

Developments and trends for investors in the global energy sector

This is a marketing communication. Please refer to the prospectus and KIID for the Fund before making any final investment decisions. Past performance does not predict future returns.

July 2022

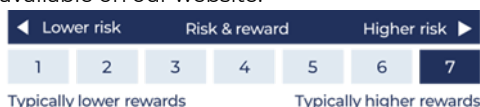
GUINNESS GLOBAL ENERGY FUND

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 actively managed and uses the MSCI World Energy Index as a comparator benchmark only.

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.

RISK

The Guinness Global Energy Fund is an equity fund. Investors should be willing and able to assume the risks of equity investing. The value of an investment and the income from it can fall as well as rise as a result of market and currency movement, and you may not get back the amount originally invested. The Fund invests only in companies involved in the energy sector; it is therefore susceptible to the performance of that one sector, and can be volatile. Details on the risk factors are included in the Fund's documentation, available on our website.



The risk and reward indicator shows where the fund ranks in terms of its potential risk and return. The fund is ranked as higher risk as its price has shown high fluctuations historically. This is based on how investments have performed in the past and you should note that the fund may perform differently in the future and its rank may change. Historic data may not be a reliable indicator for the future.

HIGHLIGHTS FOR JUNE

OIL

Brent/WTI fall as demand destruction concerns build

Brent and WTI oil prices fell in June. Brent closed June at \$115/bl, down by \$5/bl over the month, while WTI closed down \$9/bl at \$106/bl. Five-year forward prices slipped by \$1/bl, Brent closing at \$73/bl and WTI at \$67/bl. OECD inventories for oil and oil products remain close to the bottom of the ten-year range, but high prices and global GDP concerns have slowed demand growth. OPEC+ met at the end of June and resolved to stick to planned quota increases in July and August. In reality, spare capacity across the group is hard to come by.

NATURAL GAS

US gas price falls; European and Asian gas prices spike

The European and Asian gas prices (using UK NBP) closed June at \$20/\$34 /mcf, whilst the US spot price (Henry Hub) fell to \$8.4/mcf. Russian gas flows into Europe dropped, as Putin further 'weaponises' the commodity. US gas prices dropped as the Freeport LNG export facility went offline for three months, dampening demand.

EQUITIES

Energy underperforms the broad market in June

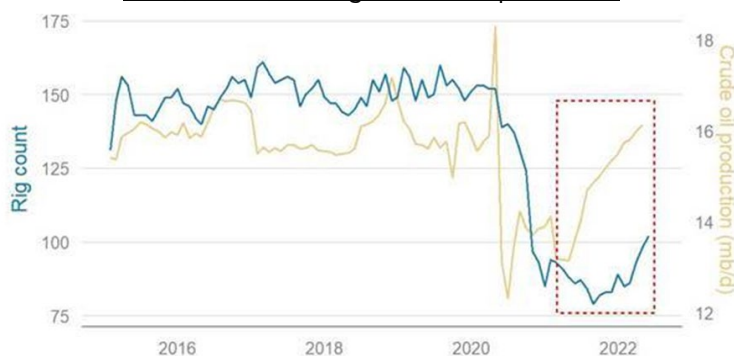
The MSCI World Energy Index (net return) fell by 15.0% in June, underperforming the MSCI World Index (net return) which fell by 8.7% over the month (all in US dollar terms).

CHART OF THE MONTH

OPEC struggles with spare capacity

Aggregate oil production from Saudi, Kuwait and UAE has returned to pre-COVID levels, as the core members of OPEC try to make up for shortfalls from other OPEC and OPEC+ members. However, the drilling rig count active in these three countries is barely off the 2021 floor. To maintain productive capacity, a certain level of drilling is required, which we think requires much more CAPEX than is currently being deployed.

Saudi/Kuwait/UAE: rig count vs oil production



Source: DNB

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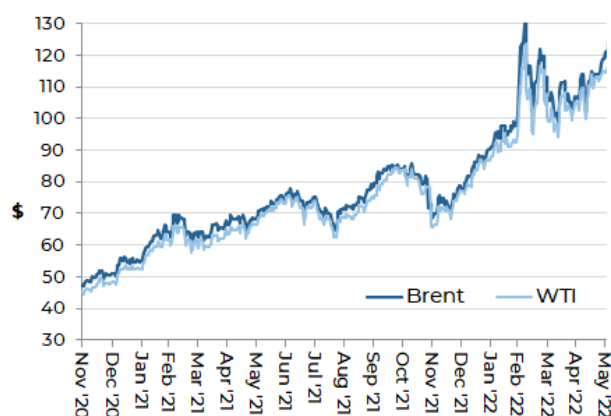
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1. JUNE IN REVIEW

i) Oil market

Oil price (WTI and Brent \$/barrel): Dec 2020 to June 2022



Source: Bloomberg; Guinness Global Investors

The West Texas Intermediate (WTI) oil price started June at \$115/bl, rose over the first week of the month to a peak on June 8 of \$122, before sliding and closing slightly lower at \$106/bl. WTI has averaged \$102/bl so far this year, having averaged \$68/bl in 2021, \$40/bl in 2020 and \$58/bl in 2019.

Brent oil traded in a similar shape, opening at \$120/bl, peaking at \$127/bl and closing the month at \$115/bl. Brent has averaged \$106/bl so far in 2022, having averaged \$70/bl in 2021, \$42/bl in 2020 and \$64/bl in 2019. The gap between the WTI and Brent benchmark oil prices widened over the month, ending June at just over \$9/bl. The Brent-WTI spread averaged \$2.4/bl in 2021.

Factors which strengthened WTI and Brent oil prices in June:

- **OPEC+ output struggling to grow**

In theory, OPEC+ production should have grown by 2.4m b/day so far this year, representing quota increases of 0.4m b/day per month. In reality, the group's production is about flat, with declines from Russia and anaemic growth from many OPEC members contributing to the result. At the start of June, OPEC+ resolved to accelerate its production quota increases within the existing framework. Instead of monthly increases of 0.4m b/day from July to September, OPEC+ are now targeting two increases of 0.6m b/day in July and August, then no increase in September. That Russia has been allocated an increased quota of 0.4m b/day, when its production is falling, highlights the 'optical' nature of the increases – a bullish indicator for oil prices.

