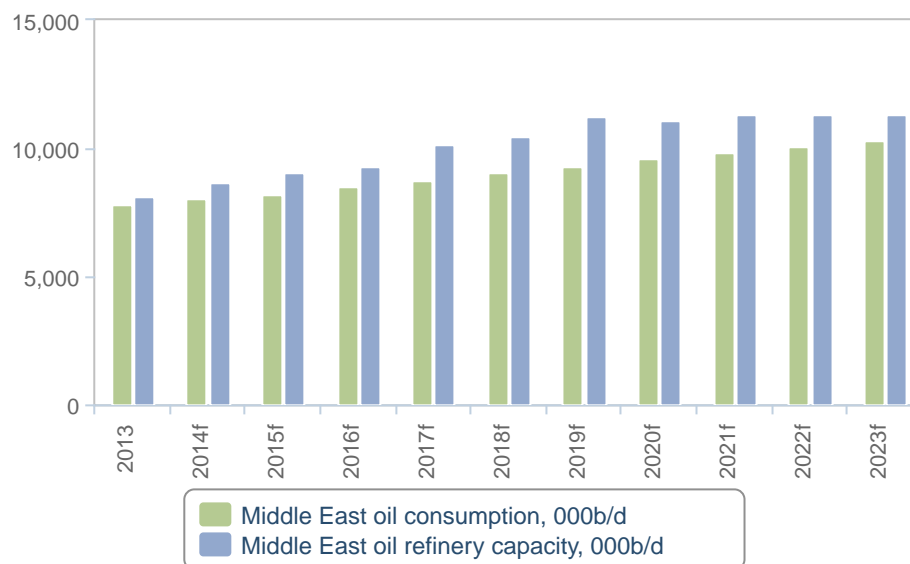
With an abundance of cheap feedstock and widespread government support to diversify the economy, we forecast robust growth in Middle East refining capacity across our 10-year forecast period. New investment will spread across a number of greenfield and brownfield developments, but key contributors to growth include -

- Saudi Arabia's Jubail, Yanbu and Jazan refineries, slated to add 1.2mn b/d capacity by 2016.
- Kuwait's 615,000b/d Al Zour refinery, targeting first production in 2018.
- Capacity upgrades at the Ras Laffan and Sitra refineries in Qatar and Bahrain.

Much of the new production is targeting Asian markets, and we see this as the primary destination for Middle East refined fuels exports. However, with domestic consumption set to grow, we believe local demand could put pressure on regional refining capacity, towards the end of our forecast period in 2023.

Closing The Gap

Middle East Refining Capacity and Refined Product Consumption, 2013-2023



f = BMI forecast. Source: EIA, BMI

Growing refining capacity and rising domestic consumption are also having a significant impact on regional trade; despite a 4mn b/d increase in production by 2023, we forecast only 1.4mn b/d growth in oil exports.

Middle East Gas Production - A Growing Domestic Priority

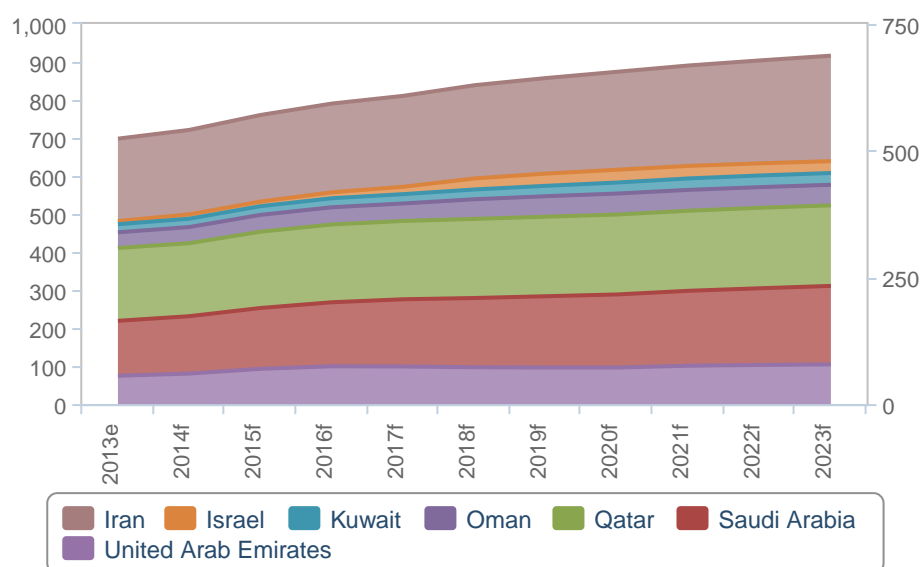
Middle East gas production is set for growth, as the region looks to alternative domestic energy sources to release lucrative oil production for export.

The vast majority of production will come from conventional sources, although we see growing interest in the region's sizeable shale gas resources - notably in Saudi Arabia. However, a lack of infrastructure, unfavourable geology and limited water supplies are major obstacles to development, and we see a limited role for shale gas within our forecast period. Pricing structures are also prohibitive and substantial pricing reforms would be needed to drive wider exploration and development of both unconventional and non-associated gas.

While some new production is targeted for export, including from the Barzan gas project in Qatar and the Leviathan project in Israel, we see rising domestic consumption soak up the bulk of additional output. We forecast net regional gas exports to fall from an estimated 61bn cubic metres (bcm) in 2013, to 49bcm in 2023. However, this masks a varied picture in the region, with some countries - such as Israel - set to become net gas exporters, whilst others - such as the UAE and Kuwait - set to see their import dependence grow.

A Steady Incline

Middle East Gas Production (bcm), 2013-2023



e/f = BMI estimate/forecast. Source EIA, BMI

Middle East Gas Consumption - Production Struggling To Keep Pace With Demand

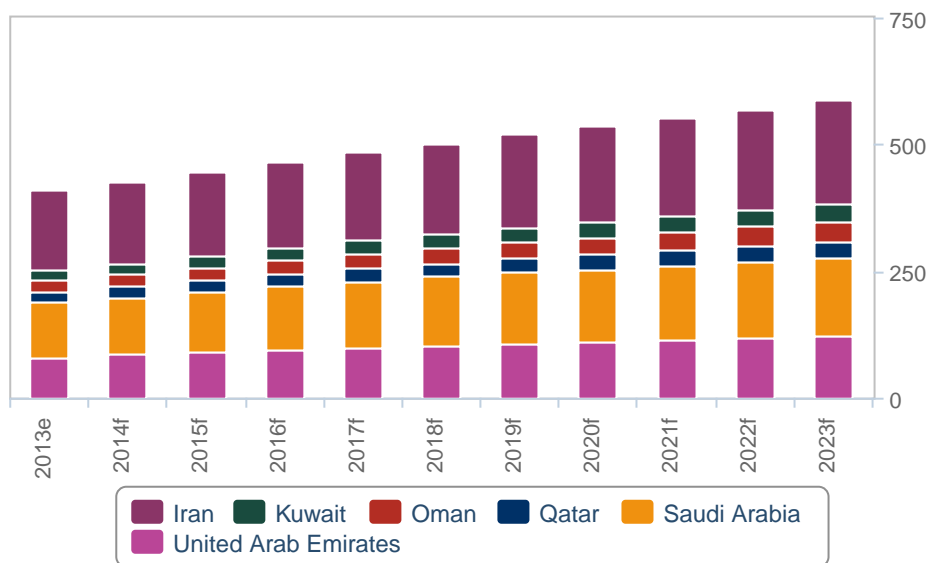
For the Middle East as a whole, gas consumption growth is set to outpace production across our 10-year forecast period. Driving consumption growth will be the region's burgeoning downstream segment and reorientation of the Middle East power sector towards gas-fired generation.

We forecast gas consumption to increase from an estimated 482bcm in 2013, to around 700bcm by 2023. As with production, consumption growth is relatively uniform across the region. We forecast the strongest growth in countries such as Saudi Arabia and Qatar, which are targeting the most aggressive downstream

expansions to-date. However, as demand growth increasingly outstrips the increase in production, we caution that gas could emerge as major downstream bottleneck, towards the second half of our forecast period.

Strong Prospects For Growth

Gas Consumption Selected Middle East Countries (bcm), 2013-2023



e/f = BMI estimate/forecast. Source: EIA, BMI

Global Industry Overview

***BMI View:** Oil at USD80/bbl will be a credible threat to peripheral shale, ultra-deepwater and oil sands projects based on breakeven cost estimates. USD65-USD70 is the next level when a critical mass of projects, including major US shale plays and Gulf of Mexico projects will become economically unviable. While we do not currently forecast prices averaging below USD90/bbl in 2015, here we examine the implications of a steep and precipitous fall of oil prices.*

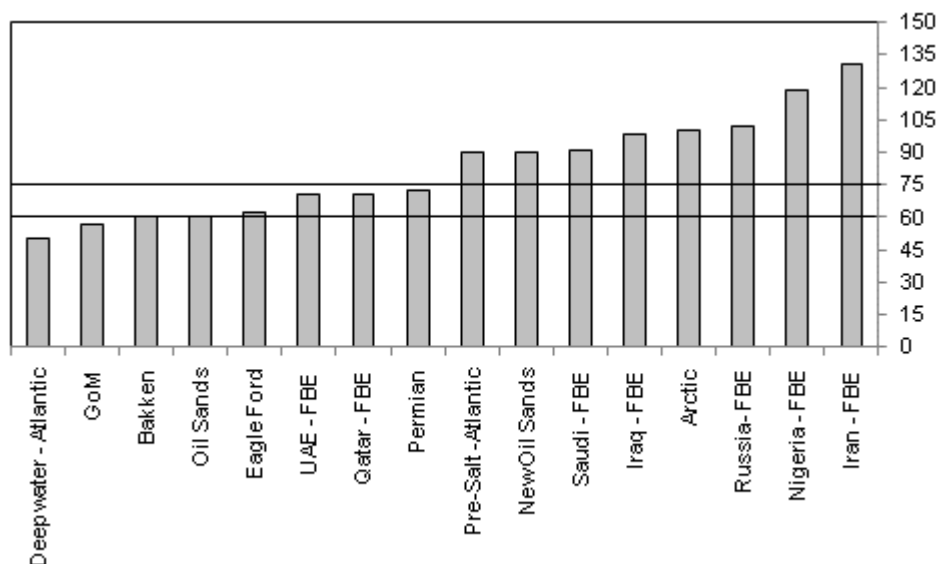
Our core view is that oil prices will trade in the USD90-100/bbl range in the coming months and over 2015, under the assumption that OPEC will act to curb supply in late November. If however, OPEC does not cut production we see a plausible scenario with Brent hitting USD60/bbl over the coming months, presenting major risks to a vast part of current and planned production.

