THE GUINNESS GLOBAL ENERGY REPORT

Developments and trends for investors in the global energy sector | May 2019

GUINNESS GLOBAL ENERGY FUND

Fund size: $298m (30.4.2019)

The Guinness Global Energy Fund invests in listed equities of companies engaged in the exploration, production and distribution of oil, gas and other energy sources. We believe that over the next twenty years the combined effects of population growth, developing world industrialisation and diminishing fossil fuel supplies will force energy prices higher and generate growing profits for energy companies.

The Fund is run by Will Riley, Jonathan Waghorn and Tim Guinness. The investment philosophy, methodology and style which characterise the Guinness approach have been applied to the management of energy equity portfolios since 1998.

HIGHLIGHTS FOR APRIL

OIL

Brent and WTI continue to strengthen; OPEC cuts hard

Brent and WTI both rose over the month; Brent was up from $67/bl to $72/bl; WTI rose from $60/bl to $64/bl. OPEC production was about flat in April versus March, but Iranian exports were under threat due to the removal of sanctions waivers in May. The US oil rig count continues to fall and the pace of US onshore growth is slowing.

NATURAL GAS

US gas prices lower; Asian prices also weaker

Henry Hub prices weakened from $2.66/mcf to $2.58/mcf. US gas supply is 11 Bcf/day higher than twelve months ago, thanks to growth in Appalacia and in associated gas from US shale oil production, leaving market oversupplied. Asian and European gas prices have weakened (both to c.$4.5/mcf at end-April) as a result of seasonal oversupply of liquified natural gas.

EQUITIES

Energy underperforms the broad market

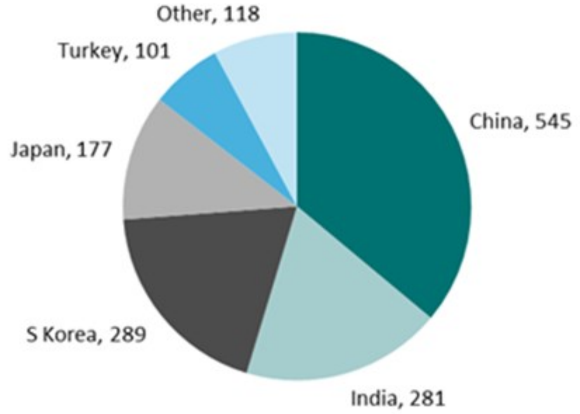
The MSCI World Energy Index (net return) rose in April by 1.0%, underperforming the MSCI World Index (net return) which rose by 1.4% over the month (all in US dollar terms). Year-to-date, the MSCI World Energy Index has underperformed the MSCI World by 1.6%.

CHART OF THE MONTH

Iranian oil import waivers due for cancellation

In late April, the US government announced the cancellation of 180 day waivers that had been put in place for the importing of Iranian oil. As a result, any country continuing to purchase Iranian oil after May 2 will in theory itself face US sanctions. The largest importers of Iranian crude are China (0.5m b/day), India and South Korea (both 0.3m b/day). Whether China cuts its purchases is tied closely to US/China tariff negotiations. At a minimum, we expect China to continue to lift equity barrels from Iran (c.0.2m b/day), as there is no direct revenue associated with them.

Importers of Iranian oil production (000s b/day)



Source: DNB; Guinness Asset Management

Important information about this report

This report is primarily designed to inform you about recent developments in the energy markets invested in by the Guinness Global Energy Fund. It also provides information about the Fund's portfolio, including recent activity and performance. This document is provided for information only and all the information contained in it is believed to be reliable but may be inaccurate or incomplete; any opinions stated are honestly held at the time of writing, but are not guaranteed. The contents of the document should not therefore be relied upon. It is not an invitation to make an investment nor does it constitute an offer for sale.

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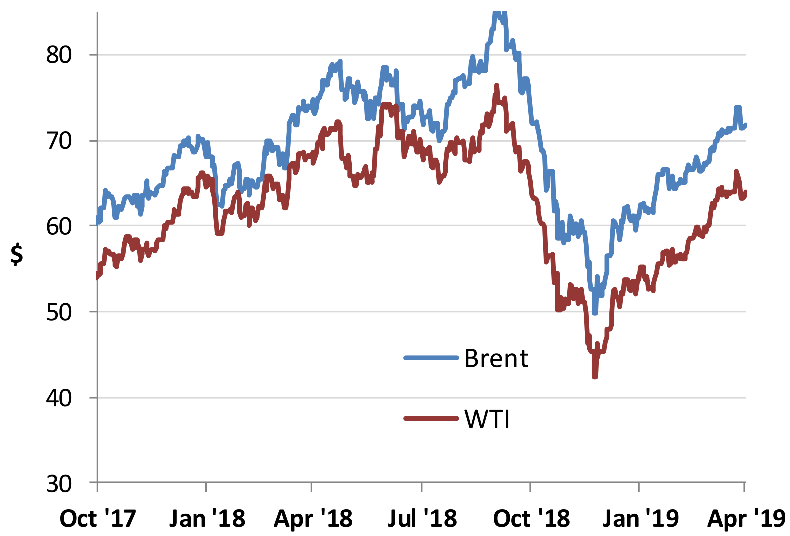
1. APRIL IN REVIEW

i) Oil market

Figure 1: Oil price (WTI and Brent $/barrel) 18 months October 31 2017 to April 30 2019



Source: Bloomberg LP

The West Texas Intermediate (WTI) oil price started April at $60.1/bl and built to a high on April 23 of $66.4/bl, before drifting lower to close at $63.9/bl. WTI has averaged $57/bl so far in 2019, having averaged $65/bl in 2018, $51/bl in 2017, $43/bl in 2016, $49/bl in 2015 and $93/bl in 2014.

Brent oil traded in a similar shape, opening at $67.5/bl, trading up to $73.9/bl before closing the month at $71.9/bl. Brent averaged $72/bl in 2018. The gap between the WTI and Brent benchmark oil prices widened over the month, ending April at around $8/bl, versus a range of $7-10/bl over the previous six months.

Factors which strengthened WTI and Brent oil prices in April:

- **Iranian oil import waivers to be cancelled**
  On April 23, the US government announced that waivers currently in place for the import of Iranian crude oil would not be renewed when they expire in early May. Officially, Iran continues to export around 1.3m b/day (though the actual figure is thought to be closer to 2m b/day), and cancellation of the waivers likely removes up to 1m b/day from the market. The largest importers of Iranian oil in April were China, India, South Korea and Japan, together receiving around 1m b/day. China may be resistant to a reduction, but we think those other countries would comply with the US.

- **US supply essentially flat; and drilling rig count falling**

The latest EIA production data showed a 8,000 b/day production increase 2019 (latest data point), taking year-on-year growth down to 1.4m b/day. The US onshore drilling rig count fell by 11 rigs in April, taking the total decline in 2019 to 80 rigs (-10%). This increases expectations of a continued slowdown in US shale oil production growth later in 2019. There is typically a 5-6 month lag from rig count change to production change.

- **Venezuela production remains under pressure**
  The situation in Venezuela continues to be highly problematic with estimates that production in April remained flat vs March at around 0.8m b/day, having been around 1.2m b/day in late 2018. There have been continuing efforts to unseat President Maduro, but at the time of writing, all known military movements have taken place around the cities of Caracas and Maracay, well away from the country's oil production. Under Maduro, production could well slip further, but it is estimated that regime change could bring a recovery to 1.3-1.5m b/day in fairly short order.

- **Global oil demand growth remaining steady**
  Despite the IMF again downgrading global GDP growth for 2019 (3.5% to 3.3%), the IEA re-iterated their estimate for global oil demand growth this year, at 1.4m b/day. The IEA's estimate for oil growth comprises an increase in demand of 0.4m b/day from the OECD (mainly US) and 1m b/day from the non-OECD. Initial consumption data for Q1 2019 is supportive.

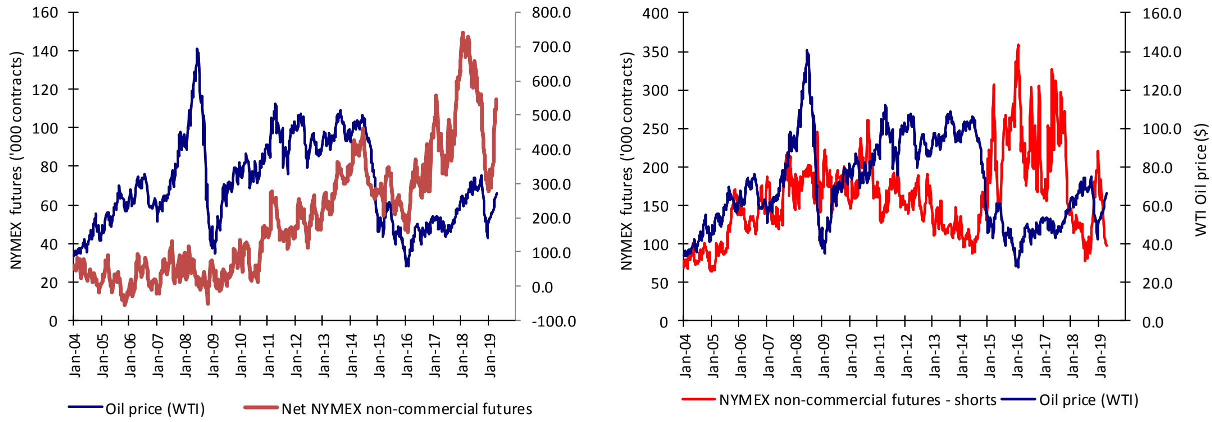
Factors which weakened WTI and Brent oil prices in April:

- **US inventories rising**
  After two months of tightening versus seasonal averages in February and March, inventories in the US loosened slightly in April. Crude oil and refined products in storage built by 9m barrels over the month, higher than the five year average build of 6m barrels. Total US inventories now sit very lose to the fear year average, but remain around 140m barrels above the ten year average.

Speculative and investment flows

The New York Mercantile Exchange (NYMEX) net non-commercial crude oil futures open position was 547,000 contracts long at the end of April versus 448,000 contracts long at the end of March. The net position peaked in February 2018 at 739,000 contracts long. Typically, there is a positive correlation between the movement in net position and movement in the oil price. The gross short position declined to 112,000 contracts at the end of April versus 97,000 at the end of March.