- **IEA forecast strong global oil demand growth in 2023**

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In mid-June, the IEA published their first forecast for oil demand in 2023, pegging growth at 2.2m b/day, which would take demand to a new high of 101.6m b/day. This expectation is consistent with the IMF's current global GDP growth forecast for 2023 of 3.6%. Recessionary concerns may result in a lower outcome for 2023, but the IEA's oil forecast serves as a reminder of the upward pressures that still exist structurally for oil demand post-COVID.

- **OECD inventories close to bottom of 10-year range**

OECD total product and crude inventories at the end of May (latest data point) were estimated by the IEA to be 2,676m barrels, up by 6m barrels versus the level reported for April. The inventory level reported for May is around 5% below the 10-year average, and close to the bottom of the 10-year range. Low inventories were a key catalyst for the US and other IEA members in March to announce record releases from Strategic Petroleum Reserves.

Factors which weakened WTI and Brent oil prices in June:

- **High product prices contributing to demand destruction**

With Brent oil prices averaging around \$118 per barrel in June, the burden of high oil prices is impacting demand. A price of \$118 per barrel translates into the world paying around 5% of GDP for its oil, which is not extreme versus history. However, the impact on the end consumer is being amplified by high product prices (e.g. gasoline; diesel; jet fuel), which have risen faster than crude oil this year. With US gasoline prices in late June averaging close to \$5/gallon, President Biden announced a desire to pause federal gasoline taxes in an effort to shield consumers from increasing pump prices.

- **COVID surge in China**

The current surge of COVID in China has impacted forecasts for oil demand. The IEA are currently forecasting Chinese demand for 2022 to average 15.4m b/day, a drop of 0.1m b/day versus 2021. If this forecast proves accurate, it will be the first annual drop in China's consumption of oil this century. Against this, the IEA expect demand to surge in 2023 to 16.3m b/day, as the impacts of COVID are unwound.

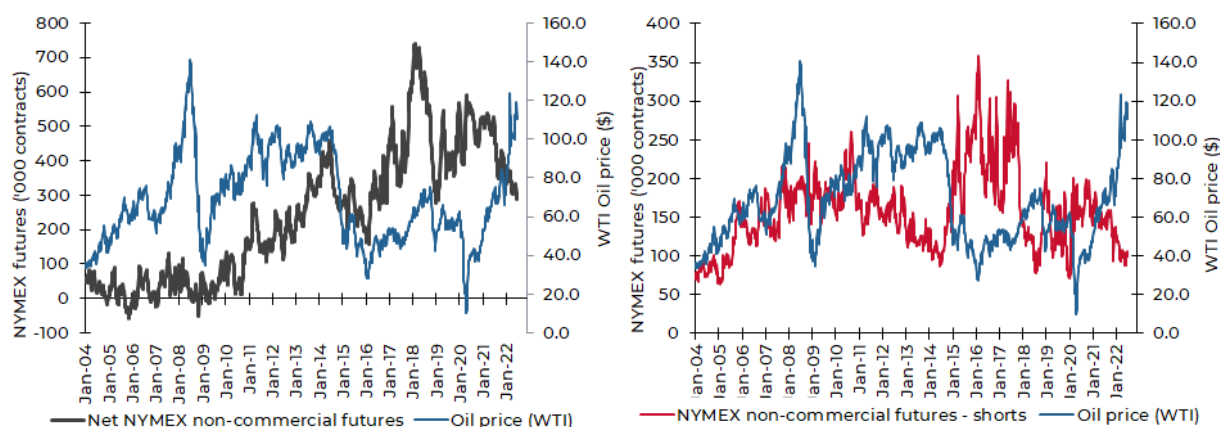
- **Fears of recession**

High inflation prints in June and greater-than-expected interest rate hikes from the US Federal Reserve led to greater concerns around global economic growth, and the fear that this would translate into lower demand for many commodities, including oil.

Speculative and investment flows

The New York Mercantile Exchange (NYMEX) net non-commercial crude oil futures open position was 333,000 contracts long at the end of May versus 316,000 contracts long at the end of April. 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 expanded slightly to 115,000 contracts at the end of May versus 102,000 at the end of the previous month.

NYMEX Non-commercial net and short futures contracts: WTI January 2004 – July 2022



Source: Bloomberg LP/NYMEX/ICE (2022)

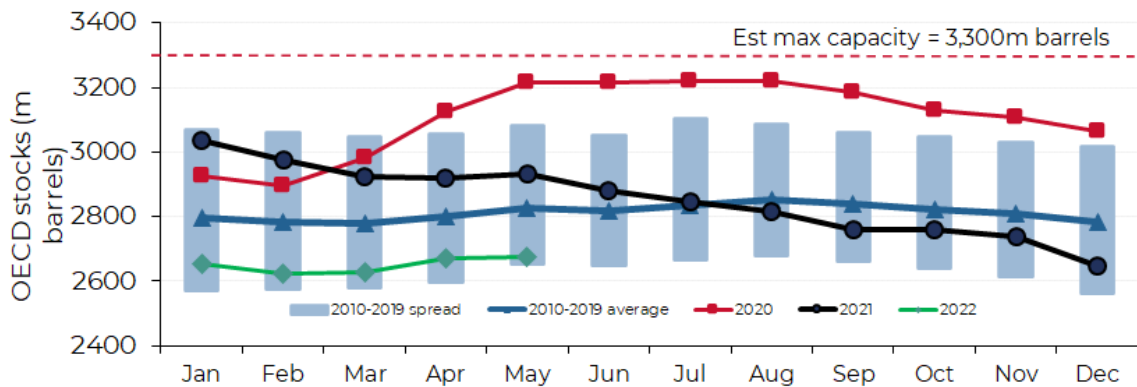
OECD stocks

OECD total product and crude inventories at the end of May (latest data point) were estimated by the IEA to be 2,676m barrels, up by 6m barrels versus the level reported for April. This compares to a 10-year average build for

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April of 33m barrels, implying that the OECD market was undersupplied. The significant oversupply situation in 2020 pushed OECD inventory levels close to maximum capacity in August 2020 (c3.3bn barrels), with persistent tightening thereafter taking inventories well below normal levels.

