

# THE GUINNESS GLOBAL ENERGY REPORT

Developments and trends for investors in the global energy sector

August 2021

## GUINNESS GLOBAL ENERGY FUND

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 co-managers Will Riley, Jonathan Waghorn and Tim Guinness, supported by Jamie Melrose (analyst). The investment philosophy, methodology and style which characterise the Guinness approach have been applied to the management of energy equity portfolios since 1998.

### 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.

## HIGHLIGHTS FOR JULY

### OIL

#### WTI/Brent volatile on demand concerns, but up overall

Brent and WTI oil prices were both up slightly in July, but dipped mid-month as concerns surfaced round the effect of the COVID Delta variant on oil demand. WTI closed the month at \$74/bl, whilst Brent rose \$75/bl. OPEC+ met in early July but failed initially to reach agreement. Outstanding issues were later resolved, with the OPEC+ group setting out a tapering of existing cuts from August 2021 to September 2022. They will, however, continue to micro-manage the market should further shocks occur.

### NATURAL GAS

#### US, European and Asian gas prices all strongly

A combination of rebounding economic activity, warmer US weather and low inventories in Europe and Asia have acted to create unusually tight gas markets. The European gas price (using UK NBP) and Japanese LNG prices both rose to over \$14.0/mcf; and the US spot price (Henry Hub) increased to \$4.0/mcf.

### EQUITIES

#### Energy underperforms the broad market in July

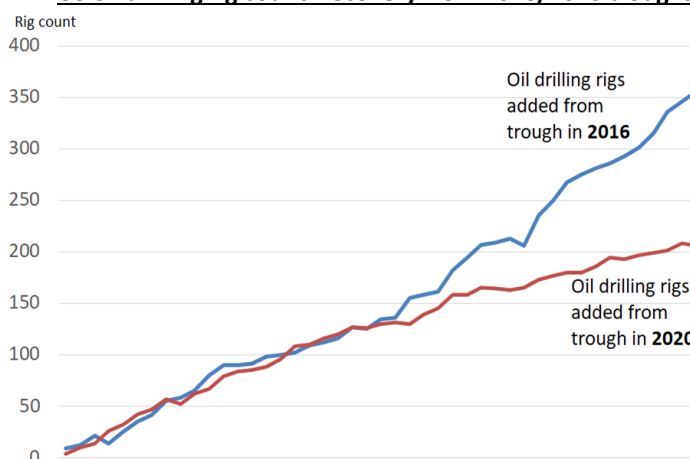
The MSCI World Energy Index (net return) fell by 6.2% in July, underperforming the MSCI World Index (net return) which rose by 1.8% over the month (all in US dollar terms).

## CHART OF THE MONTH

### US shale activity remains muted, despite high oil prices

The drilling rig count in the US is a barometer for the amount of production growth that is likely to come from the region. The rig count has grown by just over 200 rigs from the trough in late 2020, which compares to the addition of just over 350 rigs from the previous cycle trough in 2016. In other words, rigs are being added far more slowly this cycle, despite the attraction of a high spot oil price over \$70/bl. This can be viewed as a sign of the ongoing capital discipline in the US shale oil industry.

#### US oil drilling rig count: recovery from 2016/2020 troughs



Source: Bloomberg; Guinness Asset Management

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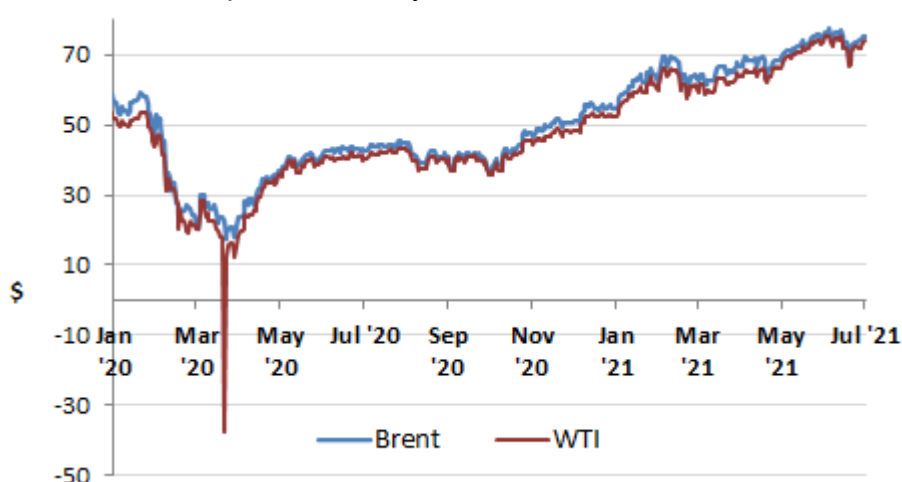
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**1. JULY IN REVIEW**

**i) Oil market**

*Oil price (WTI and Brent \$/barrel): Jan 2020 to July 2021*



Source: Bloomberg LP

The West Texas Intermediate (WTI) oil price started July at \$73.5/bl and drifted lower over the first half of the month, reaching \$66.4/bl on July 19. The price then recovered quickly and closed the month at \$74.0/bl. WTI has averaged \$63/bl so far in 2021, having averaged \$40/bl in 2020, \$58/bl in 2019 and \$65/bl in 2018.

Brent oil traded in a similar shape, opening at \$75.1/bl, dipping mid-month to \$68.6/bl and closing the month at \$75.4/bl. Brent has averaged \$66/bl so far in 2021, having averaged \$42/bl in 2020, \$64/bl in 2019 and \$72/bl in 2018. The gap between the WTI and Brent benchmark oil prices closed slightly over the month, ending July at around \$1.5/bl, versus \$3/bl on average in 2020.

**Factors which strengthened WTI and Brent oil prices in July:**

- OPEC: production discipline & resolution to impasse**

Initial estimates indicate that OPEC production increased by 0.4 m b/day in July. The production increase was primarily driven by Saudi due to the increasing OPEC production quota and the final tapering of its additional voluntary production cut. We note that OPEC cut compliance increased to a record high of 116% from 108% in June, with several countries struggling to increase their oil production in line with rising OPEC production quotas. We also saw OPEC resolve issues that had created an impasse following their 1 July meeting – please see our managers’ comments for further analysis.

- **Capital discipline from non-OPEC oil producers**

In spite of the sharp rise in spot oil prices so far this year, the supply response from non-OPEC countries (outside the OPEC+ group) continues to be muted. This includes the US shale industry, where the rise in rigs actively drilling for oil has been far shallower than in the previous upcycle of 2016. So far, since the trough in 2020 (44 weeks ago), just over 200 rigs have been added, versus over 350 over the same time period in the previous (2016) cycle.

**Factors which weakened WTI and Brent oil prices in July:**

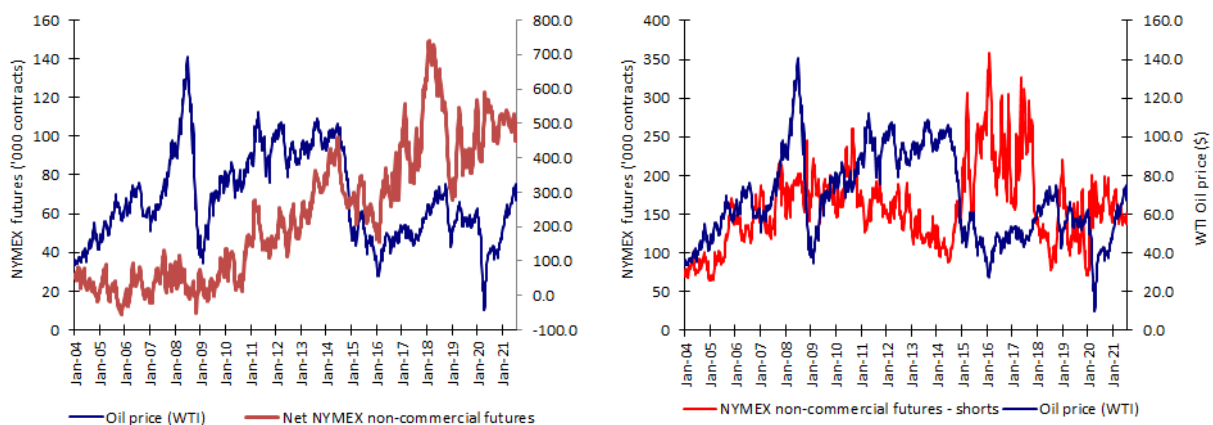
- **Concerns around the Delta variant of COVID**

Mobility data in Europe (e.g. France and Germany) softened in July as the spread of the Delta variant of COVID set back the recovery. This in turn is dampening the rebound in oil demand, but likely by less than 1m b/day, and judging by India’s snap back from their latest wave, should not last more than 2-3 months. We do, however, keep a close eye on China, where oil demand is already at new highs. Global oil demand is forecast to average 96.4m b/day in 2021, up by over 5m b/day versus 2020.