With the key oil Benchmarks of Brent and WTI having (at the time of writing) fallen 22.5% and 19.5% respectively since late June 2014, we analyse the breakeven costs of major oil regions and producers to indicate where production is most likely to be impacted. The focus of our research has been put on areas with the strongest production growth potential, primarily North America, the South Atlantic Margin and the Middle East.

We see new oil sands projects, pre-salt, Arctic and peripheral shale developments as the most at risk if oil prices fall to around USD80/bbl. We also note that OPEC producers, particularly Iraq and Iran, will be under severe fiscal strain.

Middle East And +USD80/bbl Projects At Risk

Average Breakeven Cost Per Barrel Or Fiscal Breakeven (FBE) USD/bbl



Deepwater Atlantic = Campos + Santos Basin, Gulf Of Guinea. GoM = Gulf of Mexico. FBE = Fiscal Breakeven. Project and fiscal breakeven prices estimated from a combination of market sources and BMI estimates. Source: BMI Research.

Non-OPEC Oil - US

US has driven non-OPEC oil production gains with shale oil production and a resurgence of projects in the Gulf of Mexico adding 1mn barrels per day (b/d) in 2012 and 1.2mn b/d in 2013 to US production. In 2014, production from the seven shale plays tracked by the EIA is expected to add a cumulative 1mn b/d by the end of October.

Our research suggests shale oil growth will remain profitable above USD80/bbl. At this level, sweet spot production areas in all the main shale plays will continue to be profitable, but more marginal areas of some of the plays, where oil recovery volumes are poorer will be impacted.

Production in the core areas of the three key oil plays - Bakken, Eagle Ford and Permian - will remain profitable in the USD65-70/bbl range, though a fall of prices below that level will take out critical mass production.

Table: Key US Production Zones Average Full Cycle Breakeven Cost Per Barrel (USD/bbl)

	Upper	Lower	Mid- Range
Bakken	76	40	58-62
Eagle Ford	70	60	60-64
Permian	89	65	70-74
Gulf of Mexico	80	40	54-60

Shale play breakeven prices estimated from a combination of market sources and BMI estimates. Source: BMI Research.

Emerging shale plays where less extensive drilling has taken place and operations not yet full optimised, such as the Cline, Northern Mississippian Lime and Tuscaloosa Marine Shale, would also come under pressure at USD80/bbl.

We expect projects in the Gulf of Mexico (GoM) to be profitable at prices under USD65/bbl, though margins at some projects requiring significant new infrastructure are likely to be squeezed at around USD80/bbl. The supermajors invested in these projects will look for more significant returns and avoid investments in the more costly GoM projects. Higher cost deepwater is likely to be sacrificed before shale. Whereas deepwater projects need longer-term price guarantees to support significant upfront capex costs, shale developments can be more flexible in regards to oil price fluctuations and scaled on a well-by-well basis.

Non-OPEC Oil - Canada

New oil sands projects in **Canada** are already being impacted with Western Canadian Select (WCS) prices trading at a discount to (currently) USD85/bbl WTI, driving project postponements. Both **Total** and **Statoil** have pulled out of investing in new oil sands projects over the course of 2014 (see '*Oil Sands Outlook Weakens Further*', October 10). While we expect current oil sands projects will remain profitable at over USD65/bbl, the majority of new developments, and particularly the mining and upgrading projects, will be impacted at around USD80/bbl. The stream assisted gravity drainage (SAGD) projects will be more profitable than mining developments and are the more likely projects to move forward, if any.

Table: Canadian Oil Sands Average Full Cycle Breakeven Cost Per Barrel (USD/bbl)

	Upper	Lower	Mid-Range
Oil Sands - Operational	65	50	58-62
Oil Sands - New	115	80	85-95

Project Breakeven prices estimated from a combination of market sources and BMI estimates. Source: BMI Research.

Non-OPEC Oil - South Atlantic Margin

Brazil has the potential to be a major non-OPEC producer due to considerable offshore resources and in particular pre-salt reserves in the Campos and Santos Basins. Growth has already been somewhat stifled by local content and cost challenges, and we expect this to continue. Most estimates point at Campos Basin developments being profitable at between USD40-60/bbl, though some calculations for major pre-salt are far higher. The landmark Libra field has been pessimistically been cited at needing between USD75/bbl and USD120/bbl to breakeven.

Angola may face similar problems. While the final investment decision (FID) was taken by **Total** on the deepwater Kaombo project in April 2014, this was only completed following a USD4bn reduction in project costs. The next wave of projects in Angola's offshore would target the pre-salt. Goldman Sachs estimates Angola pre-salt will require oil prices of between USD80-95/bbl to be viable. Such projects are expected to be postponed given the current oil price climate.

OPEC Oil - GCC

OPEC, in particular the Middle East, holds the vast majority of the world's low cost oil. Production costs are around USD10-30/bbl for conventional onshore and shallow water projects. In particular, Kurdistan has been highlighted as one of the most profitable regions, given its more favourable contract structure and untapped onshore resources.

Table: Middle East Onshore Conventional Breakeven Cost Per Barrel, (USD/BBL)

	Upper	Lower	Mid-Range
Middle East - Onshore	30	10	17

Project Breakeven prices estimated from a combination of market sources and BMI estimates. Source: BMI Research.

However, while breakeven costs in the Middle East are low, less diversified economies have a considerable dependency on oil to fund government budgets. Fuel subsidies, social welfare programmes and substantial capital expenditure on infrastructure, push up the required oil price to balance budgets. Producers in the Middle East leverage between USD50-90 on each barrel produced to fund their budgets; a significant margin that can rapidly become unsustainable in a lower oil price environment.

Table: Average Fiscal Breakeven Prices Of Key Middle East Producers 2014 (USD/bbl)

Iran	130.6
Iraq	103.6
Saudi	89.8
UAE	72.4
Qatar	71.0
Kuwait	62.1

Source: IMF, Deutsche Bank - 2014

The sharp drop in oil prices, if sustained, will therefore lead some producers in the Middle East to run budget deficits. Countries including Iran (under sanctions) and Iraq (missing output targets) are expected to run fiscal deficits in 2014. Under a scenario where oil prices remain under USD90/bbl in 2015, Saudi Arabia will be in far more vulnerable position. While the majority of OPEC members have considerable financial reserves, eating into these to support extensive spending programmes is unsustainable.

Frontier Exploration At Risk

The high oil price environment of the last four years has supported oil companies to explore more extreme and unproven areas for oil. We increasingly see more frontier areas at risk of losing out on investment in our forecast lower oil price scenario. In particular, we highlight risk to further exploration and development in:

- Arctic frontiers, including the Barents Sea (Norway), Chukchi Sea (US), Beaufort Sea (Canada) and Greenland.
- West Africa Ultra-Deepwater, including Sierra Leone, Liberia and Cote d'Ivoire.

Latin America ultra-deepwater, including Guyana and Suriname.

Appendix

Global - Crude Oil, Refined Fuels And Natural Gas Prices, 10-year Forecasts

Table: Energy Price Forecasts, 2012-2017 (Global 2012-2017)