OECD total product and crude inventories, monthly, 2004 to 2022



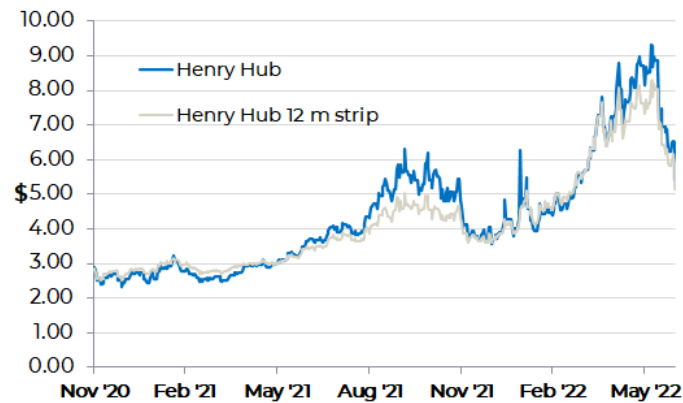
Source: IEA Oil Market Reports (June 2022 and older)

ii) Natural gas market

The US natural gas price (Henry Hub front month) opened May at \$7.24/mcf (1,000 cubic feet) and rose over the month to a peak on May 25 of \$8.97, before closing at \$8.15/mcf. The spot gas price has averaged \$5.71/mcf so far in 2022, having averaged \$3.70/mcf in 2021, \$2.13/mcf in 2020 and \$2.53/mcf in 2019.

The 12-month gas strip price (a simple average of settlement prices for the next 12 months' futures prices) also rose over the month, rising from \$6.80/mcf to \$7.32/mcf. The strip price has averaged \$5.57/mcf so far in 2022, having averaged \$3.52 in 2021, \$2.54 in 2020 and \$2.60 in 2019.

Henry Hub gas spot price and 12m strip (\$/Mcf): Dec 2020 to June 2022



Source: Bloomberg LP

Factors which strengthened the US gas price in June included:

- **Higher thermal coal prices**

Thermal coal prices in the north-east of the US rose again in June, as coal supply is pulled into a strong export market. This in turn has raised the switching price for US utilities between natural gas and coal.

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

High gas demand and low inventories in Europe and Asia held international gas prices at around \$25-35/mcf during the month. This in turn is maximising demand for exports of LNG from the US. The EIA forecasts that US LNG exports will remain elevated, growing to 13 bcf/day at the end of the year (though note the Freeport LNG disruption mentioned below).

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Factors which weakened the US gas price in June included:

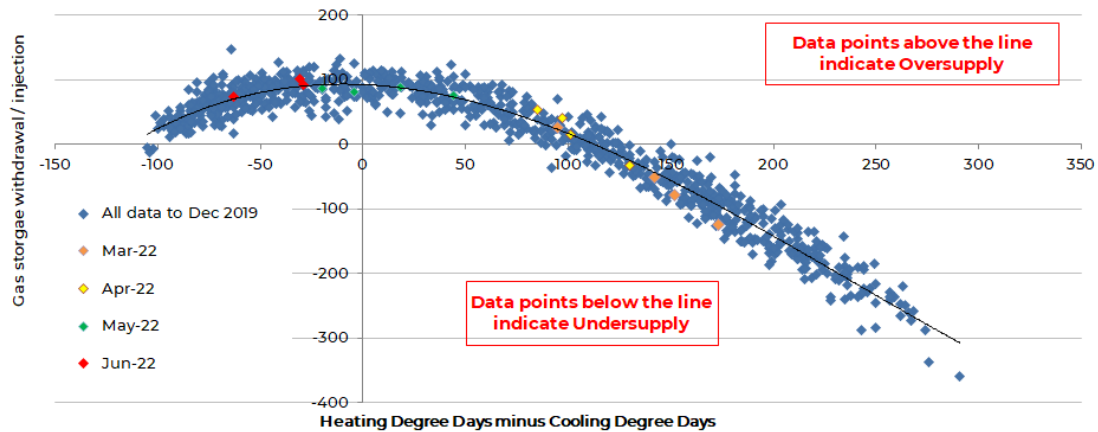
- Fire at Freeport LNG facility**

The Freeport LNG facility on the US Gulf Coast was shut-down after a fire on June 8. The plant, which is the second largest in the US at just over 2 Bcf/day, is expected to be offline until September, and reduces demand for domestic natural gas supplies. This event has also caused a material spike in international gas prices, since Freeport is normally responsible for supplying around 5% of the world's LNG market.

- Market undersupplied (ex-weather effects)**

Builds into US natural gas inventories during June were slightly higher than expected for the time of year. Adjusting for the impact of weather, the builds implied that the US gas market was, on average, nearly 0.5 Bcf/day oversupplied.