**Speculative and investment flows**

The New York Mercantile Exchange (NYMEX) net non-commercial crude oil futures open position was 450,000 contracts long at the end of July versus 523,000 contracts long at the end of June. 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 increased to 152,000 contracts at the end of July versus 142,000 at the end of the previous month.

**NYMEX Non-commercial net and short futures contracts: WTI January 2004 – July 2021**

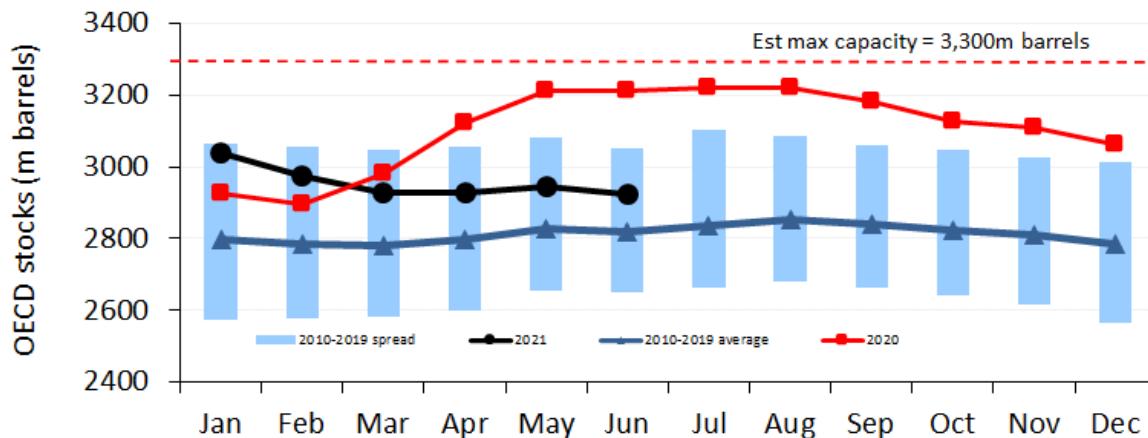


Source: Bloomberg LP/NYMEX/ICE (2021)

**OECD stocks**

OECD total product and crude inventories at the end of June (latest data point) were estimated by the IEA to be 2,923m barrels, down by 22 barrels versus the level reported for May. This compares to a 10-year average decrease for May of 8m barrels, implying that the OECD market was undersupplied. The significant oversupply situation in 2020 pushed OECD inventory levels close to maximum capacity in August (c3.3bn barrels), with a tightening thereafter.

**OECD total product and crude inventories, monthly, 2004 to 2021**



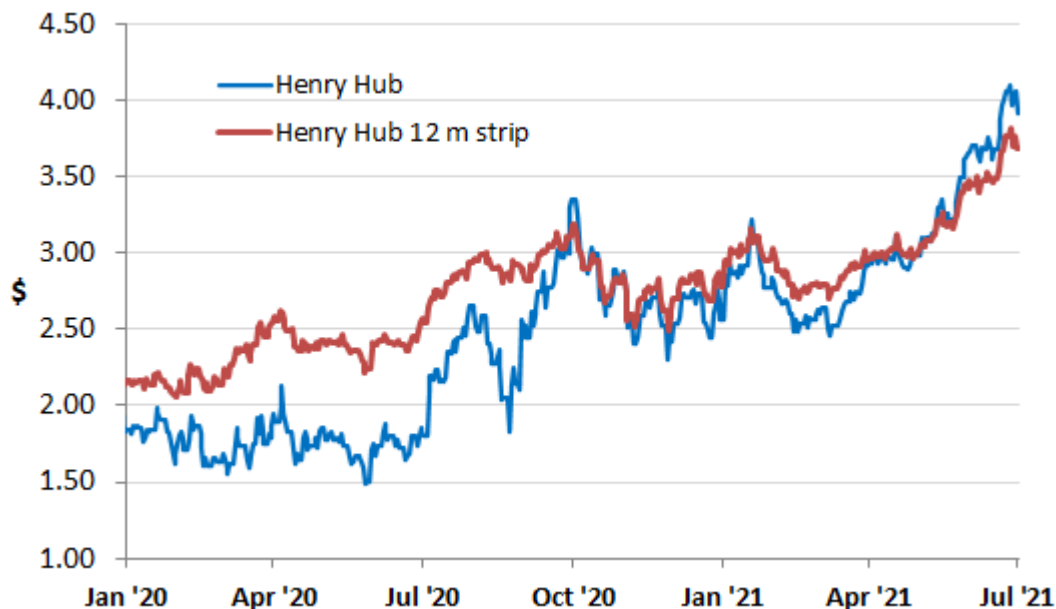
Source: IEA Oil Market Reports (July 2021 and older)

**ii) Natural gas market**

The US natural gas price (Henry Hub front month) opened July at \$3.66/mcf (1,000 cubic feet) and moved up strongly over the month, closing at \$3.91/mcf. The spot gas price has averaged \$2.98/mcf so far in 2021, having averaged \$2.13/mcf in 2020, \$2.53/mcf in 2019 and \$3.07 in 2018.

The 12-month gas strip price (a simple average of settlement prices for the next 12 months' futures prices) also rose over the month, opening at \$3.48/mcf and closing at \$3.68/mcf. The strip price averaged \$2.54 in 2020 having averaged \$2.60 in 2019 and \$2.90 in 2018.

**Henry Hub gas spot price and 12m strip (\$/Mcf) 18 months Dec 2019 to July 2021**



Source: Bloomberg LP

**Factors which strengthened the US gas price in July included:**

- **Market undersupplied**

Injections into US natural gas inventories during July were lower than expected for the time of year. Adjusting for the impact of weather, the builds implied that the US gas market was, on average, around 1-2 Bcf/day undersupplied.

**Lower than normal international gas inventories and stronger international demand**

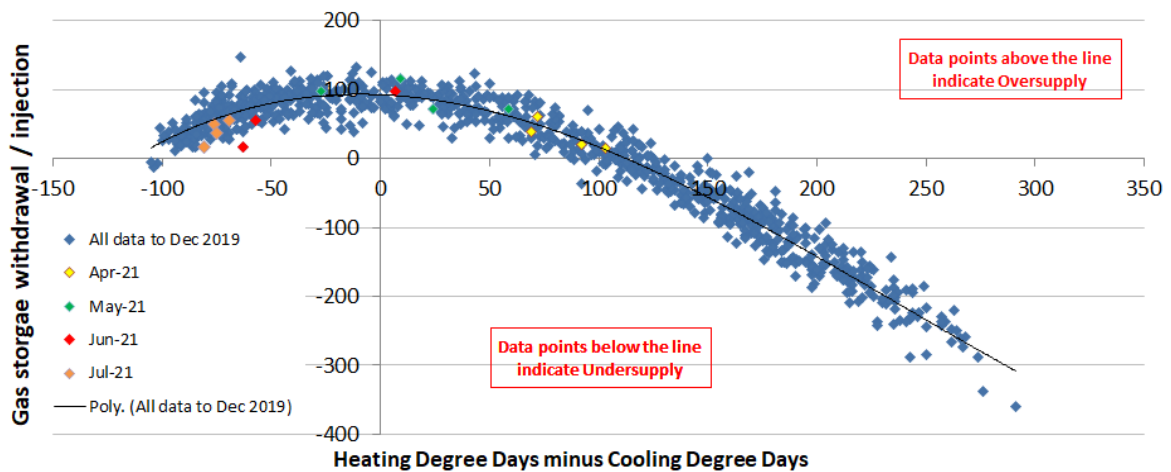
The outlook for international natural gas markets (Asia and Europe) in the remainder of summer 2021 continues to strengthen as European natural gas inventories are currently running 25% below the 5yr average (and around 50% below the 2020 levels), while Asian demand continues to rebound overall. In addition, exports of US natural gas to Mexico are surprisingly strong.

**Factors which weakened the US gas price in July included:**

**US onshore supply rising**

The latest US natural gas production data published by the EIA (for May) indicates that onshore supply of gas rose by 0.3 Bcf/day to 101.2 Bcf/day. This level of production is 0.7 Bcf/day higher than at the start of the year, but around 3 Bcf/day lower than peak production in Dec 2019. Despite the increase in supply so far in 2021, it has been more than outweighed by the rise in demand, coming from improving economic activity and rising LNG exports.