	2012	2013	2014f	2015f	2016f	2017f
OPEC basket, USD/bbl	109.50	105.90	102.00	72.00	70.00	69.00
WTI, USD/bbl	93.30	98.00	96.23	71.00	70.00	69.00
Brent, USD/bbl	111.70	108.70	103.41	75.00	73.00	72.00
Urals, USD/bbl	110.60	107.90	103.00	73.00	71.00	70.00
Dubai, USD/bbl	108.88	105.40	101.00	71.00	69.00	68.00
Unleaded gasoline, Rotterdam, USD/bbl	121.28	115.19	110.71	97.65	95.40	93.66
Unleaded gasoline, New York, USD/bbl	124.79	118.70	114.83	102.14	101.61	100.18
Unleaded gasoline, Singapore, USD/bbl	123.47	115.89	112.46	98.14	96.82	96.20
Unleaded gasoline, global average, USD/bbl	123.18	116.59	112.67	99.31	97.94	96.68
Gasoil/diesel, Rotterdam, USD/bbl	130.36	124.81	118.38	104.89	102.79	101.05
Gasoil/diesel, Singapore, USD/bbl	128.18	123.15	118.07	103.53	100.39	99.39
Gasoil/diesel, global average, USD/bbl	129.78	124.84	118.92	105.35	103.30	101.59
Naphtha, Rotterdam, USD/bbl	106.75	100.27	98.30	98.85	98.79	97.02
Naphtha, Singapore, USD/bbl	102.87	100.27	98.62	84.42	81.62	80.62
Naphtha, global average, USD/bbl	104.81	100.27	98.46	91.64	90.21	88.82
Jet/kerosene, Rotterdam, USD/bbl	131.41	127.30	120.26	106.70	106.00	103.00
Jet/kerosene, New York, USD/bbl	130.74	125.10	119.46	107.40	106.50	104.50
Jet/kerosene, Singapore, USD/bbl	126.90	122.65	116.57	101.80	102.00	100.46
Jet/kerosene, global average, USD/bbl	129.68	125.02	118.76	105.30	104.83	102.65
Bunker fuel 180, Rotterdam, USD/bbl	101.52	95.07	88.05	75.80	71.00	68.50
Bunker fuel 180, New York, USD/bbl	104.65	97.52	95.22	76.90	75.50	74.50
Bunker fuel 180, Singapore, USD/bbl	102.46	93.96	88.65	72.30	73.00	73.00
Bunker fuel 180, global average, USD/bbl	102.88	95.52	90.64	75.00	73.17	72.00
Bunker fuel 380, Rotterdam, USD/bbl	97.47	91.24	84.66	69.80	68.00	66.00
Bunker fuel 380, New York, USD/bbl	100.29	93.13	87.82	72.90	73.00	71.50
Bunker fuel 380, Singapore, USD/bbl	101.08	95.84	88.60	71.30	72.00	72.10
Bunker fuel 380, Singapore, USD/bbl	101.08	95.84	88.60	71.30	72.00	72.10
Bunker fuel 380, global average, USD/bbl	99.61	93.40	87.03	71.33	71.00	69.87
Bunker fuel, Rotterdam, USD/bbl	99.50	93.16	88.04	86.53	83.50	81.33
Bunker fuel, New York, USD/bbl	102.47	95.33	94.02	91.00	87.00	83.50
Bunker fuel, Singapore, USD/bbl	101.77	94.90	90.23	88.18	85.28	83.15

Energy Price Forecasts, 2012-2017 (Global 2012-2017) - Continued

	2012	2013	2014f	2015f	2016f	2017f
Bunker fuel, global average, USD/bbl	101.25	94.46	90.76	88.57	85.26	82.66
Henry Hub, USD/mn BTU	3.35	3.74	4.50	4.60	5.10	5.75

f = BMI forecast. Source: Bloomberg/BMI

Table: Energy Price Forecasts, 2018-2023 (Global 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
OPEC basket, USD/bbl	72.00	75.00	76.00	77.00	78.00	80.00
WTI, USD/bbl	71.00	72.00	74.00	76.00	77.00	79.00
Brent, USD/bbl	75.00	78.00	79.00	80.00	81.00	83.00
Urals, USD/bbl	73.00	76.00	77.00	78.00	79.00	81.00
Dubai, USD/bbl	71.00	74.00	75.00	76.00	77.00	79.00
Unleaded gasoline, Rotterdam, USD/bbl	93.59	93.59	93.59	93.59	93.59	93.59
Unleaded gasoline, New York, USD/bbl	98.44	98.44	98.44	98.44	98.44	98.44
Unleaded gasoline, Singapore, USD/bbl	96.81	96.81	96.81	96.81	96.81	96.81
Unleaded gasoline, global average, USD/bbl	96.28	96.28	96.28	96.28	96.28	96.28
Gasoil/diesel, Rotterdam, USD/bbl	100.77	100.77	100.77	100.77	100.77	100.77
Gasoil/diesel, Singapore, USD/bbl	100.23	100.23	100.23	100.23	100.23	100.23
Gasoil/diesel, global average, USD/bbl	101.10	101.10	101.10	101.10	101.10	101.10
Naphtha, Rotterdam, USD/bbl	95.10	95.10	95.10	95.10	95.10	96.10
Naphtha, Singapore, USD/bbl	81.62	81.62	81.62	81.62	81.62	81.62
Naphtha, global average, USD/bbl	88.36	88.36	88.36	88.36	88.36	88.86
Jet/kerosene, Rotterdam, USD/bbl	98.50	98.50	98.50	98.50	98.50	98.50
Jet/kerosene, New York, USD/bbl	98.50	98.50	98.50	98.50	98.50	98.50
Jet/kerosene, Singapore, USD/bbl	97.00	97.00	97.00	97.00	97.00	97.00
Jet/kerosene, global average, USD/bbl	98.00	98.00	98.00	98.00	98.00	98.00
Bunker fuel 180, Rotterdam, USD/bbl	68.00	68.00	68.00	68.00	68.00	68.00
Bunker fuel 180, New York, USD/bbl	73.00	73.00	73.00	73.00	73.00	73.00
Bunker fuel 180, Singapore, USD/bbl	71.00	71.00	71.00	71.00	71.00	71.00
Bunker fuel 180, global average, USD/bbl	70.67	70.67	70.67	70.67	70.67	70.67
Bunker fuel 380, Rotterdam, USD/bbl	65.00	65.00	65.00	65.00	65.00	65.00
Bunker fuel 380, New York, USD/bbl	67.00	67.00	67.00	67.00	67.00	67.00
Bunker fuel 380, Singapore, USD/bbl	70.20	70.20	70.20	70.20	70.20	70.20

Energy Price Forecasts, 2018-2023 (Global 2018-2023) - Continued

	2018f	2019f	2020f	2021f	2022f	2023f
Bunker fuel 380, Singapore, USD/bbl	70.20	70.20	70.20	70.20	70.20	70.20
Bunker fuel 380, global average, USD/bbl	67.40	67.40	67.40	67.40	67.40	67.40
Bunker fuel, Rotterdam, USD/bbl	79.50	81.43	81.43	81.43	81.43	82.43
Bunker fuel, New York, USD/bbl	80.85	70.00	70.00	70.00	70.00	70.00
Bunker fuel, Singapore, USD/bbl	82.09	89.18	89.18	89.18	89.18	90.18
Bunker fuel, global average, USD/bbl	80.81	80.20	80.20	80.20	80.20	80.87
Henry Hub, USD/mn BTU	6.50	6.75	7.00	7.00	7.10	7.10

f = BMI forecast. Source: Bloomberg/ BMI

Middle East - Regional Appendix

The data contained in these appendix tables is correct as of 1 October 2014. It represents a snapshot of our regional forecasts at the end of our last publishing quarter. It is included for reference purposes only. Latest data, reflecting forecasts made for the market this quarter, can be found in the Industry Forecast Scenario section of this report. Please note that because this table represents a snapshot of our last regional forecasts, whereas data included in the Industry Forecast Scenario represents our latest forecasts made this quarter, country-specific data may not match.

Table: Oil Consumption - Historical Data & Forecasts, 2011-2018 ('000b/d)

	2011	2012	2013	2014	2015	2016	2017	2018
Bahrain	52	50	53	55	58	61	63	66
Kuwait	398	410	423	439	456	473	490	505
Iran	1,784	1,765	1,776	1,794	1,785	1,820	1,880	1,937
Iraq	720	751	692	699	720	744	769	796
Israel	249	297	256	246	239	231	224	220
Oman	123	145	150	156	162	168	174	180
Qatar	160	190	199	210	220	230	241	250
Saudi Arabia	2,537	2,693	2,850	2,987	3,125	3,268	3,403	3,531
UAE	647	671	696	725	752	781	808	837
Other	698	700	704	707	711	714	718	722

Oil Consumption - Historical Data & Forecasts, 2011-2018 ('000b/d) - Continued

	2011	2012	2013	2014	2015	2016	2017	2018
BMI Universe	6,669	6,973	7,094	7,310	7,516	7,776	8,052	8,321
Regional Total	7,368	7,673	7,798	8,018	8,227	8,490	8,770	9,043

f = forecast. Source: EIA, BMI

Table: Oil Consumption - Long-Term Forecasts, 2015-2023 ('000b/d)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bahrain	58	61	63	66	68	71	73	75	77
Kuwait	456	473	490	505	520	535	548	561	575
Iran	1,785	1,820	1,880	1,937	1,995	2,055	2,116	2,180	2,245
Iraq	720	744	769	796	827	861	895	934	974
Israel	239	231	224	220	218	216	214	211	209
Oman	162	168	174	180	185	191	196	201	205
Qatar	220	230	241	250	260	271	282	293	302
Saudi Arabia	3,125	3,268	3,403	3,531	3,654	3,774	3,897	4,016	4,132
UAE	752	781	808	837	859	874	886	895	902
Other	711	714	718	722	725	729	729	729	729
BMI Universe	7,516	7,776	8,052	8,321	8,587	8,847	9,106	9,367	9,621
Regional Total	8,227	8,490	8,770	9,043	9,312	9,576	9,835	10,095	10,349

f = forecast. Source: EIA, BMI

Table: Oil Production - Historical Data & Forecasts, 2011-2018 ('000b/d)

	2011	2012	2013	2014	2015	2016	2017	2018
Bahrain	45	52	52	53	55	45	52	52
Kuwait	2,682	2,787	2,811	2,869	2,928	2,682	2,787	2,811
Iran	4,270	3,594	3,308	3,436	3,447	4,270	3,594	3,308
Iraq	2,638	2,995	3,039	3,403	3,817	2,638	2,995	3,039
Israel	0	1	1	2	2	0	1	1