Figure 2: NYMEX Non-commercial net and short futures contracts: WTI January 2004 – April 2019

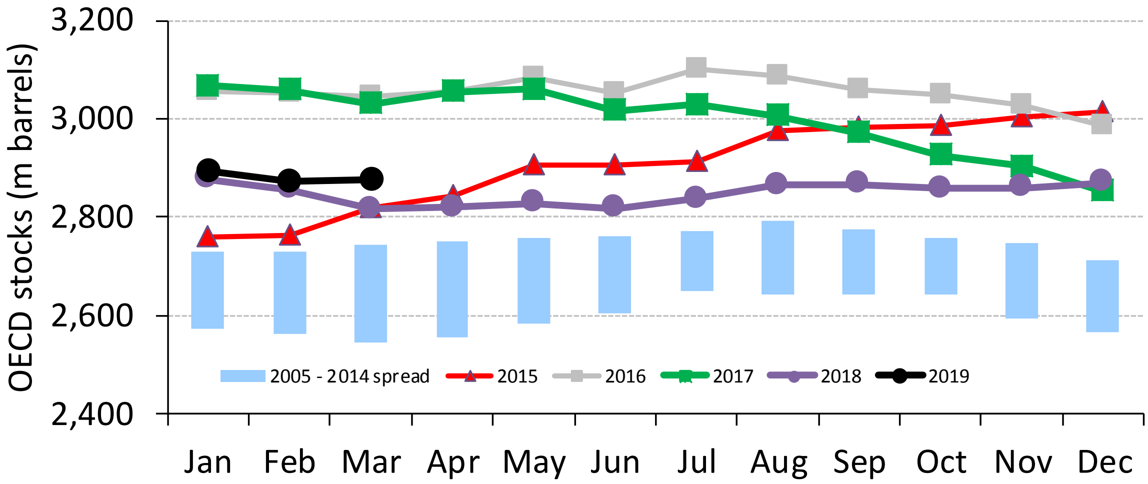


Source: Bloomberg LP/NYMEX/ICE (2019)

OECD stocks

OECD total product and crude inventories at the end of March (latest data point) were estimated by the IEA to be 2,877m barrels, up by 6m barrels versus the level reported for February. This compares to a 10-year average decrease for March of 3m barrels, implying that the market loosened over the month by around 0.3m b/day. Inventories were broadly flat in 2018.

Figure 3: OECD total product and crude inventories, monthly, 2004 to 2019



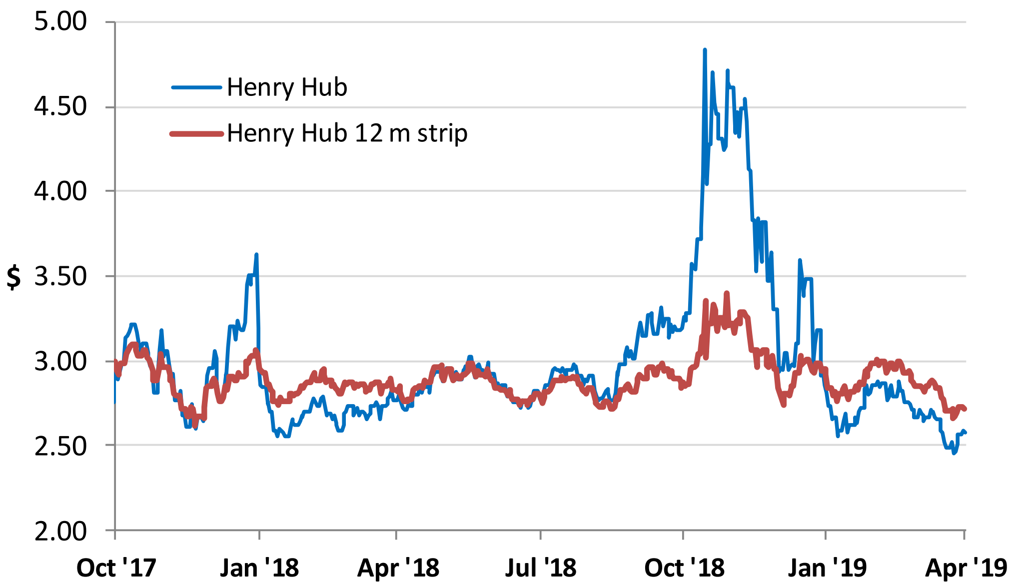
Source: IEA Oil Market Reports (April 2019 and older)

ii) Natural gas market

The US natural gas price (Henry Hub front month) opened April at $2.66/mcf (1,000 cubic feet), dipping to $2.46/mcf in the middle of the month, before closing at $2.58/mcf. The spot gas price has averaged $2.81/mcf so far in 2019, which compares to an average gas price of $3.07 in 2018, $3.02 in 2017, $2.55/mcf in 2016 and $2.61/mcf in 2015.

The 12-month gas strip price (a simple average of settlement prices for the next 12 months' futures prices) declined over the month, opening at $2.85/mcf and closing at $2.71 /mcf. The strip price averaged $2.90 in 2018, $3.12 in 2017, $2.84 in 2016 and $2.86 in 2015.

Figure 4: Henry Hub gas spot price and 12m strip ($/Mcf) October 31 2017 to April 30 2019



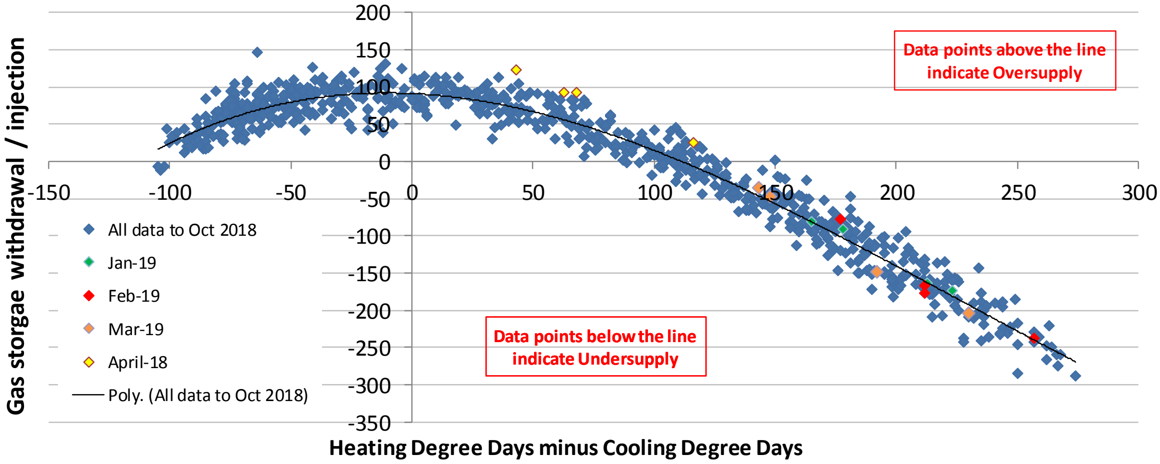
Source: Bloomberg LP

Factors which weakened the US gas price in April included:

- **Strong US onshore natural gas production**
  Onshore US natural gas production averaged 96.3 Bcf/day in January 2019 (the latest available data point), up by 11.3 Bcf/day on the level reported twelve months earlier. Rising associated gas supply from shale oil, and a pickup of activity in the Marcellus basin, are the key reasons for the rise in production: both look set to continue for the rest of 2019.

- **Structurally oversupplied market**
  Adjusting for the impact of weather in April, the most recent movements of gas in storage suggest the market is, on average, operating at a surplus of around 5 Bcf/day (as indicated by the yellow dots on the graph below).

Figure 5: Weather adjusted US natural gas inventory injections and withdrawals



Source: Bloomberg LP; Guinness Asset Management

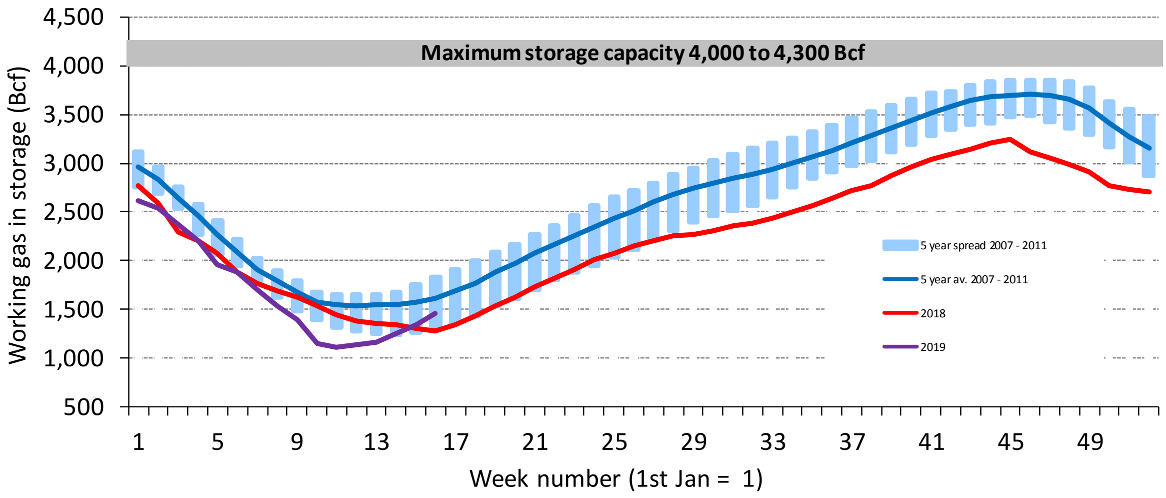
Factors which strengthened the US gas price in April included:

- **Depressed gas inventories**
  US natural gas inventories were estimated to be around 1.5 Tcf at the end of April (around 0.3 Tcf lower than the 10-year average). The market remains sanguine about the tightness of this market (seeing a fall in the 12 month pricing strip since the start of the year) in the face of continued supply increases via associated gas (from shale oil) and the north-east of the US.

Natural gas inventories

Swings in the balance for US natural gas should, in theory, show up in movements in gas storage data. Natural gas inventories at the end of April were reported by the EIA to be 1.5 Tcf. Current gas in storage is, therefore, below the 10 year average as a result of weather and strong demand plus increasing volumes of gas exported via LNG. Whilst gas inventories today are low, the high visibility of low cost supply growth for 2019 is keeping a cap on prices.

Figure 6: Deviation from 5yr gas storage norm vs gas price 12-month strip (H. Hub $/Mcf)



Source: Bloomberg; EIA (May 2019)

2. MANAGER'S COMMENTS

Chevron and Occidental both bid for Anadarko

During April, we saw the return of competitive M&A activity in the North American E&P sector as Chevron, and subsequently Occidental, bid for Anadarko. Anadarko shares are up 60% from the start of the month and it was pleasing to us that the prices offered by Chevron and Occidental were broadly in line with our internal view of the value of Anadarko equity. The Guinness Global Energy fund owns a number of similar North American E&P companies whose valuation is similar to Anadarko's prior to the bid. We assess their value potential in this piece.