**Weather adjusted US natural gas inventory injections and withdrawals**

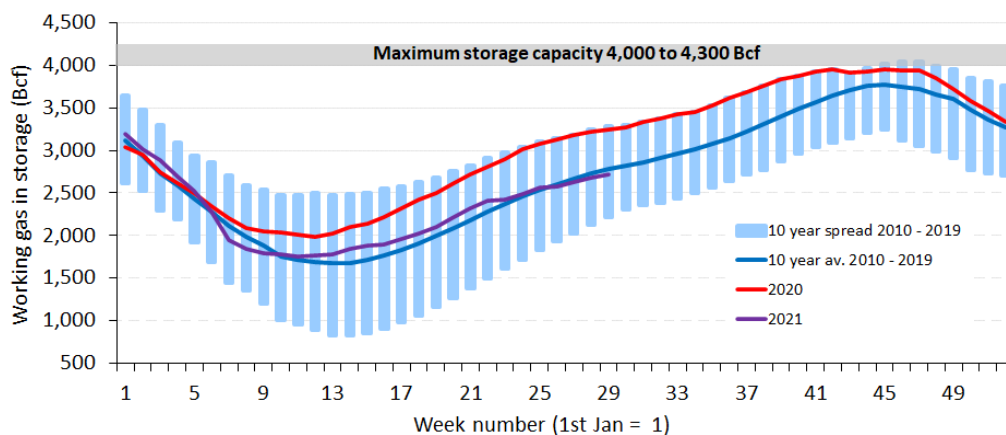


Source: Bloomberg LP; Guinness Asset Management

**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 July were reported by the EIA to be 2.7 Tcf. Current gas in storage is in line with the 10-year average.

**Deviation from 5yr gas storage norm**



Source: Bloomberg; EIA (August 2021)

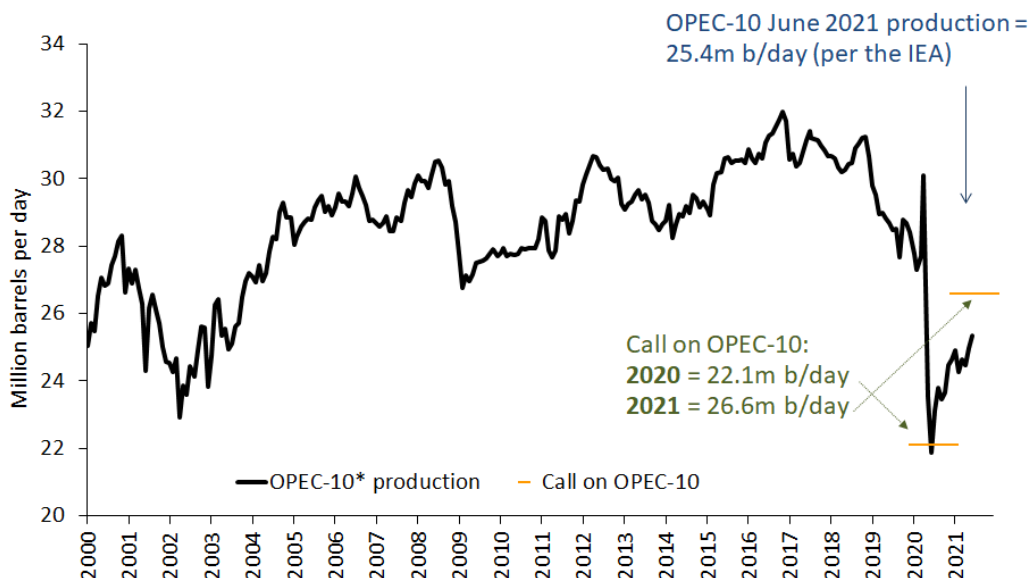
## 2. MANAGER'S COMMENTS

**We saw oil price volatility in July as concerns grew around an impasse within OPEC and the impact of the Delta variant of COVID on oil demand. Here, we provide thoughts on both topics.**

OPEC met formally on July 1, the backdrop to the meeting being an undersupplied oil market, meaning that the OPEC+ group needed to add supply to prevent the oil market becoming overheated. Estimates for June saw the market undersupplied by around 0.5m to 1.0m b/day, with the undersupply only likely to worsen without additional barrels from OPEC.

The July 1 OPEC meeting was expected to be straightforward, with agreement of around 2m b/day of OPEC+ supply to be brought back into the market over the following four or five months. However, the meeting broke up without conclusion, with disagreements around relative 'base' production members, especially from the UAE, being the main sticking point.

### OPEC-10 production vs call on OPEC 2000 – 2021



Source: IEA Oil Market Report (July 2021 and prior); Guinness estimates

For a period in July, then, the oil market found itself in limbo. On the one hand, a lack of agreement from OPEC around production increases was bullish for spot prices in the short term, since it would imply a tighter market than otherwise expected. Overall, however, we saw this initial lack of agreement as a negative, in that it raised the threat of a more significant blow up within the group, and a potential abandonment of existing production quotas. And it was for this reason that longer dated oil prices fell during the first half of July.

After two weeks of further negotiations, OPEC announced with the following agreements:

- **A monthly supply increase of 0.4m b/day** from OPEC+ from August 2021 until the current 5.8m b/day production cut is fully reversed by the end of September 2022.



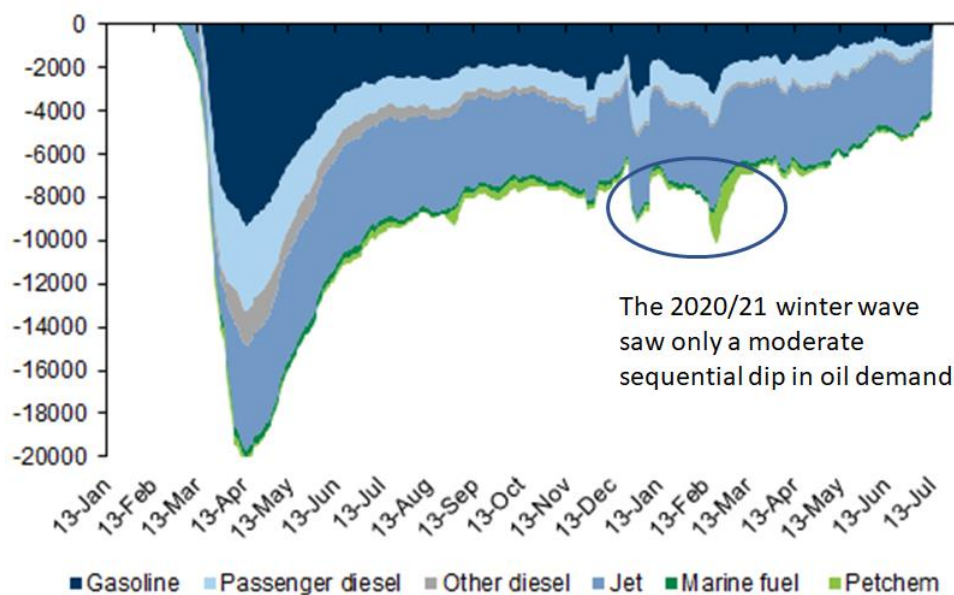
- **An increase to the ‘baseline’ production for various OPEC+ members, including UAE, Saudi and Russia.** This change has no impact on OPEC’s production level or the trajectory of agreed production increases, but is relevant for future quota negotiations.
- **Quota agreement extended from April 2022 to December 2022.** With the UAE granted an upward adjustment of its baseline production, which had been a stumbling block, there were no further obstacles to the extension of the OPEC+ supply agreement from April 2022 to December 2022. “OPEC+ is here to stay”, declared the Saudi Energy Minister after the meeting, adding that the OPEC+ spirit of cooperation would enable supply coordination beyond 2022 if required.

OPEC+ has now provided the market with longer-term production guidance and how it plans to fully reverse the production cuts that were introduced in the face of COVID in early 2020. However, it is important to be aware of the OPEC+ disclaimer of ongoing monthly meetings for ratifying each production increase. Even though OPEC+ now has provided the market with a longer-term guidance, it will continue to micro-manage the market and adjust production according to the market situation. OPEC+ continues to have little interest in pushing the oil market into an oversupply situation.

OPEC’s micro-management of the oil market will become more relevant again if the recovery in oil demand is challenged by the spread of the Delta variant of COVID. Given low vaccination rates, emerging market countries are likely to see the greatest new infection waves and returns of lockdowns.