Oil Production - Historical Data & Forecasts, 2011-2018 ('000b/d) - Continued

	2011	2012	2013	2014	2015	2016	2017	2018
Oman	891	923	945	964	973	891	923	945
Qatar	1,631	1,569	1,567	1,561	1,573	1,631	1,569	1,567
Saudi Arabia	11,256	11,717	11,582	11,552	11,580	11,256	11,717	11,582
UAE	3,079	3,204	3,212	3,237	3,287	3,079	3,204	3,212
Other	39	40	42	43	44	39	40	42
BMI Universe	26,491	26,842	26,517	27,077	27,661	26,491	26,842	26,517
Regional Total	26,530	26,883	26,559	27,120	27,706	26,530	26,883	26,559

f = forecast. Source: EIA, BMI

Table: Oil Production - Long-Term Forecasts, 2015-2023 ('000b/d)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bahrain	55	57	59	62	64	67	70	73	76
Kuwait	2,928	3,016	3,103	3,198	3,247	3,302	3,351	3,417	3,500
Iran	3,447	3,460	3,474	3,487	3,501	3,515	3,529	3,543	3,557
Iraq	3,817	3,981	4,124	4,165	4,148	4,133	4,175	4,217	4,259
Israel	2	2	2	3	3	3	3	3	3
Oman	973	978	983	974	964	945	927	908	900
Qatar	1,573	1,585	1,581	1,582	1,585	1,589	1,588	1,576	1,565
Saudi Arabia	11,580	11,667	11,776	11,896	12,037	12,201	12,368	12,538	12,711
UAE	3,287	3,353	3,429	3,513	3,595	3,673	3,747	3,822	3,898
Other	44	46	47	48	50	51	51	51	51
BMI Universe	27,661	28,100	28,531	28,879	29,146	29,429	29,757	30,097	30,470
Regional Total	27,706	28,146	28,578	28,927	29,196	29,480	29,808	30,149	30,521

f = forecast. Source: EIA, BMI

Table: Refining Capacity - Historical Data & Forecasts, 2011-2018 ('000b/d)

	2011	2012	2013	2014	2015	2016	2017	2018
Bahrain	270	270	270	270	270	270	270	270
Kuwait	930	930	930	930	930	930	930	930
Iran	1,741	1,750	1,860	1,955	1,955	1,955	2,075	2,075
Iraq	638	638	638	708	708	708	708	708
Israel	270	286	286	296	296	296	296	296
Oman	222	222	222	222	222	222	292	292
Qatar	339	339	339	339	339	485	485	485
Saudi Arabia	2,080	2,112	2,212	2,512	2,912	2,912	3,312	3,312
UAE	527	527	527	527	527	527	727	1,027
Other	765	803	843	886	930	976	1,025	1,076
BMI Universe	7,016	7,073	7,283	7,758	8,158	8,304	9,094	9,394
Regional Total	7,781	7,876	8,126	8,644	9,088	9,280	10,119	10,470

f = forecast. Source: EIA, BMI

Table: Refining Capacity - Long-Term Forecasts, 2015-2023 ('000b/d)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bahrain	270	270	270	270	270	360	360	360	360
Kuwait	930	930	930	930	1,545	1,231	1,415	1,415	1,415
Iran	1,955	1,955	2,075	2,075	2,075	2,075	2,075	2,075	2,075
Iraq	708	708	708	708	848	848	848	848	848
Israel	296	296	296	296	296	296	296	296	296
Oman	222	222	292	292	292	292	292	292	292
Qatar	339	485	485	485	485	485	485	485	485
Saudi Arabia	2,912	2,912	3,312	3,312	3,312	3,312	3,312	3,312	3,312
UAE	527	527	727	1,027	1,027	1,027	1,027	1,027	1,027
Other	930	976	1,025	1,076	1,130	1,187	1,187	1,187	1,187
BMI Universe	8,158	8,304	9,094	9,394	10,149	9,925	10,109	10,109	10,109
Regional Total	9,088	9,280	10,119	10,470	11,279	11,112	11,296	11,296	11,296

f = forecast. Source: EIA, BMI

Table: Gas Consumption - Historical Data & Forecasts, 2011-2018 (bcm)

	2011	2012	2013	2014	2015	2016	2017	2018
Bahrain	12.62	12.81	13.0	13.2	13.4	13.6	13.8	14.1
Kuwait	16.80	17.98	19.2	20.6	22.0	23.6	25.0	26.5
Iran	153.34	155.29	158.9	162.9	166.9	171.1	175.4	179.8
Iraq	0.88	0.65	1.2	1.6	2.0	2.2	4.1	5.3
Israel	3.32	3.69	6.2	8.5	9.1	10.0	10.0	11.2
Oman	17.54	20.25	22.3	23.7	25.2	26.9	28.6	30.3
Qatar	19.53	20.51	21.5	22.6	23.5	24.9	26.4	27.2
Saudi Arabia	92.26	102.80	107.9	112.8	119.6	125.8	132.1	136.0
UAE	75.40	77.67	80.8	84.9	89.3	94.0	98.6	103.0
Other	46.00	48.30	50.7	53.2	55.9	58.7	61.6	64.7
BMI Universe	391.69	411.65	431.0	450.8	471.1	492.1	513.9	533.4
Regional Total	437.69	459.95	481.7	504.0	527.0	550.8	575.5	598.1

f = forecast. Source: EIA, BMI

Table: Gas Consumption, 2015-2023 (bcm)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bahrain	13.4	13.6	13.8	14.1	14.4	14.6	14.9	15.24	15.54
Kuwait	22.0	23.6	25.0	26.5	27.7	29.2	31.5	33.70	36.06
Iran	166.9	171.1	175.4	179.8	184.3	188.9	193.6	198.44	203.41
Iraq	2.0	2.2	4.1	5.3	5.9	8.9	12.5	14.34	14.77
Israel	9.1	10.0	10.0	11.2	11.6	11.9	11.9	11.96	12.03
Oman	25.2	26.9	28.6	30.3	32.1	33.9	35.8	37.57	39.26
Qatar	23.5	24.9	26.4	27.2	28.0	28.9	30.6	31.83	32.46
Saudi Arabia	119.6	125.8	132.1	136.0	140.1	143.6	147.2	150.74	154.21
UAE	89.3	94.0	98.6	103.0	107.1	110.9	114.5	117.95	121.13
Other	55.9	58.7	61.6	64.7	67.9	71.3	71.3	71.3	71.3
BMI Universe	471.1	492.1	513.9	533.4	551.3	570.7	592.5	611.8	628.9
Regional Total	527.0	550.8	575.5	598.1	619.2	642.0	663.8	683.1	700.2

f = forecast. Source: EIA, BMI

Table: Gas Production - Historical Data & Forecasts, 2011-2018 (bcm)

	2011	2012	2013	2014	2015	2016	2017	2018
Bahrain	12.62	12.81	13.00	13.20	13.39	13.60	13.80	14.08
Kuwait	13.53	15.34	15.96	16.50	17.16	17.76	18.38	19.30
Iran	151.80	159.70	162.57	166.63	170.80	175.07	179.45	183.93
Iraq	0.88	0.65	1.18	1.63	2.02	2.22	4.15	6.57
Israel	2.60	2.52	6.18	8.54	9.09	11.67	14.54	21.82
Oman	26.51	28.00	30.90	31.92	33.20	33.86	34.54	38.68
Qatar	133.23	142.56	143.70	143.99	150.46	153.47	154.55	156.09
Saudi Arabia	92.26	103.19	108.35	113.23	120.02	126.27	132.58	136.56
UAE	52.31	54.30	55.93	60.15	69.56	74.57	74.21	72.73
Other	6.00	6.60	7.20	7.90	8.70	9.60	10.60	11.60
BMI Universe	485.75	519.07	537.76	555.79	585.71	608.49	626.19	649.75
Regional Total	491.75	525.67	544.96	563.69	594.41	618.09	636.79	661.35

f = forecast. Source: EIA, BMI

Table: Gas Production - Long-Term Forecasts, 2015-2023 (bcm)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bahrain	13.39	13.60	13.80	14.08	14.36	14.64	14.94	15.24	15.54
Kuwait	17.16	17.76	18.38	19.30	20.46	21.69	22.55	23.01	23.24
Iran	170.80	175.07	179.45	183.93	188.53	193.24	198.08	203.03	208.10
Iraq	2.02	2.22	4.15	6.57	13.47	18.56	22.23	24.04	24.26
Israel	9.09	11.67	14.54	21.82	24.06	25.31	24.66	24.03	23.41
Oman	33.20	33.86	34.54	38.68	40.37	41.44	41.10	40.69	40.59
Qatar	150.46	153.47	154.55	156.09	156.87	157.66	157.97	158.76	158.92
Saudi Arabia	120.02	126.27	132.58	136.56	140.65	144.17	147.77	151.32	154.80
UAE	69.56	74.57	74.21	72.73	72.11	72.07	75.71	77.23	78.39
Other	8.70	9.60	10.60	11.60	12.80	14.10	14.10	14.10	14.10
BMI Universe	585.71	608.49	626.19	649.75	670.89	688.79	705.02	717.34	727.25
Regional Total	594.41	618.09	636.79	661.35	683.69	702.89	719.12	731.44	741.35

f = forecast. Source: EIA, BMI

Table: Net LNG Exports - Historical Data & Forecasts, 2011-2018 (bcm)

	2011	2012	2013	2014	2015	2016	2017	2018
Bahrain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kuwait	3.27	2.63	3.28	4.08	4.86	5.80	6.59	7.17
Iran	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iraq	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Israel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oman	10.80	9.55	10.49	10.09	9.87	8.89	7.88	10.25
Qatar	96.70	104.55	104.37	101.58	106.45	105.55	105.13	105.88
Saudi Arabia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UAE	5.20	5.20	4.20	3.70	3.20	3.20	2.00	2.00
Regional total	115.97	121.93	122.34	119.44	124.38	123.45	121.60	125.31

f = forecast. Source: EIA, BMI

Table: Net LNG Exports - Long-Term Forecasts, 2015-2023 (bcm)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bahrain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kuwait	4.86	5.80	6.59	7.17	7.29	7.47	8.94	10.69	12.82
Iran	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iraq	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Israel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oman	9.87	8.89	7.88	10.25	10.12	9.42	7.22	5.02	3.23
Qatar	106.45	105.55	105.13	105.88	105.85	105.79	105.37	104.94	105.46
Saudi Arabia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UAE	3.20	3.20	2.00	2.00	2.00	-0.20	-0.20	-0.20	-0.20
Regional total	124.38	123.45	121.60	125.31	125.26	122.49	121.33	120.45	121.31

f = forecast. Source: EIA, BMI

Saudi Arabia - Refined Products Breakdown, 10-year Forecasts

We have released new data series of the breakdown of refined fuels into production, consumption and net trade of different fuels over a 10-year period.