Weather adjusted US natural gas inventory injections and withdrawals

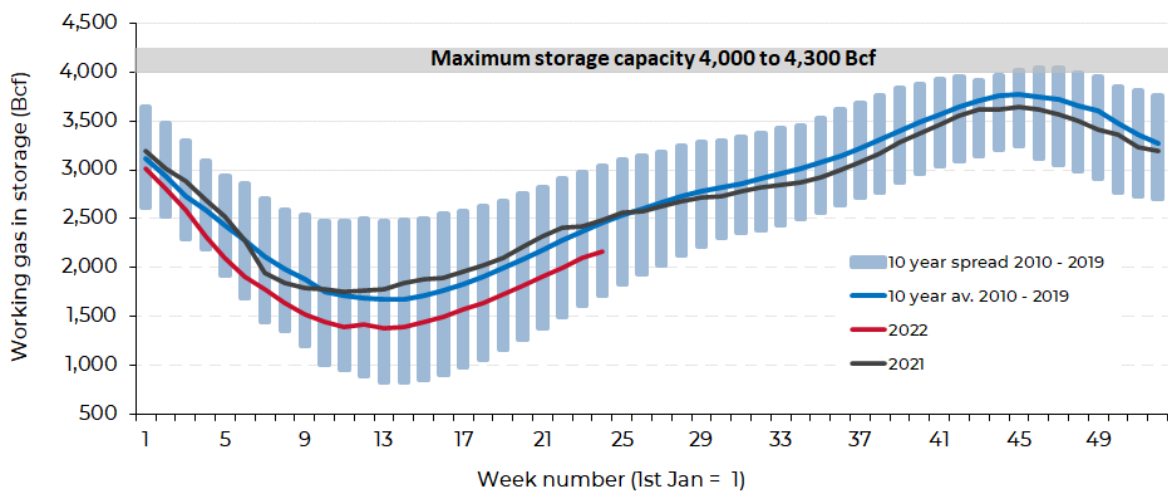


Source: Bloomberg LP; Guinness Global Investors

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 June were reported by the EIA to be 2.2 Tcf. Current gas in storage is around 0.3 Tcf below the 10-year average.

Deviation from 10yr gas storage norm



Source: Bloomberg; EIA (July 2022)

2. MANAGER'S COMMENTS

Fatih Birol, the head of the International Energy Agency, has described the current situation as “the first global energy crisis”, worse than the oil shock of the 1970s because it encompasses oil, gas and electricity. Rising demand, a shortage of investment across the energy supply chain and the significant supply uncertainties brought by the Russia/Ukraine crisis have driven prices higher. It has been a positive environment for oil and gas equities, which have significantly outperformed the broader market so far this year. Here, we explore the key developments in those energy markets over the period, the impact on energy equities and the fund, and consider the outlook.

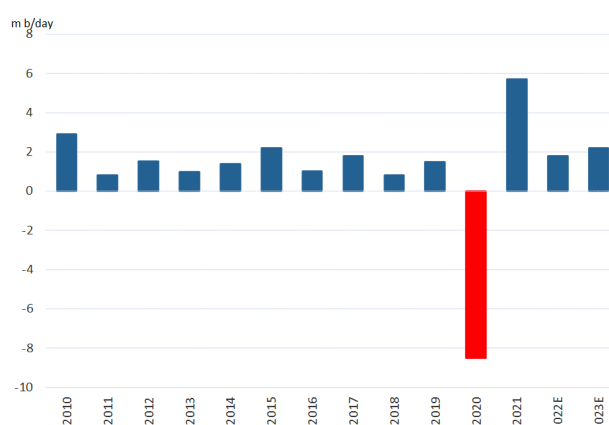
Review of 1H 2022

For much of last year, the OPEC+ group enjoyed a successful period of oil inventory management, returning oil supply back into the market as the post-COVID demand trajectory allowed. Their ambition was to keep global inventories under control, whilst achieving an oil price which satisfies the fiscal needs of its members. This aim was broadly successful, with Brent averaging \$71/bl in 2021 and inventories continuing to fall from record levels. By the start of 2022, however, the narrative was shifting to one of excessively tight inventories, and whether OPEC+ could continue to maintain market balance in the face of global oil demand reaching new highs.

The Brent oil price started the year at \$77/bl and, with inventories continuing to fall rapidly in January and February, prices rose above \$100/bl for the first time since mid-2014. An already tight market then saw major disruption at the end of February with the Russian invasion of Ukraine. Russia is normally the world's second largest oil producer, supplying around 11m b/day (11% of the market), of which around 8m b/day is exported either as crude or refined products. The prospect of Russian oil being excluded from certain parts of the market, and uncertainty around how effective Russia would be in diverting that oil and oil product to other buyers, pushed prices to over \$120/bl.

Global oil demand in 2022 was forecasted in January by the IEA to be up 3.3m b/day versus 2021, putting demand on par with its previous peak in 2019. Today, that forecast for demand growth has been cut to 1.8m b/day, a function of higher prices causing demand destruction, economic slowdown, COVID resurgence in China and the impact of sanctions on the Russian economy.

Global oil demand (m b/day)



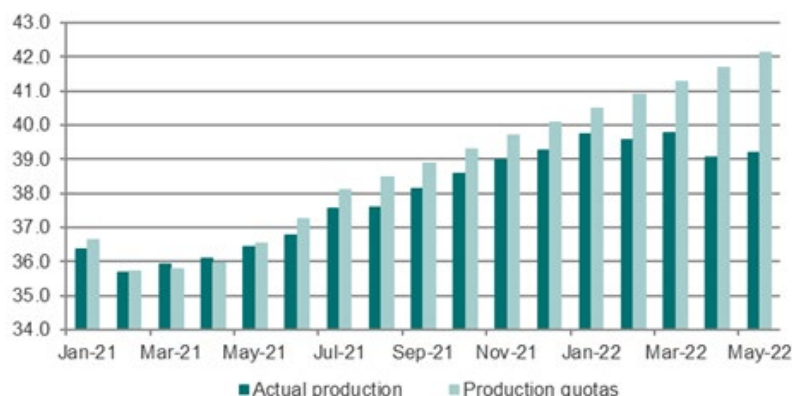
Source: IEA; Guinness Global Investors

Despite the supply challenges thrown up by the Russia/Ukraine crisis, **OPEC+** have deviated little from their plan, set out in mid-2021, to increase production quotas by 0.4m b/day per month through

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to September 2022. By this time, the COVID quota reductions will be fully unwound. A major challenge for the oil market, however, is that OPEC+ is not delivering according to plan, even outside Russia. Indeed, the gap between actual production and production quotas has been increasing consistently. Quotas for May 2022 were 42.1m b/day versus actual supply of 39.1m b/day. Beyond Russia, several countries have struggled to keep up with quota increases, in particular African members of OPEC that are seeing the effects of years of underinvestment in new oil capacity.