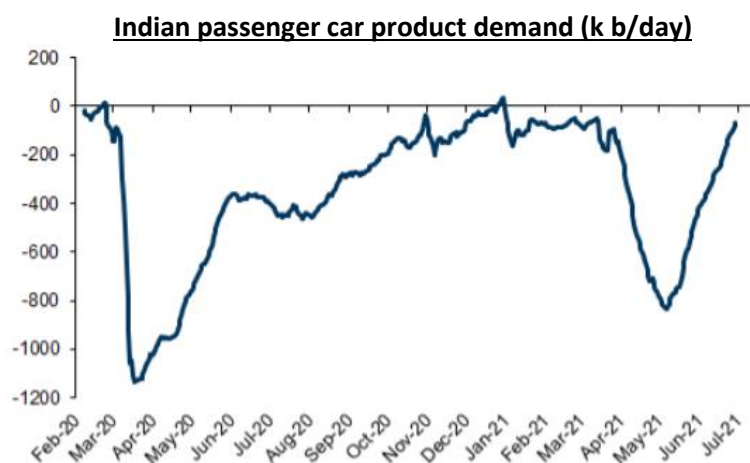
Looking back at the 2020 winter wave of COVID, which saw substantial case growth globally, we saw global oil demand dropping by around 1.5m b/day (seasonally adjusted), with Europe hardest hit. This was much smaller than feared at the time and c. 10-15% of the magnitude of the Spring 2020 shock (ex jet fuel).

#### Global oil demand relative to pre-COVID (k b/day)



Source: Goldman Sachs

Given the progress in vaccination rates, the expectation for developed markets this time is for a smaller sequential impact. Even with relatively low vaccination rates, India has seen mobility indices reaching normal levels again roughly three months after the onset of the Delta variant.



Source: Goldman Sachs

The situation in China, where oil demand is currently running at around 15m b/day, seems harder to call. At the time of writing, China has been cancelling flights and placing some restrictions on inter-city travel. Around 15% of the population is fully vaccinated, so well down on Europe and the US. Given that China's 'zero COVID' policy will be more difficult against the Delta variant, we do expect some pockets of disruption to oil demand, but again we expect the disruption to be reasonably short-lived.

For now, demand and inventory data continues to be very strong, and the oil market remains undersupplied to a greater degree than the IEA had been forecasting. Nevertheless, agreement within the OPEC+ group is timely, should the group have to adjust to further episodes of demand volatility.



### 3. PERFORMANCE Guinness Global Energy Fund

The main index of oil and gas equities, the MSCI World Energy Index (net return), fell by 6.2% in July, while the MSCI World Index (net return) rose by 1.8%. The Fund was down by 7.8% (class Y\*) in the month, underperforming the MSCI World Energy index by 1.6% (all in US dollar terms).

Within the Fund, July's strongest performers were Gazprom, Royal Dutch Shell, Enbridge, ENI and Chevron while the weakest performers were Helix, Suncor, Petrochina, Valero and Devon Energy.

\*Class Y formerly named the E class. OCF remains at 0.99%.

Performance (in USD) Past performance does not predict future returns														31/07/2021
<b>Cumulative</b>														
% returns	YTD	1 month	3 months	6 months	1 year	3 years	5 years	From Launch (31/03/08)						
Guinness Global Energy Fund (Class Y, 0.99% OCF)	23.9%	-7.8%	1.8%	19.7%	41.9%	-35.8%	-19.9%	-40.1%						
MSCI World Energy NR Index	24.1%	-6.2%	1.5%	20.6%	37.4%	-26.2%	-6.9%	-17.3%						
MSCI World Small Cap Energy Index	34.6%	-10.6%	2.8%	27.0%	71.2%	-41.7%	-31.9%	-63.1%						
50/50 Mix of World Energy and Small Cap Index	29.4%	-8.4%	2.2%	23.8%	54.3%	-34.0%	-19.4%	-40.2%						
<b>Calendar year</b>														
% returns	YTD	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008**
Guinness Global Energy Fund (Class Y, 0.99% OCF)	23.9%	-34.7%	9.8%	-19.7%	-1.3%	27.9%	-27.6%	-19.1%	24.4%	3.0%	-13.7%	15.3%	61.8%	-44.8%
MSCI World Energy NR Index	24.1%	-31.5%	11.4%	-15.8%	5.0%	26.6%	-22.8%	-11.6%	18.1%	1.9%	0.2%	11.9%	26.2%	-32.8%
MSCI World Small Cap Energy Index	34.6%	-30.5%	-2.3%	-31.3%	-12.0%	37.0%	-37.3%	-33.1%	16.4%	1.4%	-9.2%	34.8%	77.5%	-54.7%
50/50 Mix of World Energy and Small Cap Index	29.4%	-31.0%	4.6%	-23.6%	-3.5%	31.8%	-30.1%	-22.3%	17.3%	1.6%	-4.5%	23.3%	51.9%	-43.8%

Source: Guinness Asset Management and Bloomberg, 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 Y (0.99% OCF) thereafter. Performance would be lower if an initial charge and/or redemption fee were included. Returns for share classes with a different OCF will vary accordingly

#### TB Guinness Global Energy Fund

UK investors should be aware that the Guinness Global Energy Fund is now available as a UK domiciled fund denominated in GBP. The TB Guinness Global Energy Fund is available from 0.95% OCF. The historical performance of this fund will differ from the Guinness Global Energy Fund as the TB Guinness Global Energy fund has only been recently brought into line with the Guinness Global Energy Fund. The documentation needed to make an investment, including the Prospectus, the Key Investor Information Document (KIID) and the Application Form, is available from the website [www.guinnessfunds.com](http://www.guinnessfunds.com)

Please contact [info@guinnessfunds.com](mailto:info@guinnessfunds.com) or +44 (0) 20 7222 5703 for more details

**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](http://www.guinnessfunds.com).**

## 4. PORTFOLIO Guinness Global Energy Fund

### Buys/Sells

There were no buys and sells during the month, but the portfolio was actively rebalanced.

### Sector Breakdown

The following table shows the asset allocation of the Fund at **July 31 2021**.

Asset allocation as %NAV	Current	Change	Last year end		Previous year ends						
	Jul-21		Dec-20	Dec-19	Dec-18	Dec-17	Dec-16	Dec-15	Dec-14	Dec-13	Dec-12
<b>Oil &amp; Gas</b>	<b>96.7%</b>	<b>1.9%</b>	<b>94.8%</b>	<b>98.3%</b>	<b>96.7%</b>	<b>98.4%</b>	<b>96.7%</b>	<b>95.1%</b>	<b>93.7%</b>	<b>93.6%</b>	<b>98.6%</b>
Integrated	56.4%	0.1%	56.3%	51.1%	46.4%	42.9%	46.4%	41.5%	37.3%	38.4%	39.1%
Exploration & Production	24.1%	1.8%	22.2%	29.6%	35.8%	36.9%	35.8%	36.5%	36.2%	35.2%	41.6%
Drilling	0.0%	0.0%	0.0%	0.1%	2.2%	1.9%	2.2%	1.5%	3.3%	7.0%	7.4%
Equipment & Services	4.7%	0.1%	4.6%	9.6%	8.6%	9.5%	8.6%	11.4%	13.4%	9.8%	7.1%
Storage & Transportation	4.6%	0.2%	4.4%	4.0%	0.0%	3.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Refining & Marketing	6.9%	-0.3%	7.3%	3.8%	3.7%	3.7%	3.7%	4.2%	3.5%	3.1%	3.4%
Solar	1.4%	-0.4%	1.8%	0.7%	0.9%	1.4%	0.9%	4.7%	3.7%	2.6%	1.2%
Coal & Consumable Fuels	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Construction & Engineering	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.6%
Cash	1.9%	-1.4%	3.3%	1.1%	2.4%	0.2%	2.4%	0.2%	2.6%	2.6%	-0.4%

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

The Fund at end of July 2021 was on a price to earnings ratio (P/E) for 2021/2022 of 9.5x/8.4x versus the MSCI World Index at 20.2x/18.7x as set out in the following table:

As at 31 July 2021	P/E		
	2020	2021E	2022E
Guinness Global Energy Fund	54.7x	9.5x	8.4x
MSCI World Index	37.3x	20.2x	18.7x
<i>Fund Premium/(Discount)</i>	<i>47%</i>	<i>-53%</i>	<i>-55%</i>

Source: Bloomberg; Guinness Asset Management Ltd

### Portfolio holdings

Our integrated and similar stock exposure (c.56%) is comprised of a mix of mid cap, mid/large cap and large cap stocks. Our five large caps are Chevron, BP, ExxonMobil, Royal Dutch Shell and Total. Mid/large and mid-caps are ENI, Equinor, GALP, Repsol and OMV. At May 31 2021 the median P/E ratio of this group was 8.6x 2021 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.24%) 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 (EOG, Pioneer and Devon), with one other name (ConocoPhillips) having a mix of US and international production. One of the key metrics behind a number of the E&P stocks held is low enterprise value / proven reserves.

We have exposure to five (pure) emerging market stocks in the main portfolio, though one is a half-position, and in total represent 13% of the portfolio. Two are classified as integrations (Gazprom and PetroChina), one as refining (Sinopec) and two as E&P companies (CNOOC and Pharos Energy). Gazprom is the Russian national oil and gas company which produces approximately a quarter of the European Union gas demand and trades on 3.9x 2021 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.