The liquefied petroleum gas (LPG) component is either wholly accounted for in the refined products breakdown tables, or, if the country is a LPG producer at the wellhead then it is contained at the end in its own separate table that includes refined and wellhead production.

Table: Refined Petroleum Products, Production Breakdown (Saudi Arabia 2012-2017)

	2012e	2013e	2014f	2015f	2016f	2017f
Motor gasoline production, 000b/d	375.6	345.5	407.7	489.2	538.2	548.9
Motor gasoline production, % y-o-y	0.0	-8.0	18.0	20.0	10.0	2.0
Motor gasoline production, USDbn	16.6	14.5	16.5	17.4	18.7	18.8
Motor gasoline production, % of domestic production	19.4	19.4	19.4	19.4	19.4	19.4
Jet fuel/kerosene production, 000b/d	159.1	146.4	172.7	207.2	228.0	232.5
Jet fuel/kerosene production, % y-o-y	0.0	-8.0	18.0	20.0	10.0	2.0
Jet fuel/kerosene production, USDbn	7.6	6.8	7.6	8.1	8.8	8.7
Jet fuel/kerosene production, % of domestic production	8.2	8.2	8.2	8.2	8.2	8.2
Jet fuel production, 000b/d	60.2	55.4	65.4	78.5	86.3	88.1
Jet fuel production, % y-o-y	0.0	-8.0	18.0	20.0	10.0	2.0
Jet fuel production, USDbn	2.9	2.6	2.9	3.1	3.3	3.3
Jet fuel Production, % of domestic production	3.1	3.1	3.1	3.1	3.1	3.1
Kerosene production, 000b/d	98.8	90.9	107.3	128.8	141.6	144.5
Kerosene production, % y-o-y	0.0	-8.0	18.0	20.0	10.0	2.0
Kerosene production, USDbn	4.7	4.2	4.7	5.0	5.5	5.4
Kerosene production, % of domestic production	5.1	5.1	5.1	5.1	5.1	5.1
Distillate fuel oil production, 000b/d	633.4	582.8	687.7	825.2	907.7	925.9
Distillate fuel oil production, % y-o-y	0.0	-8.0	18.0	20.0	10.0	2.0
Distillate fuel oil production, USDbn	30.1	26.5	29.7	31.6	34.1	34.1
Distillate fuel oil production, % of domestic production	32.7	32.7	32.7	32.7	32.7	32.7
Residual fuel oil production, 000b/d	445.4	409.8	483.5	580.3	638.3	651.0
Residual fuel oil production, % y-o-y	0.0	-8.0	18.0	20.0	10.0	2.0
Residual fuel oil production, USDbn	16.2	13.9	15.5	18.3	19.5	19.3
Residual fuel oil production, % of domestic production	23.0	23.0	23.0	23.0	23.0	23.0
Refined LPG production, 000b/d	33.5	30.8	36.4	43.6	48.0	49.0

Refined Petroleum Products, Production Breakdown (Saudi Arabia 2012-2017) - Continued

	2012e	2013e	2014f	2015f	2016f	2017f
Refined LPG production, % y-o-y	0.0	-8.0	18.0	20.0	10.0	2.0
Refined LPG production, USDbn	1.3	1.1	1.3	1.6	1.7	1.7
Refined LPG production, % of domestic production	1.7	1.7	1.7	1.7	1.7	1.7
Other products production, 000b/d	288.1	265.1	312.8	375.3	412.9	421.1
Other products production, % y-o-y	0.0	-8.0	18.0	20.0	10.0	2.0
Other products production, USDbn	12.8	11.1	12.6	13.4	14.4	14.4
Other products production, % of domestic production	14.9	14.9	14.9	14.9	14.9	14.9

e/f = BMI estimate/forecast. Source: EIA/BMI

Table: Refined Petroleum Products, Production Breakdown (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Motor gasoline production, 000b/d	581.9	611.0	617.1	620.2	623.3	626.4
Motor gasoline production, % y-o-y	6.0	5.0	1.0	0.5	0.5	0.5
Motor gasoline production, USDbn	19.9	20.9	21.1	21.2	21.3	21.4
Motor gasoline production, % of domestic production	19.4	19.4	19.4	19.4	19.4	19.4
Jet fuel/kerosene production, 000b/d	246.5	258.8	261.4	262.7	264.0	265.3
Jet fuel/kerosene production, % y-o-y	6.0	5.0	1.0	0.5	0.5	0.5
Jet fuel/kerosene production, USDbn	8.9	9.3	9.4	9.4	9.5	9.5
Jet fuel/kerosene production, % of domestic production	8.2	8.2	8.2	8.2	8.2	8.2
Jet fuel production, 000b/d	93.3	98.0	99.0	99.5	100.0	100.5
Jet fuel production, % y-o-y	6.0	5.0	1.0	0.5	0.5	0.5
Jet fuel production, USDbn	3.4	3.5	3.6	3.6	3.6	3.6
Jet fuel Production, % of domestic production	3.1	3.1	3.1	3.1	3.1	3.1
Kerosene production, 000b/d	153.1	160.8	162.4	163.2	164.0	164.8
Kerosene production, % y-o-y	6.0	5.0	1.0	0.5	0.5	0.5
Kerosene production, USDbn	5.5	5.8	5.8	5.9	5.9	5.9
Kerosene production, % of domestic production	5.1	5.1	5.1	5.1	5.1	5.1
Distillate fuel oil production, 000b/d	981.4	1,030.5	1,040.8	1,046.0	1,051.2	1,056.5
Distillate fuel oil production, % y-o-y	6.0	5.0	1.0	0.5	0.5	0.5
Distillate fuel oil production, USDbn	36.1	37.9	38.3	38.5	38.7	38.9
Distillate fuel oil production, % of domestic production	32.7	32.7	32.7	32.7	32.7	32.7
Residual fuel oil production, 000b/d	690.1	724.6	731.9	735.5	739.2	742.9

Refined Petroleum Products, Production Breakdown (Saudi Arabia 2018-2023) - Continued

	2018f	2019f	2020f	2021f	2022f	2023f
Residual fuel oil production, % y-o-y	6.0	5.0	1.0	0.5	0.5	0.5
Residual fuel oil production, USDbn	20.0	21.5	21.8	21.9	22.0	22.4
Residual fuel oil production, % of domestic production	23.0	23.0	23.0	23.0	23.0	23.0
Refined LPG production, 000b/d	51.9	54.5	55.0	55.3	55.6	55.9
Refined LPG production, % y-o-y	6.0	5.0	1.0	0.5	0.5	0.5
Refined LPG production, USDbn	1.8	1.9	1.9	1.9	1.9	2.0
Refined LPG production, % of domestic production	1.7	1.7	1.7	1.7	1.7	1.7
Other products production, 000b/d	446.4	468.7	473.4	475.8	478.1	480.5
Other products production, % y-o-y	6.0	5.0	1.0	0.5	0.5	0.5
Other products production, USDbn	15.2	16.0	16.2	16.3	16.3	16.4
Other products production, % of domestic production	14.9	14.9	14.9	14.9	14.9	14.9

f = BMI forecast. Source: EIA/BMI

Table: Refined Petroleum Products, Consumption Breakdown (Saudi Arabia 2012-2017)

	2012e	2013e	2014f	2015f	2016f	2017f
Motor gasoline consumption, 000b/d	500.3	511.5	529.4	547.9	569.8	592.6
Motor gasoline consumption, % y-o-y	1.6	2.2	3.5	3.5	4.0	4.0
Motor gasoline consumption, % of domestic consumption	17.5	17.5	17.5	17.5	17.5	17.5
Motor gasoline consumption, USDbn	22.1	21.5	21.4	19.5	19.8	20.3
Jet fuel/kerosene consumption, 000b/d	76.7	78.4	81.2	84.0	87.4	90.9
Jet fuel/kerosene consumption, % y-o-y	1.6	2.2	3.5	3.5	4.0	4.0
Jet fuel/kerosene consumption, % of domestic consumption	2.7	2.7	2.7	2.7	2.7	2.7
Jet fuel/kerosene consumption, USDbn	3.4	3.3	3.3	3.0	3.1	3.2
Jet fuel consumption, 000b/d	71.5	73.1	75.6	78.3	81.4	84.7
Jet fuel consumption, % y-o-y	1.6	2.2	3.5	3.5	4.0	4.0
Jet fuel consumption, % of domestic consumption	2.5	2.5	2.5	2.5	2.5	2.5
Jet fuel consumption, USDbn	3.4	3.4	3.3	3.0	3.1	3.2
Kerosene consumption, 000b/d	5.2	5.4	5.5	5.7	6.0	6.2
Kerosene consumption, % y-o-y	1.6	2.2	3.5	3.5	4.0	4.0
Kerosene consumption, % of domestic consumption	0.2	0.2	0.2	0.2	0.2	0.2
Kerosene consumption, USDbn	0.3	0.2	0.2	0.2	0.2	0.2
Distillate fuel oil consumption, 000b/d	746.7	763.4	790.1	817.7	850.4	884.5

Refined Petroleum Products, Consumption Breakdown (Saudi Arabia 2012-2017) - Continued