OPEC+ production vs quotas (m b/day)



Source: DNB

The one area of growth in supply has been **US shale oil**, which looks to be up by around 0.5m b/day since the start of the year. The number of 'horizontal' drilling rigs in the US has been on an increasing trend, though still around 10% down from the pre-pandemic level. Production in the US this year has also been supported by reliance on wells that were previously drilled but left uncompleted (DUCs), which have formed an unusually large proportion of completed wells this year.

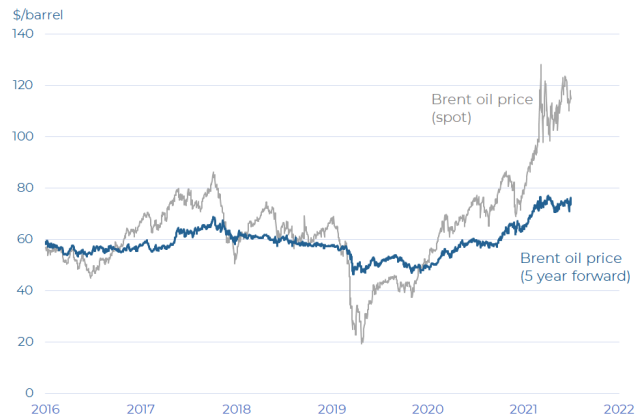
Faced with the prospect of spiralling oil prices, the US and most other IEA members announced plans to release a significant amount of oil from **strategic petroleum reserves** (SPRs). Combined planned SPR releases by the US and other IEA members for 2022 now amount to 283m barrels, or nearly 20% of the IEA's 1.45 bn barrel crude and product SPR inventories. If followed through, they represent the biggest strategic release in oil market history. The releases have helped to prop up supply, and have taken some edge off price increases. However, the oil market has also recognised that there is an element of 'kicking the can down the road' here, with a stated plan eventually to refill the SPR creating an additional oil demand burden in the future.

Much of the focus in energy markets this year has been on the rise in spot oil prices. However, there has also been a notable increase in **refining margins**, causing the prices of refined products (e.g. gasoline and diesel) to rise faster than the price of crude oil. A combination of disruption of Russian oil and refined product exports, structural capacity constraints (thanks to recent refinery retirements) and low product inventories have driven global refining margins to unusually high levels.

Whilst spot oil prices so far this year have been highly volatile, there has been a steady rising trend for **long dated oil**. The five year forward Brent oil price has risen over the last six months from \$64/bl to \$73/bl. We believe this reflects a) the growing energy supply deficit that is emerging globally and the need to incentivise greater investment to close the gap; b) the unwillingness of a portion of oil suppliers to increase CAPEX thanks to ESG pressures; and c) the impact of inflation on future cost of oil supply.

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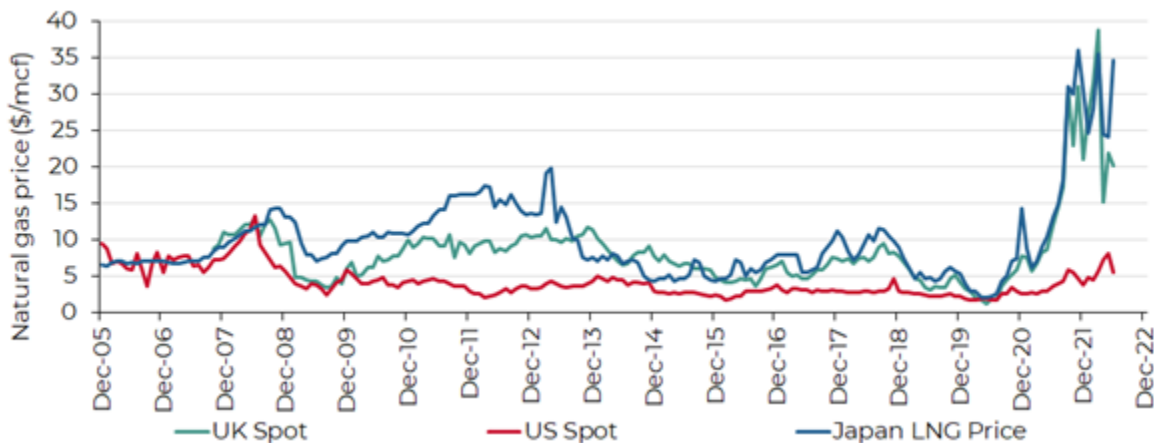
Brent oil price: spot vs five year forward (\$/b)



Source: Bloomberg; Guinness Global Investors

For **natural gas**, several factors came together across the globe in late 2021 to drive prices materially higher. Surging power demand as many economies recovered from COVID; cold winter weather in Europe; drought in Brazil and China curbing hydro output; higher European carbon prices; a shortage of coal in China combined to create extraordinarily tight markets. So far this year, many of these transitory issues have improved, but have been trumped by a far more precarious gas supply situation thanks to the Russia/Ukraine crisis. Since February's invasion, Russian gas has still flowed into Europe, albeit less than normal. The European Commission has announced its desire to reduce reliance on Russian gas, whilst recognising the significant short-term obstacles to achieving this aim. In June, Russia started to limit flows further, a clear move to 'weaponising' the commodity. Against this backdrop, natural gas prices have remained exceptionally high, with Europe having to outbid other parts of the world for marginal LNG cargoes, in an effort to fill gas storage by this winter.

Global natural gas prices (US\$/mcf)



Source: Bloomberg; Guinness Global Investors

Given the strength in oil and gas prices, the first half of 2022 has been a positive period for energy equities. The sector (MSCI World Energy Index net return in USD) finished +24.0%, well ahead of the broad market (MSCI World -20.5%). The Guinness Global Energy Fund produced a total return of +14.8% (in USD), comfortably ahead of the broad market but behind the MSCI World Energy Index.