The portfolio contains one midstream holding, Enbridge, North America's largest pipeline company. With the growth of hydrocarbon demand 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 modest exposure to oil service stocks, which comprise around 5% of the portfolio. The stocks we own are mainly diversified internationally (Helix 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 June 30 2021 (for compliance reasons disclosed one month in arrears)

Guinness Global Energy Fund (30 June 2021)			P/E			EV/EBITDA			Price/Book		
Stock	ISIN	% of NAV	2020	2021E	2022E	2020	2021E	2022E	2020	2021E	2022E
<b>Integrated Oil &amp; Gas</b>											
Exxon Mobil Corp	US30231G1022	4.8%	n/a	16.5x	13.8x	16.7x	7.4x	6.7x	1.6x	1.6x	1.6x
Chevron Corp	US1667641005	4.2%	n/a	17.8x	15.3x	13.8x	6.9x	6.5x	1.5x	1.5x	1.5x
Royal Dutch Shell PLC	GB00B03MLX29	3.8%	32.2x	9.5x	8.0x	6.7x	4.2x	4.1x	1.0x	0.9x	0.8x
Total SA	FR0000120271	3.6%	31.4x	10.1x	9.3x	8.3x	4.8x	4.5x	1.1x	1.1x	1.1x
BP PLC	GB0007980591	4.2%	n/a	9.3x	8.4x	11.1x	4.6x	4.4x	1.2x	1.1x	1.1x
Equinor ASA	NO0010096985	3.8%	37.9x	9.9x	12.0x	4.6x	2.8x	3.0x	2.0x	1.8x	1.7x
ENI SpA	IT0003132476	3.4%	n/a	14.5x	10.7x	5.7x	3.8x	3.4x	0.9x	1.0x	0.9x
Repsol SA	ES0173516115	3.6%	49.4x	9.5x	7.9x	6.4x	4.5x	4.1x	0.7x	0.8x	0.7x
Galp Energia SGPS SA	PTGALOAM0009	2.8%	n/a	16.8x	12.6x	6.3x	4.5x	4.0x	2.1x	2.2x	2.1x
OMV AG	AT0000743059	4.2%	22.5x	8.3x	7.9x	8.7x	5.1x	5.0x	1.2x	1.0x	0.9x
		<b>38.5%</b>									
<b>Integrated / Oil &amp; Gas E&amp;P - Canada</b>											
Suncor Energy Inc	CA8672241079	4.2%	n/a	11.0x	9.6x	13.7x	5.0x	4.7x	1.3x	1.2x	1.1x
Canadian Natural Resources Ltd	CA1363851017	3.6%	n/a	10.2x	10.2x	12.8x	5.2x	5.2x	1.7x	1.5x	1.4x
Imperial Oil Ltd	CA4530384086	4.0%	n/a	11.2x	10.5x	34.6x	5.8x	5.8x	1.3x	1.2x	1.1x
		<b>11.8%</b>									
<b>Integrated Oil &amp; Gas - Emerging market</b>											
PetroChina Co Ltd	CNE1000003W8	3.9%	30.4x	8.1x	9.0x	5.1x	3.9x	4.0x	0.5x	0.5x	0.4x
Gazprom PJSC	US3682872078	4.1%	177.3x	3.5x	3.5x	6.6x	3.4x	3.3x	0.4x	0.2x	0.2x
		<b>8.1%</b>									
<b>Oil &amp; Gas E&amp;P</b>											
ConocoPhillips	US20825C1045	3.8%	n/a	16.2x	14.1x	17.6x	5.8x	5.6x	2.2x	1.8x	1.7x
EOG Resources Inc	US26875P1012	4.2%	76.1x	12.8x	11.9x	10.4x	5.5x	5.2x	2.4x	2.1x	1.9x
Pioneer Natural Resources Co	US7237871071	4.0%	104.0x	14.0x	9.7x	20.7x	7.4x	5.6x	2.3x	1.7x	1.5x
Devon Energy Corp	US25179M1036	4.7%	n/a	12.4x	9.2x	16.2x	5.6x	4.7x	3.5x	2.5x	1.4x
		<b>16.7%</b>									
<b>International E&amp;Ps</b>											
CNOOC Ltd	HK0883013259	2.3%	13.4x	5.4x	5.1x	3.8x	2.4x	2.2x	0.7x	0.7x	0.7x
Pharos Energy PLC	GB00B572ZV91	0.3%	n/a	n/a	11.8x	2.1x	1.9x	1.2x	n/a	n/a	n/a
		<b>2.6%</b>									
<b>Midstream</b>											
Enbridge Inc	CA29250N1050	4.3%	20.7x	18.4x	16.2x	12.8x	12.0x	11.0x	1.8x	1.7x	1.8x
		<b>4.3%</b>									
<b>Equipment &amp; Services</b>											
Schlumberger Ltd	AN8068571086	4.0%	49.8x	28.6x	19.8x	13.9x	12.5x	10.5x	3.7x	3.3x	3.0x
Helix Energy Solutions Group Inc	US42330P1075	1.0%	n/a	n/a	n/a	6.6x	10.3x	8.6x	0.5x	0.5x	0.5x
		<b>4.9%</b>									
<b>Oil &amp; Gas Refining &amp; Marketing</b>											
China Petroleum & Chemical Corp	CNE1000002Q2	2.9%	11.2x	6.4x	6.2x	5.6x	3.9x	3.7x	0.5x	0.5x	0.5x
Valero Energy Corp	US91913Y1001	4.2%	n/a	68.9x	13.2x	42.2x	11.2x	6.5x	1.9x	1.8x	1.7x
		<b>7.0%</b>									
<b>Research Portfolio</b>											
Deltic Energy PLC	GB00B65YKF01	0.3%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
EnQuest PLC	GB00B635TG28	0.6%	n/a	2.1x	1.6x	3.1x	1.8x	1.9x	2.0x	n/a	n/a
JKX Oil & Gas PLC	GB0004697420	0.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Reabold Resources PLC	GB00B95L0551	0.3%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sunpower Corp	US8676524064	1.4%	n/a	105.1x	49.8x	177.1x	43.4x	31.4x	417.4x	11.2x	9.1x
Maxeon Solar Technologies Ltd	SGXZ25336314	0.1%	n/a	n/a	n/a	n/a	n/a	44.3x	n/a	n/a	n/a
Diversified Energy Company	GB00BYX7JT74	0.5%	6.3x	10.1x	12.4x	6.5x	5.9x	6.3x	1.1x	1.0x	1.1x
		<b>3.3%</b>									
<b>Cash</b>											
Cash	Cash	2.8%									
<b>Portfolio</b>											
		<b>100.0%</b>	<b>61.0x</b>	<b>11.0x</b>	<b>9.7x</b>	<b>9.1x</b>	<b>5.1x</b>	<b>4.8x</b>	<b>1.2x</b>	<b>1.0x</b>	<b>1.0x</b>

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.

## 5. 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	2019	2020	2021E	2022E
							<i>IEA</i>	<i>IEA</i>
<b>World Demand</b>	<b>95.3</b>	<b>96.4</b>	<b>98.2</b>	<b>99.2</b>	<b>99.7</b>	<b>91.0</b>	<b>96.4</b>	<b>99.5</b>
Non-OPEC supply (inc NGLs)	60.3	59.8	60.8	63.6	65.6	63.1	63.9	65.7
OPEC NGLs	5.2	5.3	5.4	5.5	5.4	5.2	5.3	5.5
<b>Non-OPEC supply plus OPEC NGLs</b>	<b>65.5</b>	<b>65.1</b>	<b>66.2</b>	<b>69.1</b>	<b>71.0</b>	<b>68.3</b>	<b>69.2</b>	<b>71.2</b>
<b>Call on OPEC (crude oil)</b>	<b>29.8</b>	<b>31.3</b>	<b>32.0</b>	<b>30.1</b>	<b>28.7</b>	<b>22.7</b>	<b>27.2</b>	<b>28.3</b>
Congo supply adjustment	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Gabon supply adjustment	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Eq Guinea supply adjustment	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Call on OPEC-10 (crude oil)</b>	<b>29.2</b>	<b>30.7</b>	<b>31.4</b>	<b>29.5</b>	<b>28.1</b>	<b>22.1</b>	<b>26.6</b>	<b>27.7</b>

Source: Bloomberg; IEA; Guinness Asset Management

Global oil demand in 2019 was 13m 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 demand picture for 2020, down by nearly 9m b/day, was heavily clouded by the impact of the COVID-19 virus and efforts to mitigate its spread. The IEA's best estimate is that demand will recover this year by around 5.4m b/day, leaving overall consumption on a par with 2016 but still around 3m b/day below the 2019 peak.