	2012e	2013e	2014f	2015f	2016f	2017f
Distillate fuel oil consumption, % y-o-y	1.6	2.2	3.5	3.5	4.0	4.0
Distillate fuel oil consumption, % of domestic consumption	26.1	26.1	26.1	26.1	26.1	26.1
Distillate fuel oil consumption, USDbn	35.5	34.8	34.1	31.3	31.9	32.6
Residual fuel oil consumption, 000b/d	343.9	351.6	363.9	376.6	391.7	407.3
Residual fuel oil consumption, % y-o-y	1.6	2.2	3.5	3.5	4.0	4.0
Residual fuel oil consumption, % of domestic consumption	12.0	12.0	12.0	12.0	12.0	12.0
Residual fuel oil consumption, USDbn	12.5	12.0	11.7	11.9	11.9	12.1
LPG consumption, 000b/d	591.2	604.4	625.5	647.4	716.9	745.6
LPG consumption, % y-o-y	1.6	2.2	3.5	3.5	10.7	4.0
LPG consumption, % of domestic consumption	20.7	20.7	20.7	20.7	22.0	22.0
LPG consumption, USDbn	23.0	22.1	22.4	23.4	25.9	26.4
Other products consumption, 000b/d	602.3	615.8	637.3	659.7	686.0	728.6
Other products consumption, % y-o-y	1.6	2.2	3.5	3.5	4.0	6.2
Other products consumption, % of domestic consumption	21.1	21.1	21.1	21.1	21.1	21.5
Other products consumption, USDbn	26.7	25.9	25.8	23.5	23.9	24.9

e/f = BMI estimate/forecast. Source: EIA/BMI

Table: Refined Petroleum Products, Consumption Breakdown (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Motor gasoline consumption, 000b/d	613.3	631.7	649.4	665.0	678.3	691.9
Motor gasoline consumption, % y-o-y	3.5	3.0	2.8	2.4	2.0	2.0
Motor gasoline consumption, % of domestic consumption	17.5	17.5	17.5	17.5	17.5	17.5
Motor gasoline consumption, USDbn	21.0	21.6	22.2	22.7	23.2	23.6
Jet fuel/kerosene consumption, 000b/d	94.1	96.9	99.6	102.0	104.0	106.1
Jet fuel/kerosene consumption, % y-o-y	3.5	3.0	2.8	2.4	2.0	2.0
Jet fuel/kerosene consumption, % of domestic consumption	2.7	2.7	2.7	2.7	2.7	2.7
Jet fuel/kerosene consumption, USDbn	3.3	3.4	3.5	3.6	3.7	3.7
Jet fuel consumption, 000b/d	87.6	90.3	92.8	95.0	96.9	98.9
Jet fuel consumption, % y-o-y	3.5	3.0	2.8	2.4	2.0	2.0
Jet fuel consumption, % of domestic consumption	2.5	2.5	2.5	2.5	2.5	2.5
Jet fuel consumption, USDbn	3.2	3.2	3.3	3.4	3.5	3.6
Kerosene consumption, 000b/d	6.4	6.6	6.8	7.0	7.1	7.2

Refined Petroleum Products, Consumption Breakdown (Saudi Arabia 2018-2023) - Continued

	2018f	2019f	2020f	2021f	2022f	2023f
Kerosene consumption, % y-o-y	3.5	3.0	2.8	2.4	2.0	2.0
Kerosene consumption, % of domestic consumption	0.2	0.2	0.2	0.2	0.2	0.2
Kerosene consumption, USDbn	0.2	0.2	0.2	0.3	0.3	0.3
Distillate fuel oil consumption, 000b/d	915.4	942.9	969.3	992.5	1,012.4	1,032.6
Distillate fuel oil consumption, % y-o-y	3.5	3.0	2.8	2.4	2.0	2.0
Distillate fuel oil consumption, % of domestic consumption	26.1	26.1	26.1	26.1	26.1	26.1
Distillate fuel oil consumption, USDbn	33.7	34.7	35.7	36.5	37.2	38.0
Residual fuel oil consumption, 000b/d	421.6	434.3	446.4	457.1	466.3	475.6
Residual fuel oil consumption, % y-o-y	3.5	3.0	2.8	2.4	2.0	2.0
Residual fuel oil consumption, % of domestic consumption	12.0	12.0	12.0	12.0	12.0	12.0
Residual fuel oil consumption, USDbn	12.2	12.9	13.3	13.6	13.9	14.3
LPG consumption, 000b/d	771.7	794.8	817.1	836.7	845.7	854.7
LPG consumption, % y-o-y	3.5	3.0	2.8	2.4	1.1	1.1
LPG consumption, % of domestic consumption	22.0	22.0	22.0	22.0	21.8	21.6
LPG consumption, USDbn	26.8	27.6	28.4	29.0	29.4	30.0
Other products consumption, 000b/d	754.1	776.8	798.5	817.7	834.0	850.7
Other products consumption, % y-o-y	3.5	3.0	2.8	2.4	2.0	2.0
Other products consumption, % of domestic consumption	21.5	21.5	21.5	21.5	21.5	21.5
Other products consumption, USDbn	25.8	26.5	27.3	27.9	28.5	29.1

f = BMI forecast. Source: EIA/BMI

Table: Refined Petroleum Products, Net Exports Breakdown (Saudi Arabia 2012-2017)

	2012e	2013e	2014f	2015f	2016f	2017f
Total net exports motor gasoline, 000b/d	-124.7	-165.9	-121.7	-58.6	-31.6	-43.7
Total net exports motor gasoline, % y-o-y	6.7	33.1	-26.7	-51.8	-46.1	38.0
Total net exports motor gasoline, USDbn	-5.5	-7.0	-4.9	-2.1	-1.1	-1.5
Total net exports jet fuel/kerosene, 000b/d	82.4	67.9	91.5	123.2	140.6	141.6
Total net exports jet fuel/kerosene, % y-o-y	-1.4	-17.5	34.7	34.6	14.1	0.8
Total net exports jet fuel/kerosene, USDbn	4.2	3.5	4.2	5.0	5.7	5.5
Total net exports jet fuel, 000b/d	-11.2	-17.7	-10.2	0.2	4.9	3.4
Total net exports jet fuel, % y-o-y	11.1	57.1	-42.0	-102.0	2,353.8	-31.1
Total net exports jet fuel, USDbn	-0.5	-0.8	-0.4	0.0	0.2	0.1

Refined Petroleum Products, Net Exports Breakdown (Saudi Arabia 2012-2017) - Continued

	2012e	2013e	2014f	2015f	2016f	2017f
Total net exports kerosene, 000b/d	93.6	85.6	101.8	123.0	135.7	138.3
Total net exports kerosene, % y-o-y	-0.1	-8.6	18.9	20.9	10.3	1.9
Total net exports kerosene, USDbn	4.5	4.0	4.5	4.8	5.2	5.2
Total net exports distillate fuel oil, 000b/d	-113.2	-180.6	-102.4	7.5	57.3	41.4
Total net exports distillate fuel oil, % y-o-y	11.6	59.5	-43.3	-107.3	666.1	-27.7
Total net exports distillate fuel oil, USDbn	-5.4	-8.2	-4.4	0.3	2.1	1.5
Total net exports residual fuel oil, 000b/d	101.5	58.2	119.7	203.6	246.6	243.7
Total net exports residual fuel oil, % y-o-y	-5.1	-42.7	105.6	70.2	21.1	-1.2
Total net exports residual fuel oil, USDbn	3.7	2.0	3.8	6.4	7.5	7.2
Total net exports other products, 000b/d	-314.2	-350.7	-324.6	-284.3	-273.2	-307.5
Total net exports other products, % y-o-y	3.1	11.6	-7.5	-12.4	-3.9	12.6
Total net exports other products, USDbn	-13.9	-14.7	-13.1	-10.1	-9.5	-10.5

e/f = BMI estimate/forecast. Source: EIA/BMI

Table: Refined Petroleum Products, Net Exports Breakdown (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Total net exports motor gasoline, 000b/d	-31.5	-20.8	-32.4	-44.9	-55.1	-65.5
Total net exports motor gasoline, % y-o-y	-27.9	-34.0	55.7	38.6	22.7	19.0
Total net exports motor gasoline, USDbn	-1.1	-0.7	-1.1	-1.5	-1.9	-2.2
Total net exports jet fuel/kerosene, 000b/d	152.4	161.9	161.8	160.7	160.0	159.2
Total net exports jet fuel/kerosene, % y-o-y	7.6	6.2	-0.1	-0.7	-0.5	-0.5
Total net exports jet fuel/kerosene, USDbn	5.6	5.9	5.9	5.9	5.8	5.8
Total net exports jet fuel, 000b/d	5.7	7.7	6.2	4.5	3.1	1.6
Total net exports jet fuel, % y-o-y	68.5	35.7	-20.0	-27.9	-31.4	-47.0
Total net exports jet fuel, USDbn	0.2	0.3	0.2	0.2	0.1	0.1
Total net exports kerosene, 000b/d	146.7	154.2	155.6	156.2	156.9	157.6
Total net exports kerosene, % y-o-y	6.1	5.1	0.9	0.4	0.4	0.4
Total net exports kerosene, USDbn	5.3	5.5	5.6	5.6	5.6	5.7
Total net exports distillate fuel oil, 000b/d	66.0	87.6	71.5	53.5	38.9	23.9
Total net exports distillate fuel oil, % y-o-y	59.4	32.7	-18.4	-25.2	-27.3	-38.6
Total net exports distillate fuel oil, USDbn	2.4	3.2	2.6	2.0	1.4	0.9
Total net exports residual fuel oil, 000b/d	268.5	290.4	285.4	278.4	272.9	267.3