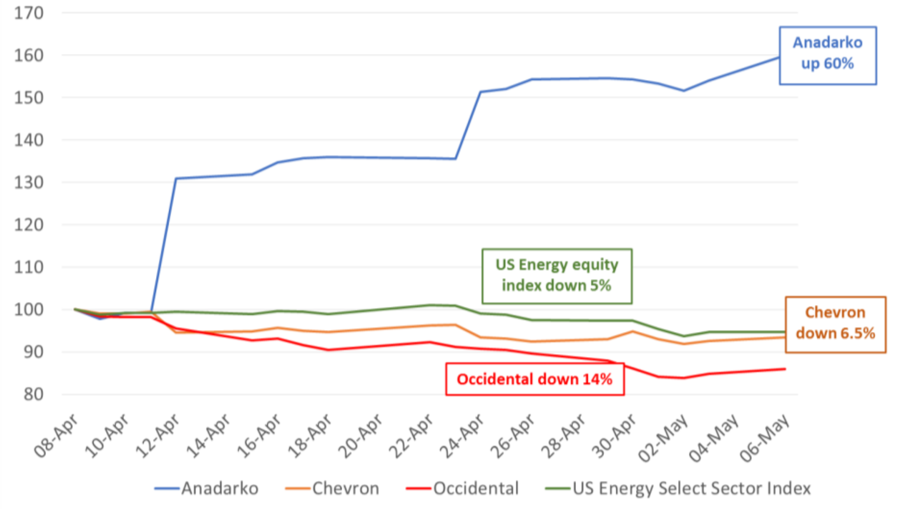
Review of events

On 12 April, Chevron announced that it has agreed to buy Anadarko at an implied share price of $65/share (using $16.25/share in cash and the remainder in Chevron shares). After the deal was announced, it became clear that the Anadarko Board had chosen to recommend the offer from Chevron instead of recommending a higher offer from Occidental (of $70/share, made up of cash and Occidental shares). The Anadarko board saw greater likelihood of Chevron completing the deal due to the company's more superior financial position and hence recommended its offer over the Occidental offer.

Twelve days later, on 24 April, Occidental increased its offer to $76/share (made up of $38/share in cash and the remainder in Occidental equity) and put the offer directly to Anadarko shareholders. The Anadarko board announced that it would properly evaluate the Occidental offer and, on 6 May (one day after Occidental increased its bid to $76/share with a larger cash component), the board announced its preference for the Occidental offer. At the point of writing, Chevron had still not publicly reacted to the Occidental offer. As of 7 May, we had the following situation:

- Anadarko shares trading at $75.5/sh, up around 60% from the week of the initial bid
- Occidental shares at $59/sh, down about 14% from the week of the initial bid
- Chevron shares at $118/sh, down around 6.5%from the week of the initial bid
- The US Energy Equity Sector (using the XLE Index) down about 5% over the same period

Chart of share price movements since 8 April 2019



Valuation of Anadarko under the various bids

Events like this are always very helpful in understanding the valuation of energy equities. Prior the initial Chevron bid, we assessed the fair value of Anadarko to be $72/share based on our discounted cash flow, sum of the parts and multiples-based valuation models.

With the equity trading at only $47/share, we saw Anadarko as being one of the cheaper North American Exploration and Production companies and our models showed that a long term Brent oil price of around $54/bl was being discounted in the valuation of Anadarko's equity.

The implied valuation of Anadarko at the various bid prices was as follows:

- The bid from Chevron (at $65/share, a 39% premium to Anadarko's prior share price) was at a 10% discount to our assessed fair value of $72/share and we saw the Chevron bid as offering 'broadly fair value' for Anadarko. At $65/share, we calculated that Chevron was buying Anadarko with a long term implied Brent oil price of around $64/bl.

- The subsequent offer from Occidental, at $76/share, was at a premium of 17% to the Chevron offer and even closer to our assessed fair value at $72/share. At that offer, we calculated that Occidental was offering to buy Anadarko with a long term implied Brent oil price of around $72/bl.

Implications for the Guinness Global Energy Fund

The Guinness Global Energy Fund owns all three companies involved in these recent events plus a number of other North American Exploration & Production companies that could be considered as peers to Anadarko. As mentioned earlier, Anadarko was initially trading at a discount valuation to many of its peers but the two offers have taken Anadarko equity to a premium valuation.

An obvious question to ask here is whether there might be a wave of similar deals to come. In our view, Anadarko has for a long time been considered as a likely takeout target and its share price weakness was clearly a catalyst for the M&A activity. However, while Anadarko was cheap versus its peers, the company was certainly not suffering particularly versus its peers and this was certainly not the acquisition of a distressed company. Also, the fact that Chevron and Occidental equity performed reasonably well during the process may lead other larger companies to consider getting access to similar North American E&P companies with depressed current valuation.

If there is more to come, then who will be next? While this is very difficult to answer, we do note a number of similarities particularly between the asset mix and characteristics of Anadarko and those of Noble Energy. However, Noble Energy is just one of a number of North American E&P names that could be a potential target and there are likely to be some pure play Permian E&P companies that become potential targets in the future.

With Occidental willing to pay 7.0x 2019 EV/EBITDA and a long term implied Brent oil price of around $72/bl, a number of the North American E&P holdings in the Guinness Global Energy fund potentially look very attractively valued. In aggregate, the fund holds seven North American oriented companies which trade on an average of 5.1x EV/EBITDA for 2019 with an implied long term Brent oil price of around $54/bl. Our assessed fair value for the companies is around 63% higher than current value and this fair value is consistent with an implied long term Brent oil price of around $70/bl (the long term oil price that is now implied in Anadarko's equity). While, we do not expect all these companies to be acquired, we do note that they also offer sizeable valuation discounts, just as Anadarko did a month ago.

North American E&P peers held in the Guinness Global Energy fund compared to Anadarko pre and post-bid

	Share price	Target price	Upside %	DCF value	Multiples based Value	Sum of The Parts Value	EV/EBITDA 2019 (at $60 Brent)	Long term implied Brent oil price
Anadarko - pre bid	**47.0**	**72.0**	**53%**	**59.2**	**69.3**	**71.5**	**4.9x**	**54.0**
Anadarko - post bid	**75.5**	**72.0**	**-5%**	**59.2**	**69.3**	**71.5**	**7.0x**	**72.0**
Apache	30.2	40.0	32%	37.6	42.5	57.6	4.6x	57.0
Canadian Nat Res	37.2	52.0	40%	56.8	47.0	49.9	5.9x	56.0
Conoco	61.2	75.0	23%	80.1	72.5	56.5	5.8x	53.0
Noble Energy	24.2	35.0	45%	34.0	31.2	49.8	6.4x	58.0
Oasis	5.6	15.0	167%	8.2	12.0	20.4	4.3x	52.0
Devon	31.1	40.0	29%	41.7	38.1	63.0	5.1x	55.0
EnCana	9.1	19.0	109%	16.0	17.2	22.5	3.5x	47.0
Peers in Guinness Global Energy Fund			**63%**				**5.1x**	**54.0**

1) PERFORMANCE Guinness Global Energy Fund

The main index of oil and gas equities, the MSCI World Energy Index (net return), was up by 0.4% in April, while the MSCI World Index (net return) rose by 3.6%. The Fund was up by 1.9% (class E) in the month, outperforming the MSCI World Energy index by 1.5% (all in US dollar terms).

Within the Fund, April's strongest performers were Anadarko, Devon, Noble, Helix Energy and Canadian Natural Resources, while the weakest performers were ENI, Equinor, Petrochina, Conocophillips and Unit Corp.

Performance (in USD) 30/04/2019

Annualised

% returns	1 year	3 years	5 years	10 years	1999 to date
Guinness Global Energy	-11.6	0.5	-8.8	2.4	9.2
MSCI World Energy Index	-6.6	4.1	-4.0	4.3	6.0

Calendar year

% returns	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007
Guinness Global Energy	17.3	-19.7	-1.3	27.9	-27.6	-19.1	24.4	3.0	-13.6	15.3	61.8	-48.2	37.6
MSCI World Energy Index	14.9	-15.8	5.0	26.6	-22.8	-11.6	18.1	1.9	0.2	11.9	26.2	-38.1	29.8

Source: Guinness Asset Management and Financial Express, bid to bid, gross income reinvested, in US dollars

Calculation by Guinness Asset Management Limited, simulated past performance prior to 31.3.08, launch date of Guinness Global Energy Fund. The Guinness Global Energy investment team has been running global energy funds in accordance with the same methodology continuously since November 1998. These returns are calculated using a composite of the Investec GSF Global Energy Fund class A to 29.2.08 (managed by the Guinness team until this date); the Guinness Atkinson Global Energy Fund (sister US mutual fund) from 1.3.08 to 31.3.08 (launch date of this Fund), the Guinness Global Energy Fund class A (1.49% OCF) from launch to 02.09.08, and class E (1.24% OCF) thereafter. Performance would be lower if an initial charge and/or redemption fee were included.

Past performance should not be taken as an indicator of future performance. The value of this investment and any income arising from it can fall as well as rise as a result of market and currency fluctuations as well as other factors. You may lose money in this investment.

Returns stated above are in US dollars; returns in other currencies may be higher or lower as a result of currency fluctuations. Investors may be subject to tax on distributions.

The Fund's Prospectus gives a full explanation of the characteristics of the Fund and is available at www.guinnessfunds.com.

2) PORTFOLIO Guinness Global Energy Fund

Buys/Sells

In April, we purchased a research position in Diversified Gas & Oil (DGOC). DGOC is a UK listed stock that specialises in mature conventional gas production in the Marcellus and Utica fields in the US. The company completed a transformational deal in 2018, buying $575m of producing gas assets from EQT, and has raised money in 2019 for further acquisitions. Whilst we are cautious about US gas macro generally, we are attracted by DGOC's impressive returns on capital at low gas prices, and dividend yield of over 7%.

Otherwise the portfolio was actively rebalanced during the month.

Sector Breakdown

The following table shows the asset allocation of the Fund at **April 30 2019**.