**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.

**OPEC-10 oil production to 31 July 2021**

('000 b/day)	31-Dec-19	30-Jun-21	31-Jul-21	Current vs Dec 2019	Current vs last month
Saudi	9,730	8,950	9,430	-300	480
Iran	2,080	2,490	2,520	440	30
Iraq	4,610	3,940	3,970	-640	30
UAE	3,040	2,740	2,750	-290	10
Kuwait	2,710	2,380	2,410	-300	30
Nigeria	1,820	1,570	1,520	-300	-50
Venezuela	730	540	490	-240	-50
Angola	1,390	1,120	1,110	-280	-10
Libya	1,110	1,170	1,170	60	0
Algeria	1,010	900	910	-100	10
<b>OPEC-10</b>	<b>28,230</b>	<b>25,800</b>	<b>26,280</b>	<b>-1,950</b>	<b>480</b>

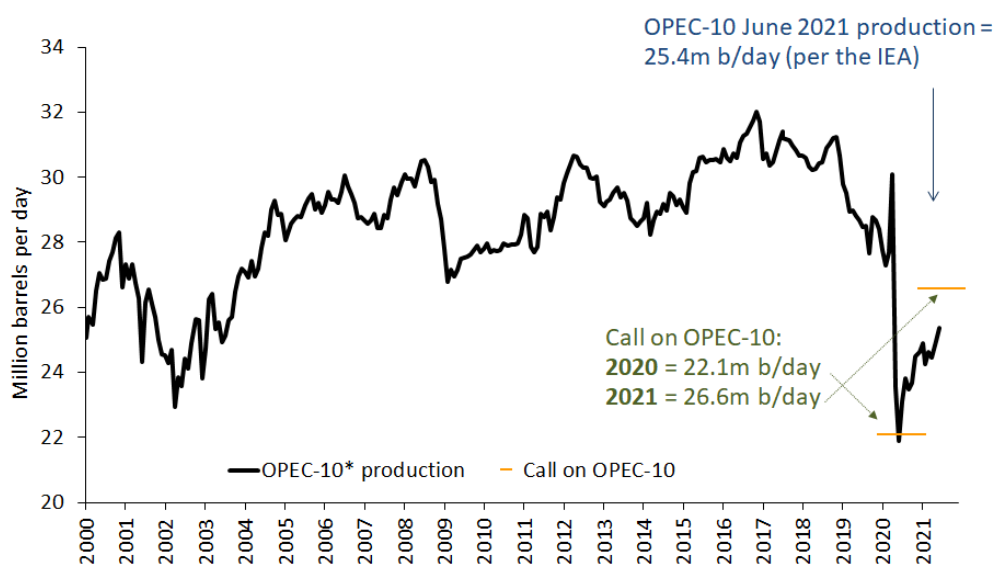
Source: Bloomberg; Guinness Asset Management

The 2017-19 period continued to see a volatile time for OPEC with further production cuts necessary to balance ongoing non-OPEC supply growth.

The challenge for OPEC then ballooned in 2020 with the onset of COVID around the world. Initially, OPEC and their non-OPEC partners failed to reach agreement around their response to demand from the spread of the virus, precipitating a fall-out between participants and a short-lived price war. In light of extreme oil market oversupply, OPEC and non-OPEC partners reconvened in April 2020 and confirmed a deal to cut their production by 9.7m b/day, relative to their 'baseline' production level of October 2018.

In July 2021, the OPEC+ group agreed to taper their quota cuts at 0.4m b/day until September 2022, whilst still meeting monthly to ratify each production increase in light of the prevailing conditions. The agreement gives us confidence that OPEC is looking to do 'what it takes' to keep the market in balance, despite extreme challenges in the shorter term.

**OPEC-10 apparent production vs call on OPEC 2000 – 2021**



Source: IEA Oil Market Report (July 2021 and prior); Guinness estimates

OPEC’s actions in recent years have generally demonstrated 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 have been designed to achieve an oil price that to some extent closes their fiscal deficit (c.\$70/bl is needed to close the gap fully), whilst not spiking the oil price too high and over-stimulating non-OPEC supply.

In the shorter term, the COVID-19 crisis has created particularly challenging conditions. Longer term, however, we believe that Saudi seek a ‘good’ oil price, well 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:

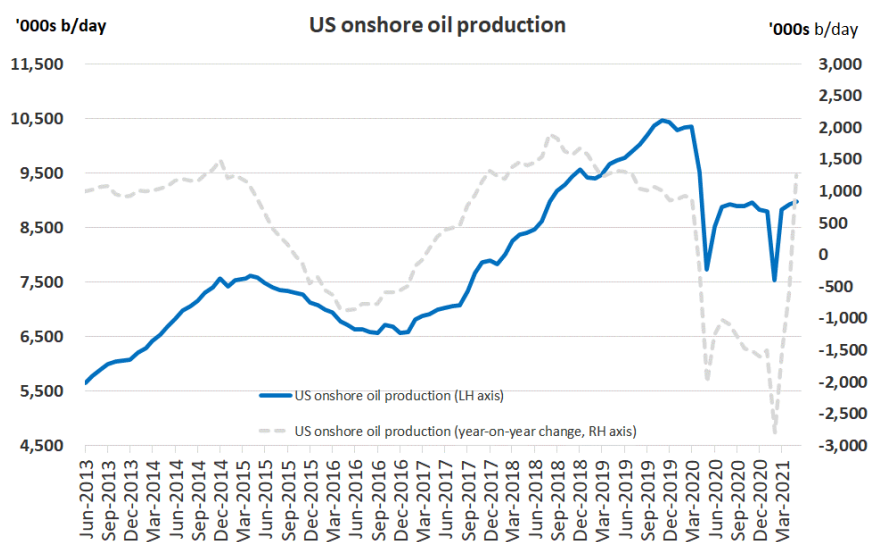
1. Saudi is interested in the average price of oil that they get, they have a longer investment horizon than most other market participants
2. Saudi wants to maintain a balance between global oil supply and demand to maintain a price that is acceptable to both producers and consumers

Nothing in the market in recent years has changed our view that OPEC can put a floor under the price – as they did in 2018, 2016, 2008, 2006, 2001 and 1998. Saudi’s desire for a \$60 oil price floor is not dimmed.

**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 1.8% p.a. from 2008-2019.

Growth in the non-OPEC region since the start of the last decade has been dominated by the 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.



Source: EIA; Guinness Asset Management

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. Our assessment is that US shale oil is a capital intensive source of oil but one where some 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. 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. During 2019 and 2020, we started to see increased pressure on US E&P companies to improve their capital discipline and to cut their reinvestment rates, and this is evidenced by higher costs of capital being charged to the US E&P companies.

The collapse in oil prices at the start of 2020 to a level well below \$50/bl changed the landscape, with US E&P companies significantly reducing capital spending as they attempt to live within their cashflows. Despite a recovering oil price since then, the overall reduction in activity will cause US shale supply to decline in 2021.

Non-OPEC supply growth outside the US has been sustained in recent years, despite lower oil prices, since projects that were sanctioned before 2014 (when oil was \$100/bl+) have continued to come onstream. However, the slowdown in investment post 2014 creates the likelihood that non-OPEC (ex-US) production will struggle to grow into the start of the 2020s. On a ten-year view, it is interesting to note that non-OPEC (ex-US) has essentially been flat (excluding the fall in early 2020 as a result of voluntary curtailments amid the COVID-19 demand shock), as new investment has simply offset the decline profiles of existing production.

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 as only being viable at high oil prices.

### **Demand looking forward**

The IEA estimate that 2022 oil demand will rise by around 3m b/day to 99.5m b/day, back close to the 2019 pre-COVID peak. The spread of the COVID virus globally caused major restrictions to the movement of people, which are now lifting.

After a sharp demand recovery in 2021 and 2022, we then expect the world to settle back into oil demand growth of plus or minus 1m b/day, led by increased use in Asia. 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.

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. Total vehicle miles travelled had stalled between 2007 and 2014, after two decades of growth, and are now growing again (ex COVID effects) at a rate of around 1% 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, the development of alternative fuels and price. At a \$50/bl oil price, the world oil bill as a percentage of GDP is around 2.0% and this will still be a stimulant of further 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.

We keep a close eye on developments in the 'new energy' vehicle fleet (electric vehicles; hybrids etc), but see little 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 3.1m in 2020, up from 2.3m in 2019. We expect to see strong EV sales growth again in 2021, up to around 4.4m, or 5% of total global sales. Even applying an aggressive growth rate to EV sales, we see EVs comprising only around 2% of the global car fleet by the end of 2022. Looking further ahead, we expect the penetration of EVs to accelerate, causing global gasoline demand to peak at some point in the middle 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 around 2030.