On a stock-by-stock basis in the fund, our three US shale oil biased E&P companies (Devon Energy Corp +29%; EOG Resources +29%; Pioneer Natural Resources +28%) were strong performers, enjoying a high degree of operational leverage to rising oil prices. US integrators (Exxon +43%; Chevron +26%) and our US refining holding (Valero +44%), also outperformed, benefitting from exceptional returns in the US refining environment. Another subsector within the fund that outperformed over the first half

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of 2022 was Canadian integrations (Imperial Oil +32%; Canadian Natural Resources +30%; Suncor +43%), with high-cost oil sands operations enjoying oil price leverage and growing free cashflow profiles.

European natural gas producers also did well, thanks to strength in the underlying commodity. Equinor, which controls a large portion of natural gas flows into the European market, was the stand-out larger cap gas name in the fund, up 32% since the start of the year.

The underperformance of the fund versus the index, however, can be explained in broad terms by the global nature of our portfolio, and in particular the direct and indirect impacts of its exposure to Russia. Over the period, we saw:

- The exceptional decline in our holding in Gazprom (a 3.8% weight at the start of the year). Our position in Gazprom was sold on 1 March, before the London GDR market was suspended on 3 March. The decision to sell was a painful one, with Gazprom one of our strongest holdings over the previous five years, but driven by a belief that little fundamental value was likely to accrue to Western shareholders of Gazprom in the future.
- Higher exposure in the fund to European integrations (e.g. OMV -13%; ENI -11%), which as a group have suffered versus North American peers thanks to Russian asset exposure/proximity to Russia.
- High weighting in the index to North America, seen as an energy safe haven through the crisis, and in particular to Exxon (+43% and Chevron (+26%). We owned both companies in the fund, but were structurally underweight their combined 27% weighting in the index.

Whilst our performance was behind the MSCI World Energy Index, which is developed market only, we take some comfort from our portfolio performing in-line with the MSCI Energy (All Country) Index, which also includes developing markets in its composition.

The estimated contribution of each position held in the fund over the period (total return in USD) can be seen in the chart below.

Estimated contribution by position for Global Energy Fund, H1 2022



Source: Bloomberg; Guinness Global Investors

Outlook

Given the state of the world economy, and uncertainties around Russian oil and gas production, the outcomes for spot oil prices in the short-term are hard to predict. What is clearer is that we are in a new cycle for oil, driven by several years of underinvestment. This cycle may be disrupted by recession, but if it is, oil prices will soon be pulled higher again, with the structural deficit that has emerged needing to be solved.

The IEA have recently published their first forecast for global **oil demand** in 2023, up by 2.2m b/day versus 2022 and taking demand over 1m b/day higher than the previous peak in 2019. This expectation is consistent with the IMF's current global GDP growth forecast for 2023 of 3.6%. Recessionary concerns may result in a lower outcome for 2023, but the IEA's oil forecast serves as a reminder of the upward pressures that still exist structurally for oil demand post-COVID. Indeed, if oil demand was 'on trend' with growth that should have occurred since 2019, demand in 2023 would be around 3m b/day higher than the current 101.6m b/day forecast.

The lack of spare capacity in **OPEC+** is a concern. The group, even outside Russia, is struggling to keep up with production quotas. At the start of June, OPEC+ announced an acceleration of quota increases, pulling the 0.4m b/day rise tabled for September forward into July and August. The reality is that these are 'optical' quota changes, relying even on increases from Russia let alone the rest of the group, to be achieved. Saudi's quota for August is 11m b/day, a level that Saudi has only achieved twice in its history. We continue to think that Saudi are a rational and intelligent operator in the oil market, seeking an oil price that provides them with a fiscal surplus (\$80/bl+), but one that does not stress the world economy. Saudi will be uncomfortable with oil at much over \$100-110/bl, but the question remains whether there is much they can do about it, should supply falter elsewhere.

In the **non-OPEC world (ex US shale)**, low levels of spending on oil developments are impacting prospects for growth. The average level of CAPEX being committed for the largest non-OPEC oil projects around the world in 2017-21 is around \$35bn, which compares to just over \$100bn in 2010-14. Whilst there are some brighter spots which will see supply increases, such as Norway, Brazil and Guyana, recent low levels of spending put non-OPEC (ex-US) supply on a path of stagnation for the next few years. Any uptick in spending in 2022/23 will take a number of years to feed through to improved supply.

US shale remains the world's most dynamic source of oil supply. Since 2019, the US shale industry has been focussed on free cashflow generation, deleveraging and increased returns to shareholders. Production growth has been out of fashion, and a key question is whether higher prices reverse this trend. The number of oil drilling rigs in the US has been on the rise, though is still around 10% below the pre-pandemic level. Further industry expansion may be constrained by oil service capacity which is starting to get stretched and is likely to bring cost inflation. Overall, we maintain our forecast that US shale production will grow this year by around 0.75m b/day versus 2021, with growth of just over 1m b/day in 2023. Growth from US shale of plus or minus 1m b/day is helpful for world oil balances, but insufficient to prevent a greater call on OPEC oil, should demand grow as expected.

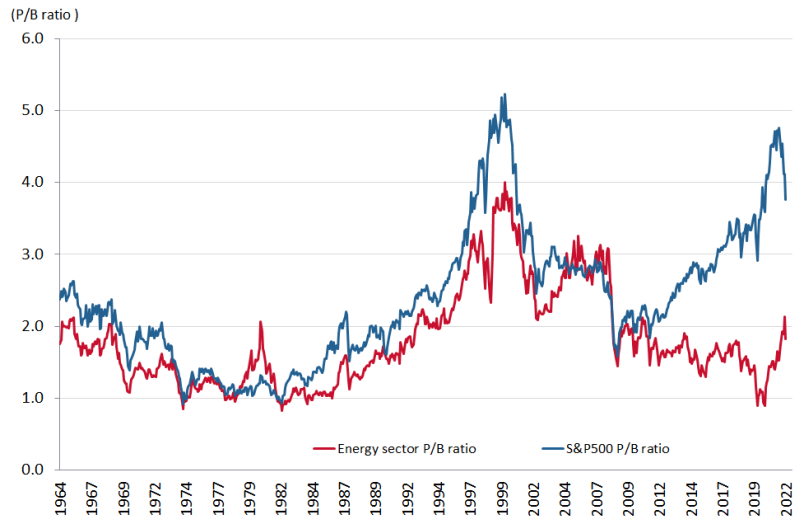
For international **natural gas** markets, the reduced flow of Russian gas into Europe creates major challenges. The European Commission has announced its ambition to reduce reliance on Russian gas, but both sides know how difficult this is in the short-term. So far this summer, Europe has done a reasonable job of refilling inventories, with gas in storage not far off the 5-year average. Russia is responding by lowering pipeline exports into Europe further, in an apparent effort to keep the European gas market tighter and maintain their leverage. Europe is bidding for LNG cargoes wherever they can, though a three month outage at Freeport LNG in Texas (c.5% of global LNG capacity) has not helped. Major new LNG projects are being commissioned (e.g. US and Qatar), but