(%)	31 Dec 2011	31 Dec 2012	31 Dec 2013	31 Dec 2014	31 Dec 2015	31 Dec 2016	31 Dec 2017	31 Dec 2018	30 April 2019
Oil & Gas	***97.9***	***97.3***	***93.7***	***93.7***	***95.1***	***96.7***	***98.4***	***99.7***	***99.8***
Integrated	30.9	30.4	29.2	27.0	30.4	32.5	28.6	27.2	27.8
Integrated – Can & Em Mkts	8.8	8.4	9.4	10.3	11.1	14.3	14.2	15.3	15.9
Exploration & production	41.1	40.3	35.4	36.2	36.5	35.4	37.0	39.0	37.5
Oil & Gas Storage & Transportation	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.9	4.0
Drilling	5.9	7.1	6.4	3.3	1.5	2.2	1.9	1.4	1.4
Equipment & services	6.1	7.4	9.8	13.4	11.4	8.6	9.5	8.8	9.0
Refining and marketing	5.1	3.7	3.5	3.5	4.2	3.7	3.7	4.1	4.2
Solar	**1.3**	**1.2**	**2.6**	**3.7**	**4.7**	**0.9**	**1.4**	**0.4**	**0.4**
Coal & consumables	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Construction & engineering	**0.4**	**0.6**	**1.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Cash	**0.4**	**0.9**	**2.7**	**2.6**	**0.2**	**2.4**	**0.2**	**-0.1**	**-0.2**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Guinness Asset Management
Basis: Global Industry Classification Standard (GICS)

The Fund at April 30 2019 was on a price to earnings ratio (P/E) for 2019 of 12.6x versus the S&P 500 Index at 17.9x as set out in the following table:

	2012	2013	2014	2015	2016	2017	2018	2019
Guinness Global Energy Fund P/E	7.6	8.1	8.5	20.6	39.0	22.2	12.4	12.6
S&P 500 P/E	30.4	27.5	24.8	29.3	27.8	23.7	19.4	17.9
Premium (+) / Discount (-)	*-75%*	*-70%*	*-66%*	*-30%*	*40%*	*-6%*	*-36%*	*-29%*
Average oil price (WTI $/bbl)	94	98	93	49	43	51	66	

Source: Standard and Poor's; Guinness Asset Management Ltd

Portfolio holdings

Our integrated and similar stock exposure (c.46%) is comprised of a mix of mid cap, mid/large cap and large cap stocks. Our four large caps are Chevron, BP, Royal Dutch Shell and Total. Mid/large and mid-caps are ENI, Equinor and OMV. At April 30 2019 the median P/E ratios of this group were 12.3x/11.7x 2018/2019 earnings. We also have two Canadian integrated holdings, Suncor and Imperial Oil. Both companies have significant exposure to oil sands in addition to downstream assets.

Our exploration and production holdings (c.37%) give us exposure most directly to rising oil and natural gas prices. We include in this category non-integrated oil sands companies, as this is the GICS approach. The stock here with oil sands exposure is Canadian Natural Resources. The pure E&P stocks have a bias towards the US (EnCana, Devon and Oasis), with five other names (Apache, Occidental, ConocoPhillips, Noble Energy, Anadarko) having a mix of US and international production and one (Tullow) which is African focused. One of the key metrics behind a number of the E&P stocks held is low enterprise value / proven reserves. Almost all of the US E&P stocks held also provide exposure to North American natural gas.

We have exposure to four (pure) emerging market stocks in the main portfolio, though one is a half-position, and in total represent 12% of the portfolio. Two are classified as integrateds (Gazprom and PetroChina) and two as E&P companies (CNOOC and SOCO International). Gazprom is the Russian national oil and gas company which produces approximately a quarter of the European Union gas demand and trades on 2.9x 2019 earnings. PetroChina is one of the world's largest integrated oil and gas companies and has significant growth potential and, alongside CNOOC, enjoys advantages as a Chinese national champion. SOCO International is an E&P company with production in Vietnam.

The portfolio contains one midstream holding, Enbridge, North America's largest pipeline company. With the growth of onshore oil and gas production expected in the US and Canada over the next five years, we believe Enbridge is well placed to execute its pipeline expansion plans.

We have useful exposure to oil service stocks, which comprise around 10.4% of the portfolio. The stocks we own are split between those which focus their activities in North America (land driller Unit Corp) and those which operate in the US and internationally (Helix, Halliburton and Schlumberger).

Our independent refining exposure is currently in the US in Valero, the largest of the US refiners. Valero has a reasonably large presence on the US Gulf Coast and is benefitting from the rise in US exports of refined products seen in recent times.

Portfolio at March 31 2019 (for compliance reasons disclosed one month in arrears)

Guinness Global Energy Fund 31 March 2019													
Stock	Curr.	Country	% of NAV	2010 B'berg mean PER	2011 B'berg mean PER	2012 B'berg mean PER	2013 B'berg mean PER	2014 B'berg mean PER	2015 B'berg mean PER	2016 B'berg mean PER	2017 B'berg mean PER	2018 B'berg mean PER	2019 B'berg mean PER
Integrated Oil & Gas													
Chevron	USD	US	3.83	13.2	9.2	10.0	11.1	12.8	33.9	88.8	29.7	15.3	18.1
Royal Dutch Shell PLC	EUR	NL	3.91	10.2	7.6	7.5	9.9	8.7	18.5	30.4	16.5	12.2	11.8
BP PLC	GBP	GB	4.14	6.5	6.5	8.1	10.0	11.9	20.9	40.0	23.9	12.4	13.6
Total SA	EUR	FR	3.77	10.8	9.6	9.2	10.3	10.4	13.4	15.8	14.8	11.1	10.5
ENI SpA	EUR	IT	4.03	8.4	8.0	7.8	12.5	14.6	68.2	nm	27.5	13.0	12.8
Equinor ASA	NOK	NO	4.08	9.5	8.3	7.4	9.0	12.6	30.8	156.2	16.3	10.9	11.9
OMV AG	EUR	AT	4.03	12.1	15.2	10.6	13.0	16.0	14.3	14.6	9.8	10.1	9.5
			27.80										
Integrated / Oil & Gas E&P - Canada													
Suncor Energy Inc	CAD	CA	3.87	27.3	12.1	13.5	13.6	13.5	38.5	nm	23.2	15.5	16.6
Canadian Natural Resources Ltd	CAD	CA	4.00	15.1	15.9	23.1	16.4	10.7	264.0	nm	31.3	13.1	16.1
Imperial Oil	CAD	CA	3.61	15.9	9.9	8.8	11.4	9.6	20.5	60.6	28.5	13.3	14.7
			11.49										
Integrated Oil & Gas - Emerging market													
PetroChina Co Ltd	HKD	HK	3.74	5.9	5.8	6.7	7.4	7.3	22.7	88.8	34.5	14.0	13.3
Gazprom OAO	USD	RU	3.57	4.2	2.8	3.0	2.7	4.6	2.8	4.0	4.5	2.6	2.9
			7.31										
Oil & Gas E&P													
Occidental Petroleum Corp	USD	US	3.74	11.8	8.0	9.5	9.5	11.4	398.8	nm	73.7	13.4	19.4
ConocoPhillips	USD	US	3.55	11.3	7.9	11.7	11.9	12.6	nm	nm	107.1	15.0	18.6
Anadarko Petroleum Corp	USD	US	3.18	26.3	14.4	13.6	11.0	9.9	nm	nm	nm	18.3	25.5
Apache Corp	USD	US	3.26	3.7	2.9	3.6	4.3	6.2	nm	nm	327.0	20.7	40.3
Devon Energy Corp	USD	US	3.52	5.3	5.2	9.8	7.4	6.1	12.8	nm	17.2	20.9	21.2
Noble Energy Inc	USD	US	3.27	11.9	9.4	10.8	8.0	10.6	433.9	nm	1545.6	25.6	196.3
EnCana Corp	USD	US	3.13	5.8	9.7	4.2	5.7	3.5	nm	301.5	13.1	8.1	7.8
Oasis Petroleum Inc	USD	US	1.60	36.0	7.3	4.1	2.2	2.5	7.6	nm	nm	21.4	21.0
			25.25										
International E&Ps													
CNOOC Ltd	HKD	HK	4.13	10.7	8.1	8.7	8.8	10.6	31.6	nm	18.3	10.3	10.7
Tullow Oil PLC	GBP	GB	1.99	23.6	5.4	4.8	36.3	nm	nm	nm	16.4	28.4	11.2
Soco International PLC	GBP	GB	0.50	7.3	4.7	1.3	1.4	2.1	nm	nm	nm	27.3	17.0
			6.63										
Midstream													
Enbridge Inc	USD	CA	3.89	46.9	42.3	39.0	35.9	32.9	29.8	27.6	33.4	24.3	25.7
			3.89										
Drilling													
Unit Corp	USD	US	1.35	4.7	3.5	3.4	3.9	3.3	nm	nm	26.8	14.3	13.7
			1.35										
Equipment & Services													
Halliburton Co	USD	US	3.42	14.6	8.8	9.9	9.5	7.4	19.8	nm	25.2	15.9	21.3
Helix Energy Solutions Group Inc	USD	US	1.63	15.0	5.3	4.3	7.4	4.1	46.8	nm	nm	36.0	30.5
Schlumberger Ltd	USD	US	3.71	15.8	12.0	10.4	9.2	7.9	13.0	37.7	29.8	26.8	27.5
			8.76										
Solar													
Sunpower Corp	USD	US	0.34	4.5	79.4	43.4	4.6	5.0	3.3	nm	nm	nm	nm
			0.34										
Oil & Gas Refining & Marketing													
Valero Energy Corp	USD	US	3.96	53.5	21.3	17.4	20.7	13.9	9.7	23.1	17.4	13.8	12.1
			3.96										
Research Portfolio													
Cluff Natural Resources PLC	GBP	GB	0.25	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
EnQuest PLC	GBP	GB	0.53	3.3	3.8	1.1	1.3	2.3	22.7	1.5	nm	5.0	3.7
JKX Oil & Gas PLC	GBP	GB	0.15	1.7	2.0	2.7	5.3	14.4	nm	nm	nm	36.1	24.0
Ophir Energy PLC	GBP	GB	0.04	nm	nm	nm	nm	2.3	nm	nm	nm	nm	26.7
Reabold Resources PLC	GBP	GB	0.22	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Shandong Molong Petroleum Machiner	HKD	HK	0.05	2.9	4.1	nm	nm	nm	nm	nm	nm	nm	nm
			1.24										
		Cash	1.98										
		Total	100										
		PER		9.9	7.8	7.6	8.1	8.6	20.6	37.9	22.1	12.5	13.3
		Med. PER		10.8	8.0	8.7	9.3	9.8	21.8	34.1	25.2	14.3	16.3

The Fund's portfolio may change significantly over a short period of time; no recommendation is made for the purchase or sale of any particular stock.