### Conclusions about oil

The table below summarises our view by showing our oil price forecasts for WTI and Brent in 2021 versus recent history.

#### 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	2020	2021
WTI	30	33	38	49	66	75	82	104	68	84	99	94	98	93	49	45	51	65	57	40	66
Brent	30	32	35	46	64	75	82	103	67	84	115	112	108	99	52	45	54	72	60	42	69
<b>Brent/WTI (12m MAV)</b>	<b>30</b>	<b>33</b>	<b>37</b>	<b>48</b>	<b>65</b>	<b>75</b>	<b>82</b>	<b>104</b>	<b>68</b>	<b>84</b>	<b>107</b>	<b>103</b>	<b>103</b>	<b>96</b>	<b>51</b>	<b>45</b>	<b>53</b>	<b>68</b>	<b>59</b>	<b>41</b>	<b>68</b>
<b>Brent/WTI y-on-y change (%)</b>		8%	12%	30%	37%	15%	9%	26%	-35%	24%	27%	-4%	0%	-7%	-47%	-11%	17%	30%	-14%	-30%	65%
Brent/WTI (5yr MAV)	30	25	32	37	42	51	61	75	79	82	89	93	93	99	92	80	69	63	55	53	58

Source: Guinness Asset Management, Bloomberg

We believe that Saudi’s long-term objective remains to maintain a ‘good’ oil price, something north of \$60/bl. The world oil bill at around \$60/bl represents 2.5% of 2021 Global GDP, 26% under the average of the 1970 – 2015 period (3.4%).

### Natural gas market

#### US gas demand

On the demand side for the US, industrial gas demand and power generation gas demand, each about 25-30% 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.

#### US natural gas demand

Bcf/day	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021E	2022E
<b>US natural gas demand:</b>											
Residential/commercial	19.2	22.4	23.4	21.4	20.5	20.9	23.4	23.5	21.3	22.2	22.0
Power generation	24.9	22.3	22.3	26.5	27.3	25.3	29.0	30.9	31.7	30.3	31.2
Industrial	19.7	20.3	20.9	20.6	21.1	21.6	23.0	23.0	22.6	23.0	23.6
Pipeline exports (Mexico)	1.8	1.9	1.9	2.7	3.8	4.0	4.6	5.1	5.4	6.1	6.4
LNG exports	-	-	-	0.1	1.0	2.6	3.4	5.7	7.3	10.3	10.9
Pipeline/plant/other	6.1	6.7	6.3	6.5	6.4	6.5	7.1	7.6	7.7	7.8	8.0
<b>Total demand</b>	<b>71.7</b>	<b>73.6</b>	<b>74.8</b>	<b>77.8</b>	<b>80.1</b>	<b>80.9</b>	<b>90.5</b>	<b>95.8</b>	<b>96.0</b>	<b>99.7</b>	<b>102.1</b>
<b>Demand growth</b>	<b>3.1</b>	<b>1.9</b>	<b>1.2</b>	<b>3.0</b>	<b>2.3</b>	<b>0.8</b>	<b>9.6</b>	<b>5.3</b>	<b>0.2</b>	<b>3.7</b>	<b>2.4</b>

Source: Guinness estimates; GS (July 2021)

Industrial demand (of which around 35% comes from petrochemicals) tends to trend up and down depending on the strength of the economy 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 2020, 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.

Total gas demand in 2020 (including Mexican and LNG exports) was around 96.5 Bcf/day, down by 0.6 Bcf/day versus 2019 but 11 Bcf/day (13%) higher than the 5 year average. The biggest contributors to the growth in demand in 2020 were power generation (numerous gas plants increasing gas' share over coal) and LNG exports (opening of new export terminals). Commercial demand for gas was lower, however.

We expect US demand in 2021, assuming prices remain around \$2.75/mcf, to be up by around 4 Bcf/day. The key change is a ramp up of LNG exports (+3 Bcf/day vs 2020, thanks to new terminals coming into full operation and arbitrage between US and European gas prices looking better).

Looking further ahead to 2025, we believe that gas will take a good share of incremental power generation growth in the US and continue to take market share from coal. 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. Beyond the mid-2020s, we expect power generation from gas to face stronger competition from renewables.

### 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, holding the gas price lower.

The supply side fundamentals for natural gas in the US are driven by three main moving parts: onshore and offshore domestic production, pipeline imports of gas from Canada and LNG imports. Of these, onshore supply is the biggest component, making up over 90% of total supply.

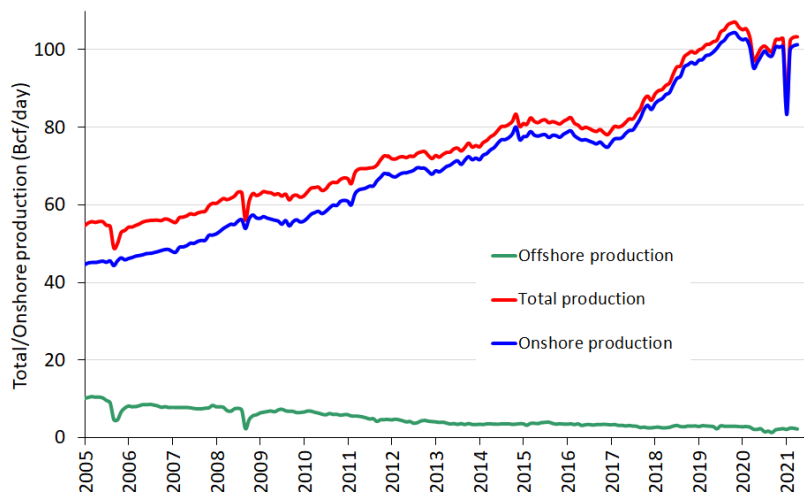
### US natural gas supply

Bcf/day	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021E	2022E
<b>US natural gas supply:</b>											
US (onshore & offshore)	65.7	66.3	70.9	74.2	73.4	73.6	84.0	92.3 <sup>▲</sup>	92.1 <sup>▲</sup>	93.0 <sup>▲</sup>	96.7 <sup>▲</sup>
Net imports (Canada)	5.4	5.0	4.9	4.9	5.5	5.8	5.4	4.7	4.4	5.3	5.3
LNG imports & other	0.8	0.6	0.5	0.5	0.4	0.3	0.1	0.1	-	-	0.1
<b>Total supply</b>	<b>71.9</b>	<b>71.9</b>	<b>76.3</b>	<b>79.6</b>	<b>79.3</b>	<b>79.7</b>	<b>89.5</b>	<b>97.1</b>	<b>96.5</b>	<b>98.3</b>	<b>102.1</b>
<b>Supply growth</b>	<b>2.4</b>	<b>-</b>	<b>4.4</b>	<b>3.3</b>	<b>- 0.3</b>	<b>0.4</b>	<b>9.8</b>	<b>7.6</b>	<b>- 0.6</b>	<b>1.8</b>	<b>3.8</b>
<b>(Supply)/demand balance</b>	<b>- 0.2</b>	<b>1.7</b>	<b>- 1.5</b>	<b>- 1.8</b>	<b>0.8</b>	<b>1.2</b>	<b>1.0</b>	<b>- 1.3</b>	<b>- 0.5</b>	<b>1.4</b>	<b>-</b>

Source: EIA; Simmons; Guinness estimates

Over the last 10 years, 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 92 at the end of June 2021. 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.

**US natural gross gas production 2005 – 2021 (Lower 48 States)**



Source: EIA 914 data (August 2021 data)

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 2020 with the fall of shale oil production, and with US oil supply now flattening, so associated gas production has also moderated. Generally, we expect to see rates of around 2-3 Bcf/day of associated gas per 1m b/day of oil production growth.

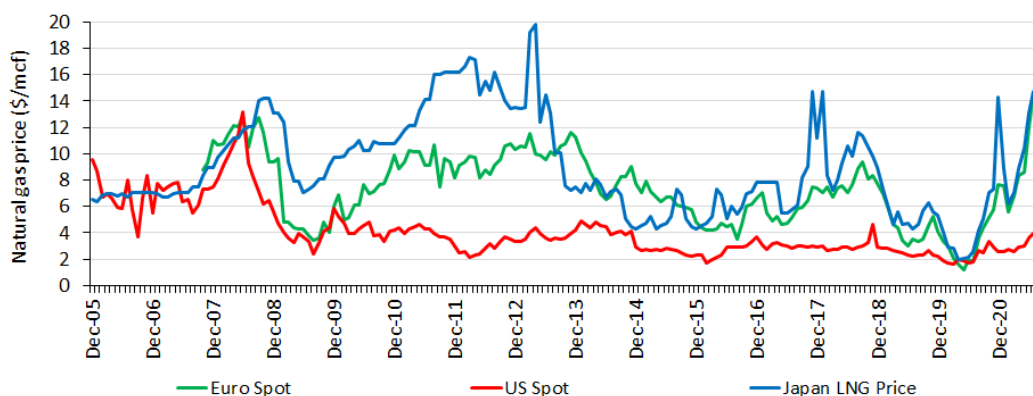
The Marcellus/Utica region, which includes the largest producing gas field in the US and the surrounding region, reached production of around 32 Bcf/day in 2020. Moderate growth is likely in 2021.