Refined Petroleum Products, Net Exports Breakdown (Saudi Arabia 2018-2023) - Continued

	2018f	2019f	2020f	2021f	2022f	2023f
Total net exports residual fuel oil, % y-o-y	10.2	8.1	-1.7	-2.5	-2.0	-2.1
Total net exports residual fuel oil, USDbn	7.8	8.6	8.5	8.3	8.1	8.0
Total net exports other products, 000b/d	-307.7	-308.0	-325.1	-341.9	-355.9	-370.2
Total net exports other products, % y-o-y	0.1	0.1	5.5	5.2	4.1	4.0
Total net exports other products, USDbn	-10.5	-10.5	-11.1	-11.7	-12.2	-12.6

f = BMI forecast. Source: EIA/BMI

Table: LPG Production, Consumption and Net Exports (Saudi Arabia 2012-2017)

	2012e	2013e	2014f	2015f	2016f	2017f
LPG production (wellhead & refined), 000b/d	1,132.2	1,222.8	1,259.5	1,322.4	1,362.1	1,389.3
LPG production (wellhead & refined), % y-o-y	1.0	8.0	3.0	5.0	3.0	2.0
LPG production (wellhead & refined), USDbn	44.1	44.8	45.2	47.7	49.1	49.2
LPG consumption, 000b/d	591.2	604.4	625.5	647.4	716.9	745.6
LPG consumption, % y-o-y	1.6	2.2	3.5	3.5	10.7	4.0
LPG consumption, % of domestic consumption	20.7	20.7	20.7	20.7	22.0	22.0
LPG net exports (wellhead & refined), 000b/d	541.0	618.4	633.9	675.0	645.2	643.8
LPG net exports (wellhead & refined), % y-o-y	0.4	14.3	2.5	6.5	-4.4	-0.2
LPG net exports (wellhead & refined), USDbn	21.1	22.6	22.7	24.4	23.3	22.8

e/f = BMI estimate/forecast. Source: National Sources/BMI

Table: LPG Production, Consumption and Net Exports (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
LPG production (wellhead & refined), 000b/d	1,417.1	1,417.1	1,410.0	1,403.0	1,396.0	1,389.0
LPG production (wellhead & refined), % y-o-y	2.0	0.0	-0.5	-0.5	-0.5	-0.5
LPG production (wellhead & refined), USDbn	49.2	49.2	48.9	48.7	48.5	48.7
LPG consumption, 000b/d	771.7	794.8	817.1	836.7	845.7	854.7
LPG consumption, % y-o-y	3.5	3.0	2.8	2.4	1.1	1.1
LPG consumption, % of domestic consumption	22.0	22.0	22.0	22.0	21.8	21.6
LPG net exports (wellhead & refined), 000b/d	645.4	622.3	593.0	566.3	550.3	534.3

LPG Production, Consumption and Net Exports (Saudi Arabia 2018-2023) - Continued

	2018f	2019f	2020f	2021f	2022f	2023f
LPG net exports (wellhead & refined), % y-o-y	0.3	-3.6	-4.7	-4.5	-2.8	-2.9
LPG net exports (wellhead & refined), USDbn	22.4	21.6	20.6	19.7	19.1	18.7

f = BMI forecast. Source: National Sources/BMI

Saudi Arabia - Total Hydrocarbons, 10-year Forecasts**Table: Total Hydrocarbons Production, Consumption and Net Exports (Saudi Arabia 2012-2017)**

	2012e	2013e	2014f	2015f	2016f	2017f
Total hydrocarbons production, 000boe	13,640.2	13,551.5	13,736.5	14,036.2	14,424.8	14,615.7
Total hydrocarbons production, 000boe, % y-o-y	4.7	-0.7	1.4	2.2	2.8	1.3
Total hydrocarbons production, USDbn	536.1	512.9	499.9	380.6	382.1	380.7
Total hydrocarbons production, USD, % y-o-y	6.8	-4.3	-2.5	-23.9	0.4	-0.3
Total hydrocarbons consumption, 000boe	4,775.6	4,886.1	5,106.1	5,357.6	5,616.4	5,857.1
Total hydrocarbons consumption, 000boe, % y-o-y	4.4	2.3	4.5	4.9	4.8	4.3
Total hydrocarbons consumption, USDbn	187.5	183.2	183.5	162.1	167.6	172.1
Total hydrocarbons consumption, USD, % y-o-y	6.9	-2.3	0.2	-11.7	3.3	2.7
Total net hydrocarbons exports, 000boe	8,864.7	8,665.4	8,630.4	8,678.6	8,808.4	8,758.6
Total net hydrocarbons exports, 000boe, % y-o-y	4.9	-2.2	-0.4	0.6	1.5	-0.6
Total net hydrocarbons exports, USDbn	352.1	333.1	319.8	221.4	217.6	211.9
Total net hydrocarbons exports, USDbn % y-o-y	6.8	-5.4	-4.0	-30.7	-1.7	-2.6
Total net hydrocarbons exports at USD50/bbl, USDbn	161.1	157.8	157.0	154.4	156.0	154.2
Total net hydrocarbons exports at USD100/bbl, USDbn	322.2	315.6	314.0	308.8	312.0	308.4

e/f = BMI estimate/forecast. Source: EIA/BMI

Table: Total Hydrocarbons Production, Consumption and Net Exports (Saudi Arabia 2018-2023)

	2018f	2019f	2020f	2021f	2022f	2023f
Total hydrocarbons production, 000boe	14,901.6	15,118.9	15,231.6	15,333.3	15,426.8	15,522.5
Total hydrocarbons production, 000boe, % y-o-y	2.0	1.5	0.7	0.7	0.6	0.6
Total hydrocarbons production, USDbn	400.2	419.8	427.2	434.2	441.1	452.7
Total hydrocarbons production, USD, % y-o-y	5.1	4.9	1.7	1.7	1.6	2.6

Total Hydrocarbons Production, Consumption and Net Exports (Saudi Arabia 2018-2023) - Continued

	2018f	2019f	2020f	2021f	2022f	2023f
Total hydrocarbons consumption, 000boe	6,099.1	6,256.2	6,383.8	6,486.2	6,575.7	6,666.8
Total hydrocarbons consumption, 000boe, % y-o-y	4.1	2.6	2.0	1.6	1.4	1.4
Total hydrocarbons consumption, USDbn	180.0	187.4	192.4	196.7	196.6	205.1
Total hydrocarbons consumption, USD, % y-o-y	4.6	4.1	2.7	2.2	-0.1	4.3
Total net hydrocarbons exports, 000boe	8,802.5	8,862.7	8,847.9	8,847.1	8,851.1	8,855.7
Total net hydrocarbons exports, 000boe, % y-o-y	0.5	0.7	-0.2	0.0	0.0	0.1
Total net hydrocarbons exports, USDbn	223.6	235.8	238.3	241.1	244.5	251.3
Total net hydrocarbons exports, USDbn % y-o-y	5.5	5.5	1.0	1.2	1.4	2.8
Total net hydrocarbons exports at USD50/bbl, USDbn	155.9	157.7	157.3	157.2	157.4	157.7
Total net hydrocarbons exports at USD100/bbl, USDbn	311.7	315.4	314.6	314.3	314.8	315.4

f = BMI forecast. Source: EIA/BMI

Glossary

Table: Glossary Of Terms

AOR	additional oil recovery	KCTS	Kazakh Caspian Transport System
APA	awards for predefined areas	km	kilometres
API	American Petroleum Institute	LAB	linear alkyl benzene
bbl	barrel	LDPE	low density polypropylene
bcm	billion cubic metres	LNG	liquefied natural gas
b/d	barrels per day	LPG	liquefied petroleum gas
bn	billion	m	metres
boe	barrels of oil equivalent	mcm	thousand cubic metres
BTC	Baku-Tbilisi-Ceyhan Pipeline	Mcm	mn cubic metres
BTU	British thermal unit	MEA	Middle East and Africa
Capex	capital expenditure	mn	million
CBM	coal bed methane	MoU	memorandum of understanding
CEE	Central and Eastern Europe	mt	metric tonne
CPC	Caspian Pipeline Consortium	MW	megawatts
CSG	coal seam gas	na	not available/ applicable
DoE	US Department of Energy	NGL	natural gas liquids
EBRD	European Bank for Reconstruction & Development	NOC	national oil company
EEZ	exclusive economic zone	OECD	Organisation for Economic Cooperation & Development
e/f	estimate/forecast	OPEC	Organization of the Petroleum Exporting Countries
EIA	US Energy Information Administration	PE	polyethylene
EM	emerging markets	PP	polypropylene
EOR	enhanced oil recovery	PSA	production sharing agreement
E&P	exploration and production	PSC	production sharing contract
EPSA	exploration and production sharing agreement	q-o-q	quarter-on-quarter
FID	final investment decision	R&D	research and development
FDI	foreign direct investment	R/P	reserves/production
FEED	front end engineering and design	RPR	reserves to production ratio
FPSO	floating production, storage and offloading	SGI	strategic gas initiative
FTA	free trade agreement	SoI	statement of intent
FTZ	free trade zone	SPA	sale and purchase agreement
GDP	gross domestic product	SPR	strategic petroleum reserve

Glossary Of Terms - Continued			
G&G	geological and geophysical	t/d	tonnes per day
GoM	Gulf of Mexico	tcm	trillion cubic metres
GS	geological survey	toe	tonnes of oil equivalent
GTL	gas-to-liquids conversion	tpa	tonnes per annum
GW	gigawatts	TRIPS	Trade-Related Aspects of Intellectual Property Rights
GWh	gigawatt hours	trn	trillion
HDPE	high density polyethylene	T&T	Trinidad & Tobago
HoA	heads of agreement	TTPC	Trans-Tunisian Pipeline Company
IEA	International Energy Agency	TWh	terawatt hours
IGCC	integrated gasification combined cycle	UAE	United Arab Emirates
IOC	international oil company	USGS	US Geological Survey
IPI	Iran-Pakistan-India Pipeline	WAGP	West African Gas Pipeline
IPO	initial public offering	WIPO	World Intellectual Property Organization
JOC	joint operating company	WTI	West Texas Intermediate
JPDA	joint petroleum development area	WTO	World Trade Organization

Source: BMI

Methodology

Industry Forecast Methodology

BMI's industry forecasts are generated using the best-practice techniques of time-series modelling and causal/econometric modelling. The precise form of model we use varies from industry to industry, in each case being determined, as per standard practice, by the prevailing features of the industry data being examined.