3) OUTLOOK

i) Oil market

The table below illustrates the difference between the growth in world oil demand and non-OPEC supply since 2015:

	2015	2016	2017	2018	2019E
				IEA	*IEA*
World Demand	***95.3***	***96.4***	***97.9***	***99.2***	***100.6***
Non-OPEC supply (inc NGLs)	*59.8*	*59.1*	*59.9*	*62.7*	*64.4*
OPEC NGLs	*5.2*	*5.4*	*5.5*	*5.5*	*5.6*
Non-OPEC supply plus OPEC NGLs	**65.0**	**64.5**	**65.4**	**68.2**	**70.0**
Call on OPEC (crude oil)	**30.3**	**31.9**	**32.5**	**31.0**	**30.6**
Congo supply adjustment	0.3	0.3	0.3	0.3	0.3
Gabon supply adjustment	0.2	0.2	0.2	0.2	0.2
Eq Guinea supply adjustment	0.1	0.1	0.1	0.1	0.1
Call on OPEC-11 (crude oil)	**29.7**	**31.3**	**31.9**	**30.4**	**30.0**

Source: 2006 - 2014: IEA oil market reports; 2015 - 19: April 2019 Oil market Report
OPEC-11 = Algeria; Angola; Ecuador; Iran; Iraq; Kuwait; Libya; Nigeria; Saudi Arabia; UAE; Venezuela

Global oil demand in 2018 was 12.2m b/day higher than the pre-financial crisis (2007) peak. This means the combined effect of the 2007/08 oil price spike and the 2008/09 recession was shrugged off remarkably quickly, thanks to growth in demand from emerging markets. The IEA forecast a further rise of 1.4m b/day in 2019, which would take oil demand to an all-time high of 100.6m b/day.

OPEC

The last five years have proved a testing time for OPEC. They have tried to keep prices strong enough that OPEC economies are not running excessive deficits, whilst not pushing the price too high and over-stimulating non-OPEC supply.

The effect of $100+ bbl oil, enjoyed for most of the 2011-2014 period, emerged in 2014 in the form of an acceleration in US shale oil production and an acceleration in the number of large non-OPEC (ex US onshore) projects reaching production. OPEC met in late 2014 and responded to rising non-OPEC supply with a significant change in strategy to one that prioritised market share over price. Post the November 2014 meeting, OPEC not only maintained their quota but also raised production significantly, up over 18 months by 2.5m b/day. This contributed to an oversupplied market in 2015 and 2016.

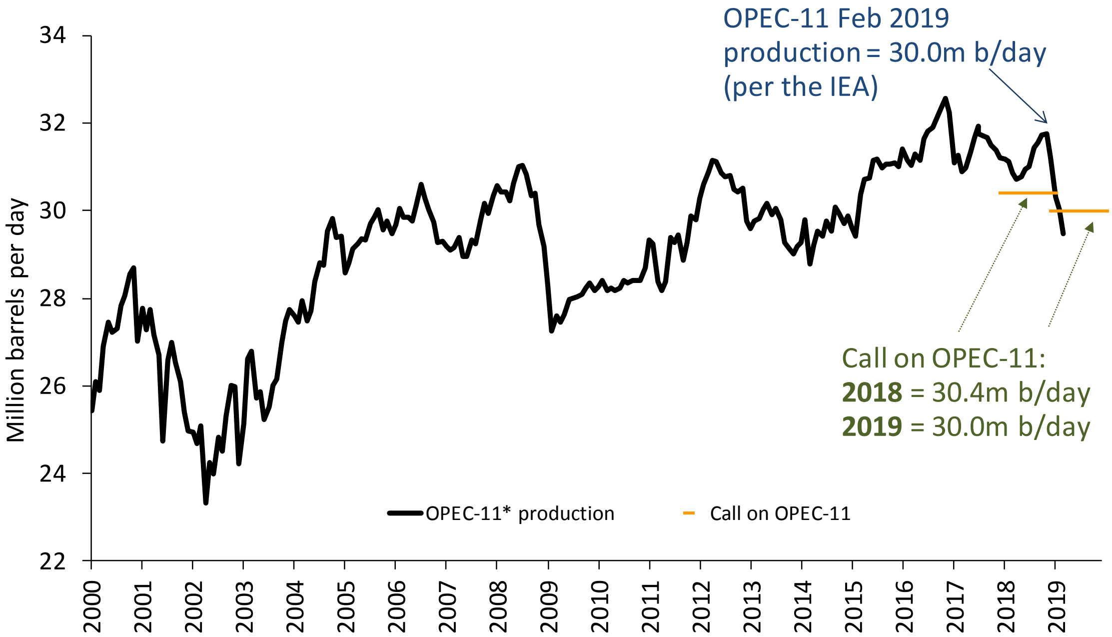
In November 2016, faced with sharply lower oil prices, OPEC stepped back from their market share stance, announcing plans for the first production cut since 2008, opting for a new production limit of 32.5m b/day. The announcement represented a cut of 1.2m b/day. There was also an understanding that non-OPEC, including Russia, would cut production by 0.6m b/day, taking the total reduction to 1.8m b/day. Compliance with the cuts was very strong and, after been delayed initially by a variety of temporary factors, inventories started to decline from mid 2017. Having originally been excluded from the cuts, Libya and Nigeria were subsequently included in the quota system.

('000 b/day)	30-Nov-14	31-Dec-16	30-Apr-19	Current vs Nov 2014 (OPEC hold mkt share)	Current vs Dec 2016 (OPEC cut production)
Saudi	9,650	10,480	**9,790**	140	-690
Iran	2,780	3,730	**2,630**	-150	-1,100
Iraq	3,370	4,630	**4,590**	1,220	-40
UAE	2,800	3,070	**3,070**	270	0
Kuwait	2,790	2,860	**2,720**	-70	-140
Nigeria	1,970	1,500	**1,900**	-70	400
Venezuela	2,350	2,080	**840**	-1,510	-1,240
Angola	1,640	1,670	**1,380**	-260	-290
Libya	580	630	**1,190**	610	560
Algeria	1,100	1,110	**1,020**	-80	-90
Ecuador	561	550	**520**	-41	-30
OPEC-11	**29,591**	**32,310**	**29,650**	**59**	**-2,660**

Source: Bloomberg; Guinness Asset Management

The last twelve months has continued to be a volatile time for OPEC. For the first half of 2018, a steep production decline from Venezuela and the promise of lower Iranian exports lead other OPEC members to raise supply, designed to prevent oil prices spiking too high. Towards the end of the year, it became apparent that OPEC had over-compensated and risked oversupplying the market in 2019. In December 2018, OPEC met in Vienna and, together with non-OPEC, announced a proposed cut of 1.2m b/day starting in January 2019 and lasting for an initial period of six months. It was proposed that OPEC (excluding Libya, Venezuela and Iran) cut total production by 0.8m b/day while non-OPEC (led predominantly by Russia) cut a total of 0.4m b/day. As of April 2019, it appears that OPEC is being compliant with its production quotas.

Figure 7: OPEC-12 apparent production vs call on OPEC 2000 – 2019



Source: IEA Oil Market Report (April 2019 and prior); Guinness estimates

OPEC's actions in recent years demonstrate a commitment to delivering a reasonable oil price to satisfy their own economies but also to incentivise investment in long term projects. Saudi's actions at the head of OPEC appear designed to achieve an oil price that to some extent closes their fiscal deficit ($70-75/bl is needed to close the gap fully), whilst not spiking the oil price too high and over-stimulating non-OPEC supply. Longer term, we believe that Saudi seek a 'good' oil price, in excess of current levels to balance their fiscal needs, but they realise that patience is required to achieve that goal.

Overall, we reiterate two important criteria for Saudi:

1. Saudi is interested in the average price of oil that they get, they have a longer investment horizon than most other market participants
2. Saudi wants to maintain a balance between global oil supply and demand to maintain a price that is acceptable to both producers and consumers

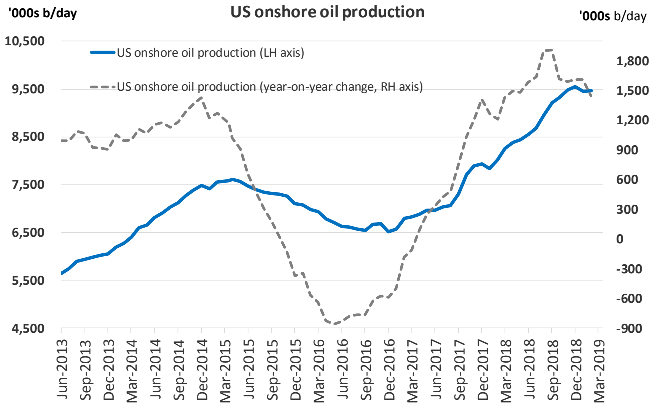
Nothing in the market in recent years has changed our view that OPEC can put a floor under the price – as they did in 2016, 2008, 2006, 2001, 1998 – and again in late 2018. Recent meetings and decisions indicate that OPEC have the resolve to continue in this manner.

Supply looking forward

The non-OPEC world has, since the 2008 financial crisis, grown its production more meaningfully than in the seven years before 2008. The growth was 0.9% p.a. from 2001-2008, increasing to 1.7% p.a. from 2008-2018.

Growth in the non-OPEC region since the start of the decade has been dominated by the successful development of shale oil and oil sands in North America (up around 7m b/day between since 2010), implying that the rest of non-OPEC region has barely grown over this period, despite the sustained high oil price until mid 2014.

The growth in US shale oil production, in particular from the Permian basin, raises the question of how much more there is to come and at what price. New oil production from these sources peaked in April 2015 at around 4m b/day, then declined by around 1.1m b/day, but is now well above the previous peak. Our assessment is that US shale oil is a capital intensive source of oil but one where real growth is viable, on average, at around $50 oil prices. In particular, there appears to be ample inventory in the Permian basin to allow growth well into the 2020s. In total, it could be comparable in size to the UK North Sea, i.e. it could grow by around a further 4m b/day over the next five years, but only if the price is sufficiently high to incentivise growth. The rate of development is heavily dependent on the cashflow available to producing companies, which tends to be recycled immediately into new wells, and the underlying cost of services to drill and fracture the wells. Naturally, cashflows available for reinvestment in a $50-60/bl world are far lower than in a $100/bl world, but with efficiency improvements, enough to see growth sustaining.



Offsetting US onshore shale oil growth, we expect to see non-OPEC supply outside the US to weaken, as the queue of large conventional project start-ups slows. Since 2014, the number of project start-ups in this region has been sustained at a high level, despite lower oil prices, since projects that were sanctioned before the 2014 (when oil was $100/bl+) have continued to come onstream. We believe 2019 marks a point, however, when the cancellation of projects that should have been sanctioned in 2015/16 starts to bite. A lack of supply response in the non-OPEC ex US region will increase the 'call' on US shale to balance the market.

Looking longer term, other opportunities to exploit unconventional oil likely exist internationally using techniques established in the US, notably in Argentina (Vaca Muerta), Russia (Bazhenov), China (Tarim and Sichuan) and Australia (Cooper). However, the US is far better understood geologically; the infrastructure in the US is already in place; service capacity in the US is high; and the interests of the landowner are aligned in the US with the E&P company. In most of the rest of the world, the reverse of each of these points is true, and as a result we see international shale being 10+ years behind North America.

Demand looking forward

The IEA estimate that 2019 oil demand growth will be 1.4m b/day, taking demand to nearly 101m b/day. Generally speaking, we have seen demand forecasts revised consistently higher since 2014, with the positive effect of lower oil prices continuing to surprise.