Overall, if the price remains in the \$2.50-\$4/mcf range, we expect a small rise in average onshore gas supply in 2021, up by around 1 Bcf/day versus 2020.

**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 – has moved to a significant premium to the US gas price (c.\$14/mcf versus c.\$4/mcf). Asian spot LNG prices have also been strong, averaging over \$9/mcf in 2021. The implied economics for US LNG exports into Europe and Asia are attractive assuming international prices are over \$5/mcf.

**International gas prices to July 2021**



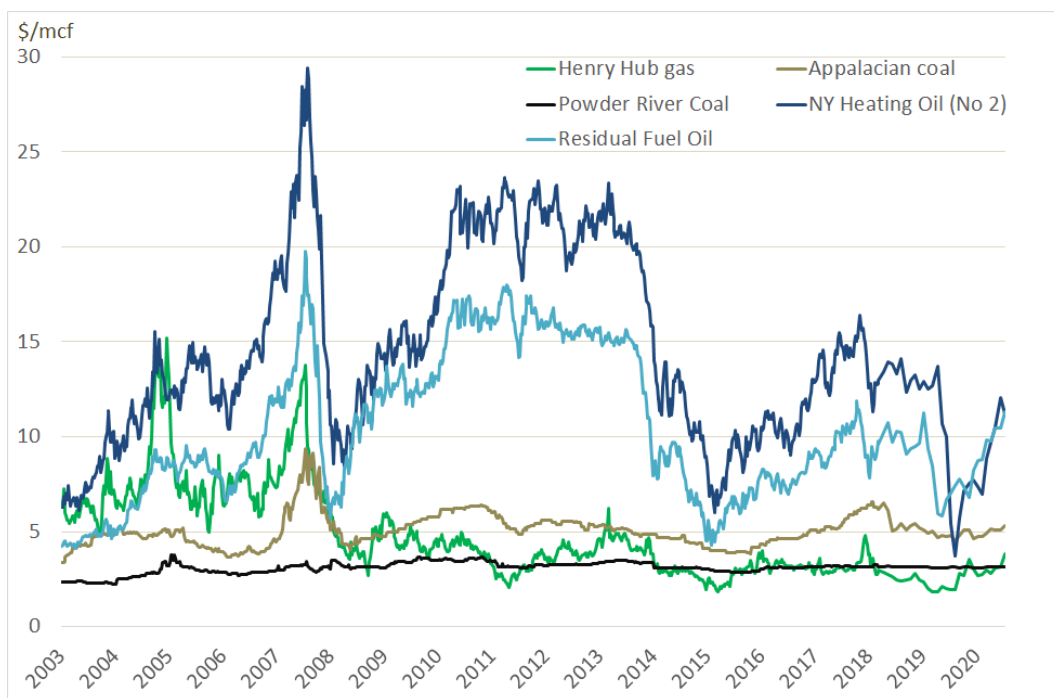
Source: Bloomberg (August 2021)

**Relationship with oil and coal**

The oil/gas price ratio (\$ per bbl WTI/\$ per mcf Henry Hub) of around 19x at the end of July 2021 sits 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.

**Natural gas versus substitutes (fuel oil and coal) - Henry Hub vs residual fuel oil, heating oil, Sandy Barge (adjusted) and Powder River coal (adjusted)**



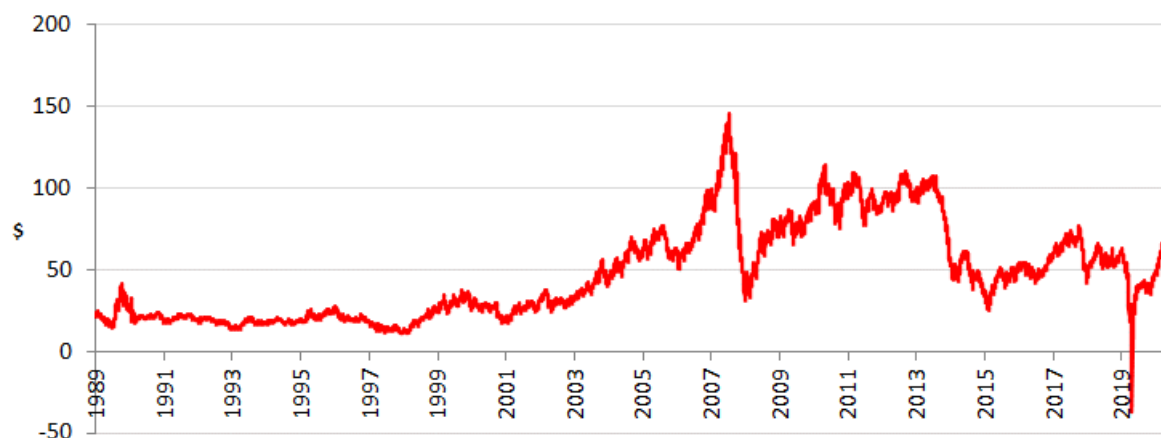
Source: Bloomberg; Guinness Asset Management (August 2021)

**Conclusions about US natural gas**

The US natural gas price was held back over the last decade by continued strength in gas supply, particularly from the Marcellus/Utica and from gas produced as a by-product of shale oil. Natural gas prices averaged \$2.13/mcf in 2020, but we suspect that the (full cycle) marginal cost of supply is now around \$3/mcf. A drop in associated gas supply over the next couple of years, thanks to lower oil prices, should allow gas prices to normalise closer to \$3/mcf, though demand in the short-term is clouded by COVID-19.

## 6. APPENDIX Oil and gas markets historical context

### 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 three distinct periods:

- 1) **1990-1998:** 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.
- 2) **1998-2014:** 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.

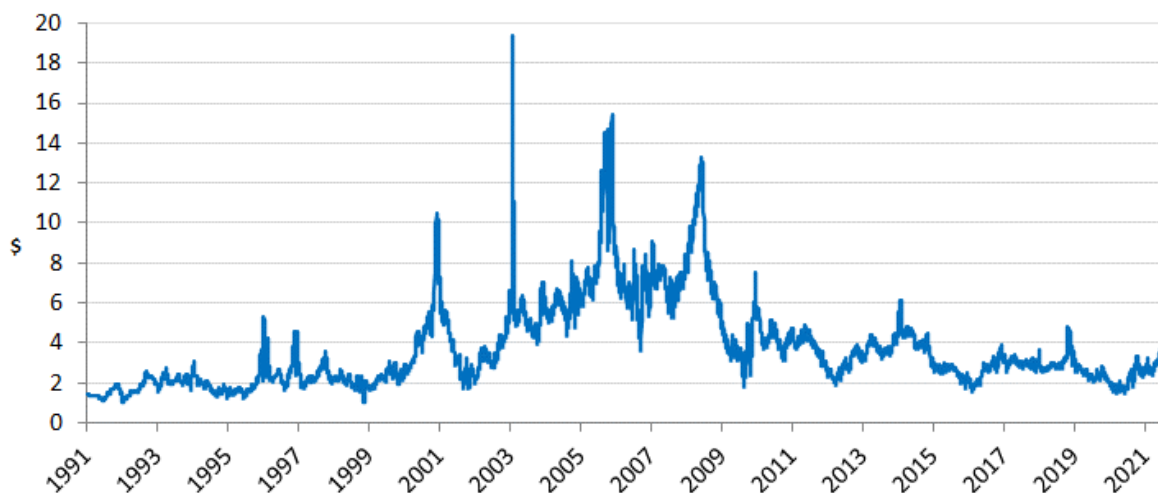
Continued expectations of a supply crunch by the end of the decade, coupled with increased speculative activity in oil markets, contributed to the oil price surging past \$90 in the final months of 2007 and as high as \$147 by the middle of 2008. This spike was brought to an abrupt end by the collapse 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.

- 3) **2014-2021:** a further downcycle in oil. Ten years of high prices leading up to 2014 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 and non-OPEC partners 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. Average prices were pinned 2017-19 in the \$50-70/bl range, with prices at the top end of this rang stimulating oversupply from US shale.

The alliance between OPEC and non-OPEC partners fell apart briefly in March 2020 and, coupled with an unprecedented collapse in demand owing to the COVID-19 crisis, oil prices dropped back below \$30/bl, before recovering to around \$50/bl by the end of 2020 thanks to renewed OPEC+ action.

**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, though the development of the LNG industry is creating a greater linkage.

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