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will take 3-5 years to come through. Overall, we do believe that we will see relief from the extreme prices currently being seen in Europe and Asia – demand destruction will be part of the solution – but prices will remain significantly elevated versus pre-pandemic levels.

The rise in oil prices, gas prices and refining margins so far this year has been accompanied by a further rally in oil & gas equities, as the market adjusts to tighter energy markets. The rise in energy equities has lifted the price-to-book (P/B) ratio for the energy sector at the end of June to around 1.8x, having fallen as low as 0.7x in March 2020. This compares to the S&P 500 which, despite falling into a bear market, still trades at 3.8x. On a relative P/B basis versus the S&P500, therefore, the valuation of energy equities sits under 0.5x, still over two standard deviations below the long-term average.

Price to book ratio of S&P 500 vs energy sector (1965-2022)



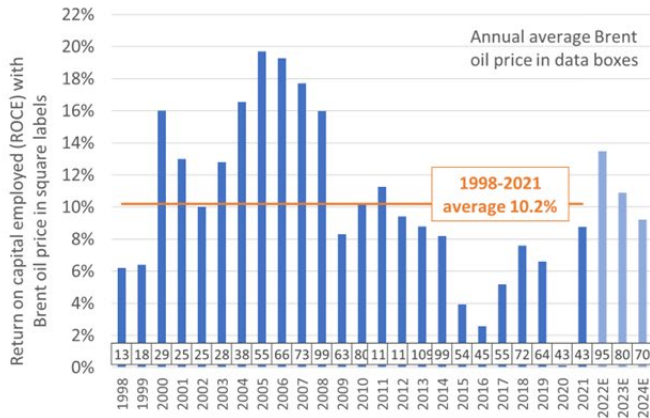
Sources: Bernstein; Bloomberg; Guinness Global Investors

We keep a close eye on the relationship between the P/B ratio for the energy sector and return on capital employed (ROCE), which historically show high correlation.

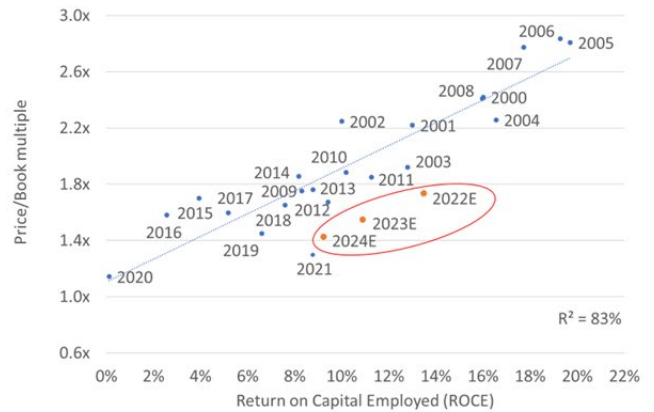
ROCE for the Guinness Global Energy portfolio in 2021 (with Brent oil averaging \$71/bl) was around 9%, still below the mid-cycle ROCE which we peg at around 10-11%. Assuming an average Brent price this year of \$95/bl, we see ROCE rise to 15%, whilst using a more conservative long-term oil price in 2023/24 of \$70-80/bl would bring ROCE back to 10-11%. In all of these scenarios (2022/23/24), the ROCE generated implies strong upside still on a P/B basis:

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ROCE of current Guinness Energy portfolio



ROCE vs P/B multiple for Guinness Energy portfolio



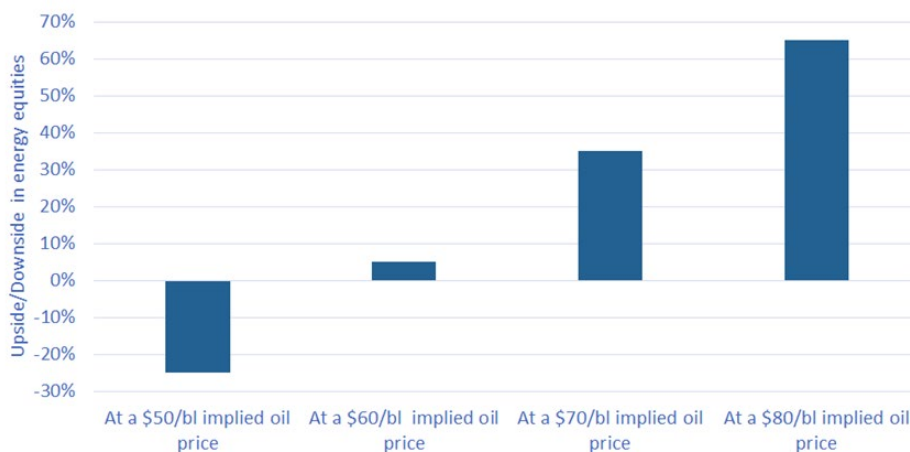
Sources: Bernstein; Bloomberg; Guinness Global Investors

Current valuation implies that the ROCE of our companies will stay at about 6%. If ROCE stays at 10-11% and the market were to pay for it sustainably, it would imply an increase in the equity valuation of around 30-35%.