The IEA's global demand estimate for 2019 comprises an increase in non-OECD demand of 1.0m b/day and OECD demand growth of 0.4m b/day. The components of this non-OECD demand growth can be summarised as follows:

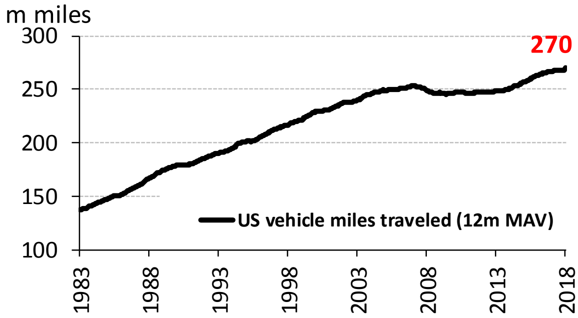
Figure 8: Non-OECD oil demand

m b/day	Demand								Growth						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018e**	**2019e**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018e**	**2019e**
Asia	21.4	22.1	22.8	24.1	25.0	26.0	26.9	27.7	0.7	0.7	1.3	0.9	1.0	0.9	0.8
Middle East	7.8	7.9	8.4	8.5	8.5	8.5	8.4	8.5	0.1	0.5	0.1	0.0	0.0	-0.1	0.1
Latin America	6.4	6.7	6.8	6.7	6.4	6.5	6.4	6.4	0.3	0.1	-0.1	-0.3	0.1	-0.1	0.0
FSU	4.6	4.7	4.66	4.6	4.5	4.5	4.7	4.8	0.1	0.0	-0.1	0.0	0.0	0.2	0.1
Africa	3.8	3.9	3.8	4.2	4.3	4.3	4.3	4.4	0.1	-0.1	0.4	0.1	0.0	0.0	0.1
Europe	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total	**44.7**	**46.0**	**47.2**	**48.7**	**49.5**	**50.5**	**51.4**	**52.5**	**1.3**	**1.2**	**1.6**	**0.7**	**1.1**	**1.0**	**1.0**

Source: IEA Oil Market Report (April 2019)

Asia has settled down into a steady pattern of growth since 2010, and accounts for much of expected growth in 2018. Historically, China has been the most important component of this growth and continues to be a major component, although signs are emerging that India will also grow rapidly.

OECD demand in 2019 is forecast to be up by 0.4m b/day. In the US, the sharp fall in gasoline prices since 2014 has stimulated a reversal in improving fuel efficiency, as drivers switch back to purchasing larger vehicles, and a rise in total vehicle miles travelled, as shown in the chart opposite. Total vehicle miles travelled had stalled between 2007 and 2014, after two decades of growth, and are now growing again at a rate of around 1-2% per year.



The trajectory of global oil demand over the next few years will be a function of global GDP, pace of the 'consumerisation' of developing economies, and price. At a $60/bl oil price, the world oil bill as a percentage of GDP is around 2.5% and this will still be a stimulant of multi-year demand growth. If oil prices move to a higher range (say around $75/bbl, representing 3%+ of GDP), we probably return to the pattern established over the past 5 years, with a flatter picture in the OECD more than offset by strong growth in the non-OECD area. Flatter OECD demand reflects improving oil efficiency over time, dampened by economic, population and vehicle growth. Within the non-OECD, population growth and rising oil use per capita will both play a significant part. Overall, we would not be surprised to see annual non-OECD demand growth of around 1.5m b/day by the end of the decade. This would represent a growth rate of 3% p.a., no greater than the growth rate over the last 15 years (3.2% p.a.).

We keep a close eye on developments in the 'new energy' vehicle fleet (electric vehicles; hybrids etc), but see nothing that makes a significant dent on the consumption of gasoline and diesel in the next few years. Sales of electric vehicles (pure electric and plug-in hybrid electrics) globally were around 1.8m in 2018, up from 1.2m in 2017. We expect to see EV sales accelerate in 2019 to around 2.5m, or 3% of total global sales. Even applying an aggressive growth rate to EV sales, we see EVs comprising only around 0.7% of the global car fleet in 2020. Looking further ahead, we expect the penetration of EVs to accelerate, causing global gasoline demand to peak at some point in the second half of the 2020s. However, owing to the weight of oil demand that comes from sources other than passenger vehicles (around 70%), which we expect to continue growing linked to GDP, we expect total oil demand not to peak until the mid 2030s.

Conclusions about oil

The table below summarises our view by showing our oil price forecasts for WTI and Brent in 2019 against their historic levels, and rises/falls in percentage terms that we have seen in the period from 2002 to 2018.

Figure 9: Average WTI & Brent yearly prices, and changes

Oil price (inflation adjusted)																			*Est*
12 month MAV	1986-2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
WTI	30	33	38	49	66	75	82	104	68	84	99	94	98	93	49	45	51	65	58
Brent	30	32	35	46	64	75	82	103	67	84	115	112	108	99	52	45	54	72	60
Brent/WTI (12m MAV)	**30**	**33**	**37**	**48**	**65**	**75**	**82**	**104**	**68**	**84**	**107**	**103**	**103**	**96**	**51**	**45**	**53**	**68**	**59**
Brent/WTI y-on-y change (%)		8%	12%	30%	37%	15%	9%	26%	-35%	24%	27%	-4%	0%	-7%	-47%	-11%	17%	30%	-14%
Brent/WTI (5yr MAV)	30	25	32	37	42	51	61	75	79	82	89	93	93	99	92	80	69	63	55

We expect oil to trade in a $60-75/bl range in the near term, supported at the lower end by OPEC. If this price range persists, we expect North American unconventional supply to sustain growth. We believe that the 'call' on unconventional supply, however, is likely to grow into the end of the decade, as conventional non-OPEC supply declines.

The world oil bill at around $70/bl represents 3.0% of 2018 Global GDP, 12% under the average of the 1970 – 2015 period (3.4%). A return to oil representing 3.4% of GDP implies an oil price of around $80/bl.

We believe that Saudi's long-term objective remains to maintain a 'good' oil price, something around $70/bl.

Natural gas market

US gas demand

On the demand side for the US, industrial gas demand and power generation gas demand, each about a quarter of total US gas demand, are key. Commercial and residential demand, which make up a further quarter, have been fairly constant on average over the last decade – although yearly fluctuations due to the coldness of winter weather can be marked.

Industrial demand (of which around 35% comes from petrochemicals) tends to trend up and down depending on the strength of the economy, the level of the US dollar and the differential between US and international gas prices. Electricity gas demand (i.e. power generation) is affected by weather, in particular warm summers which drive demand for air conditioning, but the underlying trend depends on GDP growth and the proportion of incremental new power generation each year that goes to natural gas versus the alternatives of coal, nuclear and renewables. Gas has been taking market share in this sector: in 2017, 33% of electricity generation was powered by gas, up from 22% in 2007. The big loser here is coal which has consistently given up market share over the past 10 years.

Bcf/day	2007	2008	*2009*	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019E
US natural gas demand:													
Residential/commercial	21.2	22.0	21.6	21.6	21.6	19.2	22.4	23.4	21.4	20.5	20.9	22.1	21.5
Power generation	18.7	18.2	18.8	20.2	20.8	24.9	22.3	22.3	26.5	27.3	25.3	28.5	28.5
Industrial	18.2	18.2	16.9	18.5	19.0	19.7	20.3	20.9	20.6	21.1	21.6	22.8	23.2
Pipeline exports (Canada & Mexico)	2.1	2.5	2.8	2.9	4.1	4.4	4.4	4.1	4.9	6.3	6.2	7.0	7.8
LNG exports	-	-	-	-	-	-	-	-	0.1	1.0	2.6	3.4	6.7
Pipeline/plant/other	5.2	5.3	5.5	5.6	5.8	6.1	6.7	6.3	6.5	6.4	6.5	6.8	6.8
Total demand	**65.4**	**66.2**	**65.6**	**68.8**	**71.3**	**74.3**	**76.1**	**77.0**	**80.0**	**82.6**	**83.1**	**90.6**	**94.5**
Demand growth	**4.0**	**0.8**	**- 0.6**	**3.2**	**2.5**	**3.0**	**1.8**	**0.9**	**3.0**	**2.6**	**0.5**	**7.5**	**3.9**

Source: EIA; Simmons; Guinness estimates

Total gas demand in 2018 (including Canadian, Mexican and LNG exports) is expected to be around 90.6 Bcf/day, up by 7.5 Bcf/day (9.0%) versus 2017 and 10.8 Bcf/day (13.5%) higher than the 5 year average. The biggest contributors to the growth in demand in 2018 will be power generation (hot summer and start-up of numerous gas plants increasing gas' share over coal), industrial demand (US GDP growth and petrochemical plant start-ups), and LNGS exports (opening of new export terminals).

We expect US demand in 2019, assuming prices remain around $3/mcf, to exhibit further strong growth of around 4 Bcf/day. Normalised weather would keep a cap on power generation demand, but there should be a surge in LNG exports (c.3 Bcf/day), as a wave of new export terminals come into service. The table below shows the scheduled start-up of terminals, with 4.3 Bcf/day of capacity coming in 2019.

Terminal	Location	2015	2016	2017	2018E	2019E	2020E
Cameron 1-2	LA					1.4	
Cameron 3	LA						0.7
Corpus Christi 1-2	TX					1.3	
Cove Point 1	MD				0.8		
Elba Island 1-6	GA				0.2		
Elba Island 7-10	GA					0.2	
Sabine Pass 1-2	LA						
Sabine Pass 3-4	LA	0.1	1.0	1.3			
Sabine Pass 5	LA					0.7	
Freeport 1	TX					0.7	
Freeport 2-3	TX						1.4
Incremental exports		**0.1**	**1.0**	**1.3**	**1.0**	**4.3**	**2.1**
Total US LNG exports		**0.1**	**1.1**	**2.4**	**3.4**	**7.7**	**9.8**

Source: EIA; Simmons

Looking further ahead, we also believe that gas will continue to take the majority of incremental power generation growth in the US and continue to take market share from coal. Coal fired power generation closures have been a feature as new pollution standards have come into force in an effort to reduce mercury and acid gases emissions, which likely accelerates the switch to gas. Our working assumption is for gas fired power generation to grow 0.8-1.2 Bcf/day per year, although this will be affected by actual gas prices.

US gas supply

Overall, whilst gas demand in the US has been strong over the past five years, it has been overshadowed by a rise in onshore supply, pulling the gas price lower.