Common to our analysis of every industry is the use of vector autoregressions. Vector autoregressions allow us to forecast a variable using more than the variable's own history as explanatory information. For example, when forecasting oil prices, we can include information about oil consumption, supply and capacity.

When forecasting for some of our industry sub-component variables, however, using a variable's own history is often the most desirable method of analysis. Such single-variable analysis is called univariate modelling. We use the most common and versatile form of univariate models: the autoregressive moving average model (ARMA).

In some cases, ARMA techniques are inappropriate because there is insufficient historic data or data quality is poor. In such cases, we use either traditional decomposition methods or smoothing methods as a basis for analysis and forecasting.

BMI mainly uses OLS estimators and in order to avoid relying on subjective views and encourage the use of objective views, **BMI** uses a 'general-to-specific' method. **BMI** mainly uses a linear model, but simple non-linear models, such as the log-linear model, are used when necessary. During periods of 'industry shock', for example poor weather conditions impeding agricultural output, dummy variables are used to determine the level of impact.

Effective forecasting depends on appropriately selected regression models. **BMI** selects the best model according to various different criteria and tests, including but not exclusive to:

- R^2 tests explanatory power; adjusted R^2 takes degree of freedom into account;
- Testing the directional movement and magnitude of coefficients;
- Hypothesis testing to ensure coefficients are significant (normally t-test and/or P-value);
- All results are assessed to alleviate issues related to auto-correlation and multi-collinearity.

BMI uses the selected best model to perform forecasting.

Human intervention plays a necessary and desirable role in all of **BMI**'s industry forecasting. Experience, expertise and knowledge of industry data and trends ensure that analysts spot structural breaks, anomalous data, turning points and seasonal features where a purely mechanical forecasting process would not.

Sector-Specific Methodology

There are a number of principal criteria that drive our forecasts for each energy indicator.

Energy Supply

This covers the supply of crude oil, natural gas, refined oil products and electrical power, which is determined largely by investment levels, available capacity, plant utilisation rates and national policy. We therefore examine:

- National energy policy, stated output goals and investment levels;
- Company-specific capacity data, output targets and capital expenditures, using national, regional and multinational company sources;
- International quotas, guidelines and projections from organisations such as OPEC, the International Energy Agency (IEA), and the US Energy Information Administration (EIA).

Energy Consumption

A mixture of methods is used to generate demand forecasts, applied as appropriate to each individual country:

- Underlying economic (GDP) growth for individual countries/regions, sourced from **BMI** published estimates;
- Historic relationships between GDP growth and energy demand growth in an individual country are analysed and used as the basis for predicting levels of consumption;
- Government projections for oil, gas and electricity demand;
- Third-party agency projections for regional demand, from organisations such as the IEA, EIA and OPEC;

Extrapolation of capacity expansion forecasts based on company- or state-specific investment levels.

Cross Checks

Whenever possible, we compare government and/or third-party agency projections with the declared spending and capacity expansion plans of the companies operating in each individual country. Where there are discrepancies, we use company-specific data as physical spending patterns to determine capacity and supply capability. Similarly, we compare capacity expansion plans and demand projections to check the energy balance of each country. Where the data suggest imports or exports, we check that necessary capacity exists or that the required investment in infrastructure is taking place.

Source

Sources include those international bodies mentioned above, such as OPEC, IEA, and EIA, as well as local energy ministries, official company information, and international and national news, plus international and national news agencies.

Risk/Reward Index Methodology

BMI's Risk/Reward Index (RRI) provides a comparative regional ranking system evaluating the ease of doing business and the industry-specific opportunities and limitations for potential investors in a given market. The RRI system is divided into two distinct areas:

Rewards: Evaluation of sector's size and growth potential in each state, and also broader industry/state characteristics that may inhibit its development. This is further broken down into two sub-categories:

- Industry Rewards (this is an industry-specific category taking into account current industry size and growth forecasts, the openness of market to new entrants and foreign investors, to provide an overall score for potential returns for investors);
- Country Rewards (this is a country-specific category, and the score factors in favourable political and economic conditions for the industry).

Risks: Evaluation of industry-specific dangers and those emanating from the state's political/economic profile which call into question the likelihood of anticipated returns being realised over the assessed time period. This is further broken down into two sub-categories:

- Industry Risks (this is an industry-specific category whose score covers potential operational risks to investors, regulatory issues inhibiting the industry, and the relative maturity of a market);
- Country Risks (this is a country-specific category in which political and economic instability, unfavourable legislation and a poor overall business environment are evaluated to provide an overall score).

We take a weighted average, combining Market and Country Risks, or Industry and Country Rewards. These two results in turn provide an overall Risk/Reward Index score, which is used to create our regional ranking system for the risks and rewards of involvement in a specific industry in a particular country.

For each category and sub-category, each state is scored out of 100 (with 100 the best), with the overall Risk/Reward Index score a weighted average of the total score. Importantly, as most of the countries and territories evaluated are considered by **BMI** to be 'emerging markets', our index is revised on a quarterly basis. This ensures that the index draws on the latest information and data across our broad range of sources, and the expertise of our analysts.

Sector-Specific Methodology

BMI's approach in assessing the Risk/Reward balance for oil and gas industry investors is three-fold:

- First, we have disaggregated the upstream (oil and gas exploration and production) and downstream (oil refining and marketing, gas processing and distribution), enabling us to take a more nuanced approach to analysing the potential in each segment, and identifying the different risks along the value chain.
- Second, we have identified objective indicators that may serve as proxies for issues and trends that were previously evaluated on a subjective basis.
- Finally, we have used **BMI**'s proprietary Country Risk Index in a more refined manner in order to ensure that only those risks most relevant to the industry have been included.

Conceptually, the index is organised in a manner that enables us clearly to present the comparative strengths and weaknesses of each state. The headline oil and gas index score is the principal score. However, the differentiation of upstream and downstream and the articulation of the elements that comprise each segment enable more sophisticated conclusions to be drawn, and also facilitate the use of the index by clients who have varying levels of exposure and risk appetite.

Our sector-specific industry indices include:

- Oil & Gas Risk/Reward Index: this is the overall index score, which comprises 50% upstream and 50% downstream;
- Upstream Oil & Gas Risk/Reward Index: this is the overall upstream index score, which is composed of rewards/risks (see below);
- Downstream Oil & Gas Risk/Reward Index: this is the overall downstream index score, which comprises rewards/risks (see below).

The following indicators have been used. Overall, the index uses three subjectively measured indicators and 41 separate indicators/datasets.

Table: Bmi's Oil & Gas Upstream Risk/Reward Index

Rationale	
Upstream RRR: Rewards	
Industry Rewards	
Resource Base	
- Proven oil reserves, mn bbl	Indicators used to denote total market potential. High values given better scores.
- Proven gas reserves, bcm	
Growth Outlook	
- Oil production growth, 2009-2014	Indicators used as proxies for BMI's market assumptions, with strong growth accorded higher scores.
- Gas production growth, 2009-2014	
Market Maturity	
- Oil reserves/production	Indicator used to denote whether industries are frontier/emerging/developed or mature markets. Low existing exploitation in relation to potential is accorded a higher score.
- Gas reserves and production	
- Current oil production versus peak	
- Current gas production versus peak	
Country Rewards	
State ownership of assets, %	Indicator used to denote opportunity for foreign NOCs/IOCs/independents. Low state ownership scores higher.
Number of non-state companies	Indicator used to denote market competitiveness. Presence (and large number) of non-state companies scores higher.
Upstream RRR: Risks	
Industry Risks	
Licensing terms	Subjective evaluation of government policy towards sector against BMI-defined criteria. Protectionist states are marked down.
Privatisation trend	Subjective evaluation of government industry orientation. Protectionist states are marked down.
Country Risks	
Physical infrastructure	Score from BMI's Country Risk Index (CRI). It evaluates the constraints imposed by power, transport and communications infrastructure.
Long-term policy continuity risk	From CRI. It evaluates the risk of a sharp change in the broad direction of government policy.
Rule of law	From CRI. It evaluates government's ability to enforce its will within the state.
Corruption	From CRI, to denote risk of additional legal costs and possibility of opacity in tendering or business operations affecting companies' ability to compete.

NOC = national oil company; IOC = international oil company. Source: BMI

Weighting

Given the number of indicators/datasets used, it would be inappropriate to give all sub-components equal weight. Consequently, the following weighting has been adopted:

Table: Weighting	
Component	Weighting, %
Upstream RRI	50, of which
Rewards	70 of Upstream RRI, of which
- Industry Rewards	75
- Country Rewards	25
Risks	30 of Upstream RRI, of which
- Industry Risks	65
- Country Risks	35
Downstream RRI	50 of Oil & Gas RRI, of which
Rewards	70 ,of which
- Industry Rewards	75
- Country Rewards	25
Risks	30, of which
- Industry Risks	60
- Country Risks	40

Source: BMI

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