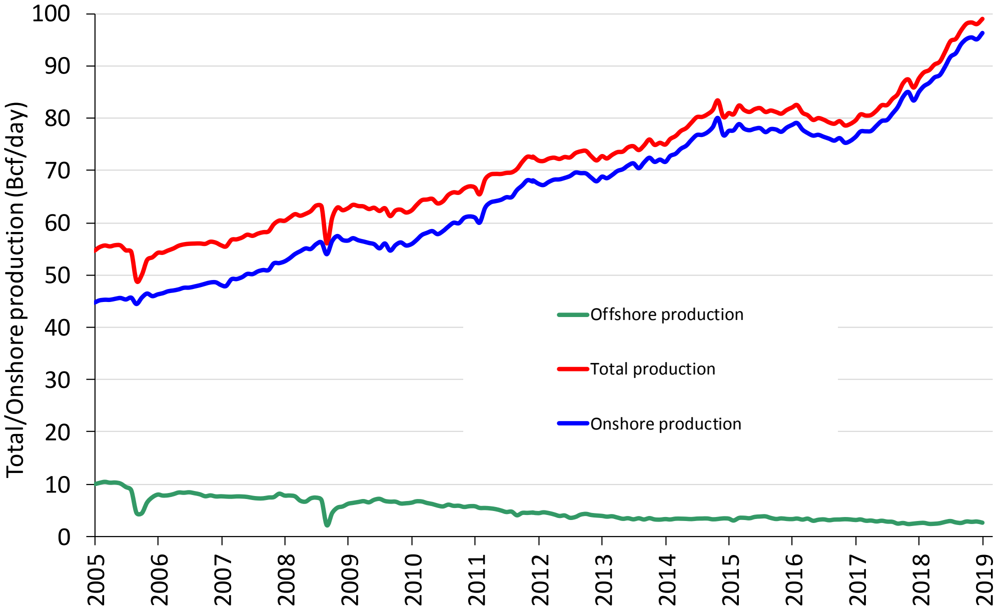
The supply side fundamentals for natural gas in the US are driven by 3 main moving parts: onshore and offshore domestic production, and pipeline imports of gas from Canada. Of these, onshore supply is the biggest component, making up over 85% of total supply.

Bcf/day	2007	2008	*2009*	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019E
US natural gas supply:													
US onshore	45.1	48.8	49.8	52.2	57.7	61.5	62.7	67.5	70.6	70.0	71.1	79.2	84.8
US offshore (Gulf of Mexico)	7.7	6.3	6.7	6.2	5.0	4.2	3.6	3.4	3.6	3.4	2.5	2.1	2.0
Pipeline imports (Canada)	10.4	9.8	9.0	9.0	8.5	8.0	7.5	7.1	7.1	8.0	8.0	8.0	8.0
LNG imports & other	2.3	1.2	1.4	1.4	1.0	0.8	0.6	0.5	0.5	0.4	0.3	0.3	0.3
Total supply	**65.5**	**66.1**	**66.9**	**68.8**	**72.2**	**74.5**	**74.4**	**78.5**	**81.8**	**81.8**	**81.9**	**89.6**	**95.1**
Supply growth	**3.2**	**0.6**	**0.8**	**1.9**	**3.4**	**2.3**	**- 0.1**	**4.1**	**3.3**	**-**	**0.1**	**7.7**	**5.5**
(Supply)/demand balance	**- 0.1**	**0.1**	**- 1.3**	**-**	**- 0.9**	**- 0.2**	**1.7**	**- 1.5**	**- 1.8**	**0.8**	**1.2**	**1.0**	**- 0.6**

Source: EIA; Simmons; Guinness estimates

Since the middle of 2008 the weaker gas price in the US reflects growing onshore US production driven by rising shale gas and associated gas production (a by-product of growing onshore US oil production). Interestingly, the overall rise in onshore production has come despite a collapse in the number of rigs drilling for gas, which has dropped from a 1,606 peak in September 2008 to only 81 in September 2016 and now 195 at the end of March 2019. However, offsetting the fall, the average productivity per rig has risen dramatically as producers focus their attention on the most prolific shale basins, whilst associated gas from oil production has grown handsomely. Onshore gas supply (gross, before processing) is now (Feb 2019) at 96.3 Bcf/day, 68% above the 57.4 Bcf/d peak in November 2008 before the rig count collapsed.

Figure 10: US natural gross gas production 2005 – 2018 (Lower 48 States)



Source: EIA 914 data (February 2019 published in April 2019)

The outlook for gas production in the US depends on three key factors: the rise of associated gas (gas produced from wells classified as oil wells); expansion of the newer shale basins, principally the Marcellus/Utica, and the decline profile of legacy gas fields.

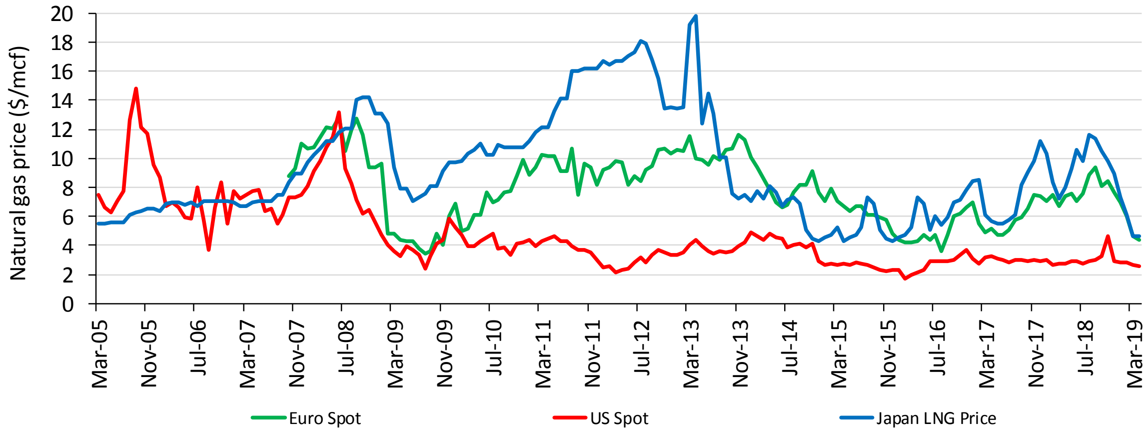
Associated gas production declined in 2016 with the fall of shale oil production, but as US oil supply now growing again, so associated gas production is also picking up. Generally, we expect to see rates of around 2-3 Bcf/day of associated gas per 1m b/day of oil production.

The Marcellus/Utica region, which includes the largest producing gas field in the US and the surrounding region, reached production of around 29 Bcf/day in 2018, with growth accelerating further in 2019 as infrastructure capacity expands. Further growth in region is likely over the next couple of years, supported by a small increase from legacy gas fields, which have reversed the decline seen for much of the earlier part of this decade.

Overall, if the price remains in the $2.50-$3.50/mcf range, we expect a significant jump in onshore gas supply in 2019, up by around 5 Bcf/day versus 2018.

Outlook for US LNG exports – global gas arbitrage

The prospects for US LNG exports depend on the differentials to European and Asian gas prices, and whether the economic incentive exists to carry out the trade. The UK national balancing point (NBP) gas price – which serves as a proxy to the European traded gas price – remains at a premium to the US gas price (c.$4.50/mcf versus c.$2.70/mcf). Asian spot LNG prices fell sharply down to around $4.50/mcf at the start of 2016 but have since averaged around $8/mcf (though currently below $5/mcf on seasonal weakness) as Chinese gas demand strengthens. The implied economics for US LNG exports into Europe and Asia are reasonably attractive assuming international prices are over $5/mcf.



Source: Bloomberg (May 2019)

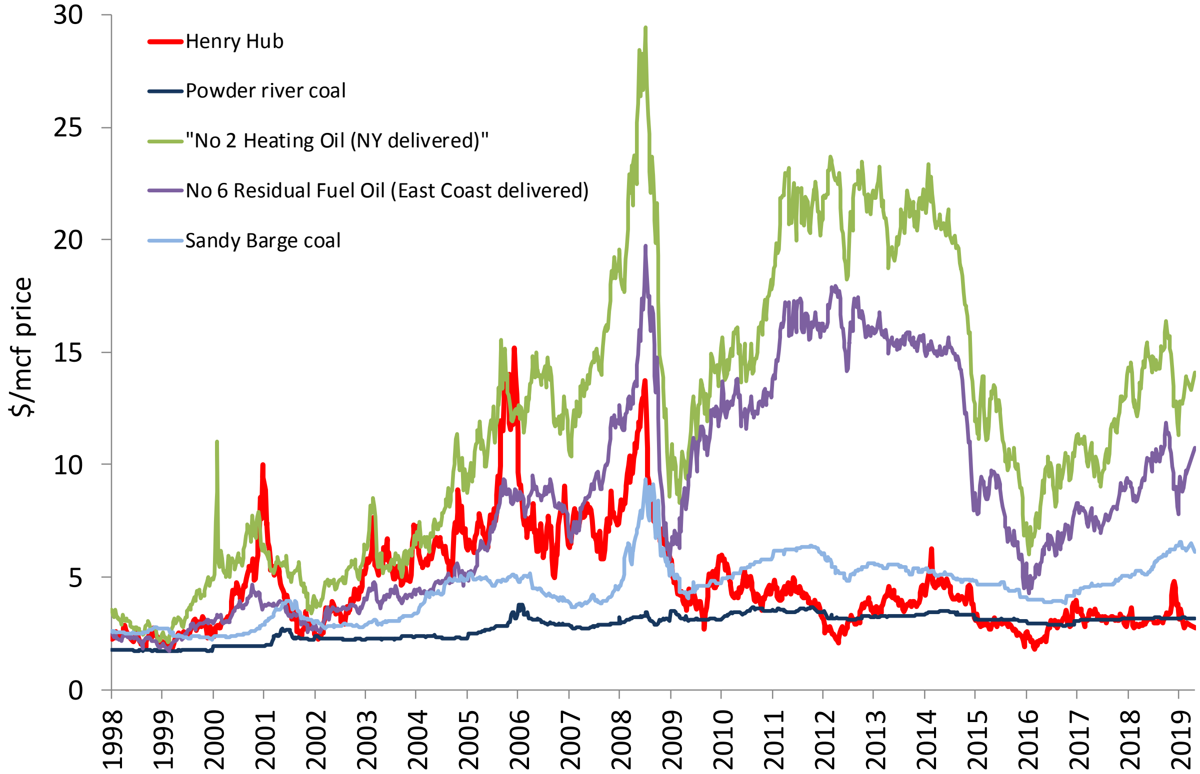
Relationship with oil and coal

The oil/gas price ratio ($ per bbl WTI/$ per mcf Henry Hub) of around 25x at the end of April 2019 sits well above the long-term ratio of c.10x.

The following chart of the front month US natural gas price against heating oil (No 2), residual fuel oil (No 6) and coal (Sandy Barge adjusted for transport and environmental costs) seeks to illustrate how coal and residual fuel oil switching provide a floor and heating oil a ceiling to the natural gas price. When the gas price has traded below the coal price support level (2012 and 2016), resulting coal to gas switching for power generation was significant.

Figure 11: Natural gas versus substitutes (fuel oil and coal)

Henry Hub vs residual fuel oil, heating oil, Sandy Barge (adjusted) and Powder River coal (adjusted)



Source: Bloomberg (May 2019)

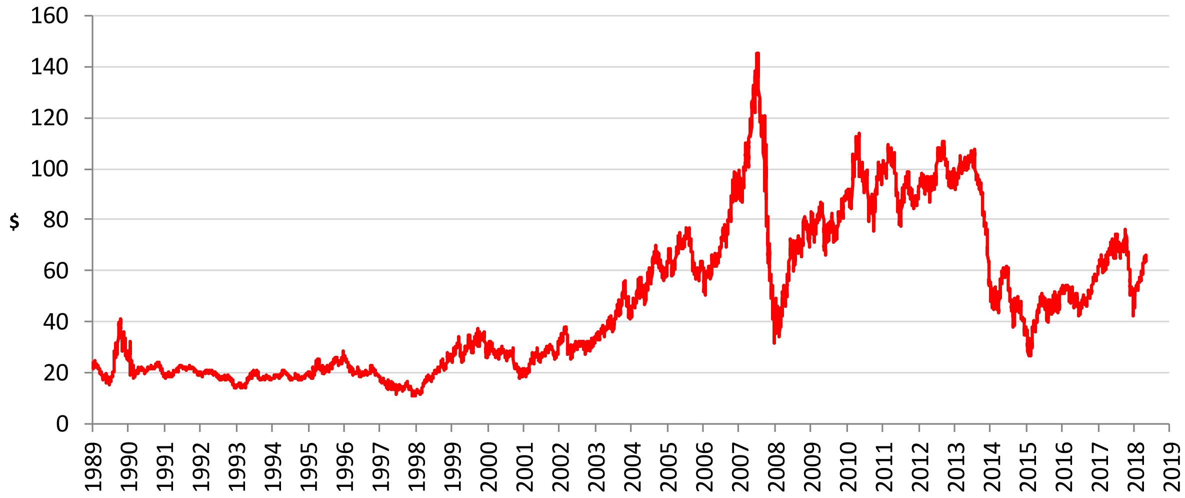
Conclusions about US natural gas

Bcf/day	2007	2008	*2009*	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019E
Total demand	65.4	66.2	65.6	68.8	71.3	74.3	76.1	77.0	80.0	82.6	83.1	90.6	94.5
Demand growth	4.0	0.8	- 0.6	3.2	2.5	3.0	1.8	0.9	3.0	2.6	0.5	7.5	3.9
Total supply	65.5	66.1	66.9	68.8	72.2	74.5	74.4	78.5	81.8	81.8	81.9	89.6	95.1
Supply growth	3.2	0.6	0.8	1.9	3.4	2.3	- 0.1	4.1	3.3	-	0.1	7.7	5.5
(Supply)/demand balance	- 0.1	0.1	- 1.3	-	- 0.9	- 0.2	1.7	- 1.5	- 1.8	0.8	1.2	1.0	- 0.6

The US natural gas price bottomed in 2012 and any recovery since then has been muted by continued strength in gas supply, particularly from the Marcellus/Utica and from gas produced as a by-product of shale oil. Average 2018 natural gas prices (at $3.07) were around 75% higher the April 2012 low, and we suspect that the (full cycle) marginal cost of supply is now around $3/mcf. However, the continued growth of associated gas (from shale oil) will probably pin the price closer to $2.50/mcf for the foreseeable future. Longer term we expect the price to normalise to nearer $3/mcf.

3. APPENDIX Oil and gas markets historical context

Figure 12: Oil price (WTI $) since 1989.



Source: Bloomberg LP

For the oil market, the period since the Iraq Kuwait war (1990/91) can be divided into two distinct periods: the first 9-year period was broadly characterized by decline. The oil price steadily weakened 1991 - 1993, rallied between 1994 –1996, and then sold off sharply, to test 20 year lows in late 1998. This latter decline was partly induced by a sharp contraction in demand growth from Asia, associated with the Asian crisis, partly by a rapid recovery in Iraq exports after the UN Oil for food deal, and partly by a perceived lack of discipline at OPEC in coping with these developments.

The last 13 years, by contrast, have seen a much stronger price and upward trend. There was a very strong rally between 1999 and 2000 as OPEC implemented 4m b/day of production cuts. It was followed by a period of weakness caused by the rollback of these cuts, coinciding with the world economic slowdown, which reduced demand growth and a recovery in Russian exports from depressed levels in the mid 90's that increased supply. OPEC responded rapidly to this during 2001 and reintroduced production cuts that stabilized the market relatively quickly by the end of 2001.

Then, in late 2002 early 2003, war in Iraq and a general strike in Venezuela caused the price to spike upward. This was quickly followed by a sharp sell-off due to the swift capture of Iraq's Southern oil fields by Allied Forces and expectation that they would win easily. Then higher prices were generated when the anticipated recovery in Iraq production was slow to materialise. This was in mid to end 2003 followed by a much more normal phase with positive factors (China demand; Venezuelan production difficulties; strong world economy) balanced against negative ones (Iraq back to 2.5 m b/day; 2Q seasonal demand weakness) with stock levels and speculative activity needing to be monitored closely. OPEC's management skills appeared likely to be the critical determinant in this environment.

By mid-2004 the market had become unsettled by the deteriorating security situation in Iraq and Saudi Arabia and increasingly impressed by the regular upgrades in IEA forecasts of near record world oil demand growth in 2004 caused by a triple demand shock from strong demand simultaneously from China; the developed world (esp. USA) and Asia ex China. Higher production by OPEC has been one response and there was for a period some worry that this, if not curbed, together with demand and supply responses to higher prices, would cause an oil price sell off. Offsetting this has been an opposite worry that non-OPEC production could be within a decade of peaking; a growing view that OPEC would defend $50 oil vigorously; upwards pressure on inventory levels from a move from JIT (just in time) to JIC (just in case); and pressure on futures markets from commodity fund investors.

After 2005 we saw a further strong run-up in the oil price. Hurricanes Katrina and Rita, which devastated New Orleans, caused oil to spike up to $70 in August 2005, and it spiked up again in July 2006 to $78 after a three week conflict between Israel and Lebanon threatened supply from the Middle East. OPEC implemented cuts in late 2006 and early 2007 of 1.7 million barrels per day to defend $50 oil and with non-OPEC supply growth at best anaemic demonstrated that it could to act a price-setter in the market at least so far as putting a floor under it.

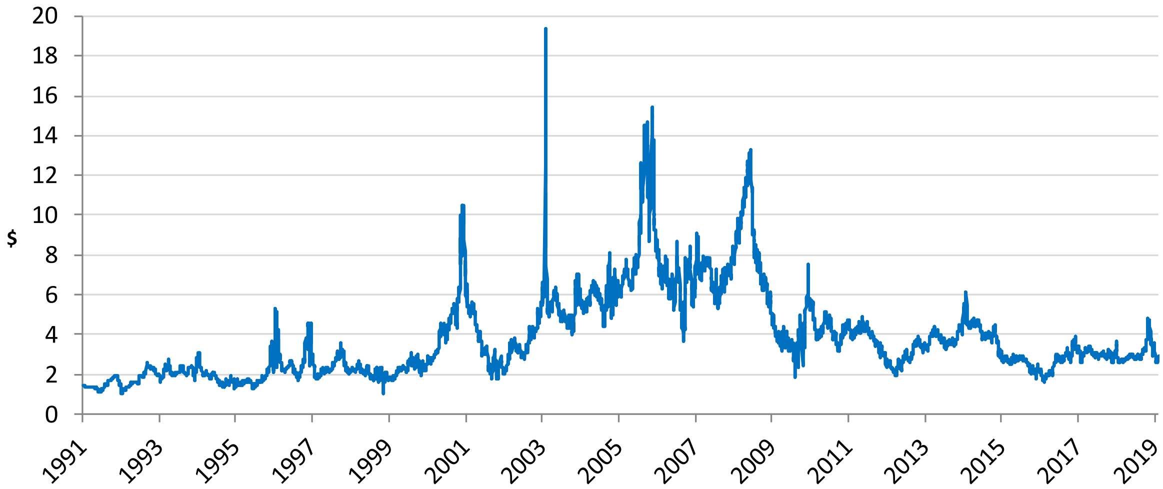
Continued expectations of a supply crunch by the end of the decade, coupled with increased speculative activity in oil markets, contributed to the oil price surging past $90 in the final months of 2007 and as high as $147 by the middle of 2008. This spike was brought to an abrupt end by the collapse of Lehman Brothers and the financial crisis and recession that followed, all of which contributed to the oil price falling back by early 2009 to just above $30. OPEC's responded decisively and reduced output, helping the price to recover in 2009 and stabilise in the $70-95 range where it remained for two years.

Prices during 2011-2014 moved higher, averaging around $100, though WTI generally traded lower than Brent oil benchmarks due to US domestic oversupply affecting WTI. During this period, US unconventional oil supply grew strongly, but was offset by the pressures of rising non-OECD demand and supply tensions in the Middle East/North Africa.

2014 marked the end of the oil cycle that started in the early 2000s. Ten years of high prices catalysed a wall of new non-OPEC supply, sufficient that OPEC saw no choice but to stop supporting price and re-set the investment cycle. Oil prices found a bottom in 2016 (as a result of OPEC cutting production again), but its recovery was capped by the volume of new supply still coming into the market from projects sanctioned pre the 2014 price crash.

Today, strong global demand growth, underinvestment in OPEC states outside the Arabian Gulf, and a slowdown in non-OPEC growth have combined to set up the new oil cycle, with prices in the $50-50/bl range once again.

Figure 13: North American gas price since 1991 (Henry Hub $/Mcf)



Source: Bloomberg LP

With regard to the US natural gas market, the price traded between $1.50 and $3/Mcf for the period 1991 - 1999. The 2000s were a more volatile period for the gas price, with several spikes over $8/mcf, but each lasting less than 12 months. On each occasion, the price spike induced a spurt of drilling which brought the price back down. Excepting these spikes, from 2004 to 2008, the price generally traded in the $5-8 range. Since 2008, the price has averaged below $4 as progress achieved in 2007-8 in developing shale plays boosted supply while the 2008-09 recession cut demand. Demand has been recovering since 2009 but this has been outpaced by continued growth in onshore production, driven by the prolific Marcellus/Utica field and associated gas as a by-product of shale oil production.

North American gas prices are important to many E&P companies. In the short-term, they do not necessarily move in line with the oil price, as the gas market is essentially a local one. (In theory 6 Mcf of gas is equivalent to 1 barrel of oil so $60 per barrel equals $10/Mcf gas). It remains a regional market more than a global market because the infrastructure to export LNG from North America is not yet in place.

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