The higher ROCE is being supported by robust free cash generation. Assuming an average Brent oil price of \$75/bl, we estimate the free cashflow yield of our portfolio, after capital expenditure, to be around 10% and note that the 2022 estimated dividend yield of the portfolio currently sits at around 4%.

To put this another way, we are often asked what oil price is implied in the portfolio, as a barometer of the expectation priced into the equities. At the end of June, we estimate that the valuation of our portfolio of energy equities reflected a long-term Brent/WTI oil price of around \$59/bl combined with a normalisation of global refining margins. If the market were to price in a long-term oil price of \$70/bl, it would imply around 35% upside while there would be around 65% upside at a long-term oil price of \$80/bl Brent:

Upside/downside for Guinness energy portfolio (1 year forward view)



Source: Guinness Global Investors

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3. PERFORMANCE Guinness Global Energy Fund

Past performance does not predict future returns.

The main index of oil and gas equities, the MSCI World Energy Index (net return), fell by 15.0% in June, while the MSCI World Index (net return) fell by 8.7% in USD.

Within the Fund, May's strongest performers included Sinopec, Repsol, Enbridge, Galp and Equinor while the weakest performers included Helix, Devon Energy, Halliburton, Schlumberger and Enquest

Performance (in USD) as at 30.06.2022

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.

Cumulative % returns	YTD	1 year	3 years ann.	5 years ann.	Launch of strategy* ann. (31.12.98)		
Guinness Global Energy Fund (Class Y, 0.99% OCF)	14.8%	23.3%	2.0%	2.2%	8.2%		
MSCI World Energy NR Index	24.0%	31.2%	5.6%	5.3%	5.9%		
Calendar year							
% returns	2021	2020	2019	2018	2017	2016	2015
Guinness Global Energy Fund (Class Y, 0.99% OCF)	44.5%	-34.7%	9.8%	-19.7%	-1.3%	27.9%	-27.6%
MSCI World Energy NR Index	40.1%	-31.5%	11.4%	-15.8%	5.0%	26.6%	-22.8%
2014 2013 2012 2011 2010 2009 2008*							
Guinness Global Energy Fund (Class Y, 0.99% OCF)	-19.1%	24.4%	3.0%	-13.7%	15.3%	61.8%	-44.8%
MSCI World Energy NR Index	-11.6%	18.1%	1.9%	0.2%	11.9%	26.2%	-32.8%

Source: FE fundinfo, Guinness Global Investors and Bloomberg, bid to bid, gross income reinvested, in US dollars

Calculation by Guinness Global Investors, *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 December 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. Returns for share classes with a different OCF will vary accordingly.

Investors should note that fees and expenses are charged to the capital of the Fund. This reduces the return on your investment by an amount equivalent to the Ongoing Charges Figure (OCF). The fund performance shown has been reduced by the current OCF of 0.99% per annum. Returns for share classes with different OCFs will vary accordingly. Performance returns do not reflect any initial charge; any such charge will also reduce the return.

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 0.96% 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.tbaileys.com. Please contact info@guinnessgi.com or +44 (0) 20 7222 5703 for more details.

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.guinnessgi.com.

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4. PORTFOLIO Guinness Global Energy Fund

Buys/Sells

In June there were no buys or sells of full positions, but the portfolio was actively rebalanced.

Sector Breakdown

The following table shows the asset allocation of the Fund at **June 30 2022**.

Asset allocation as %NAV	Current	Change	Last year end	Previous year ends				
	Jun-22		Dec-21	Dec-20	Dec-19	Dec-18	Dec-17	Dec-16
Oil & Gas	96.1%	-0.8%	96.9%	94.8%	98.3%	96.7%	98.4%	96.7%
Integrated	54.7%	-2.9%	57.7%	56.3%	51.1%	46.4%	42.9%	46.4%
Exploration & Production	22.9%	-0.8%	23.7%	22.2%	29.6%	35.8%	36.9%	35.8%
Drilling	0.0%	0.0%	0.0%	0.0%	0.1%	2.2%	1.9%	2.2%
Equipment & Services	7.3%	3.3%	4.0%	4.6%	9.6%	8.6%	9.5%	8.6%
Storage & Transportation	5.5%	1.1%	4.3%	4.4%	4.0%	0.0%	3.5%	0.0%
Refining & Marketing	5.7%	-1.4%	7.2%	7.3%	3.8%	3.7%	3.7%	3.7%
Solar	0.7%	-0.3%	1.0%	1.8%	0.7%	0.9%	1.4%	0.9%
Coal & Consumable Fuels	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%
Cash	3.2%	1.0%	2.1%	3.3%	1.1%	2.4%	0.2%	2.4%

Source: Guinness Global Investors. Basis: Global Industry Classification Standard (GICS)

The Fund at end of June 2022 was on a price to earnings ratio (P/E) for 2021/2022 of 13.0x/6.3x versus the MSCI World Index at 16.9x/14.9x as set out in the following table:

As at 30 June 2022	P/E		
	2020	2021E	2022E
Guinness Global Energy Fund	77.9x	13.0x	6.3x
MSCI World Index	31.1x	16.9x	14.9x
Fund Premium/(Discount)	150%	-23%	-58%

Source: Bloomberg; Guinness Global Investors

Portfolio holdings

Our integrated and similar stock exposure (c.55%) 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 June 30 2022 the median P/E ratio of this group was 8.7x 2021 earnings. We also have three Canadian integrated holdings, Suncor, Cenovus and Imperial Oil. All three companies have significant exposure to oil sands in addition to downstream assets.

Our exploration and production holdings (c.23%) 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, Diamondback, 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 two emerging market stocks, Petrochina and Sinopec, in the portfolio and in total represent around 3% of the portfolio.

The portfolio contains two midstream holdings, Enbridge and Kinder Morgan, two of 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 both companies are well placed to execute their pipeline expansion plans.

We have reasonable exposure to oil service stocks, which comprise around 7% of the portfolio. The stocks we own are mainly diversified internationally (Helix and Schlumberger).

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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 a recovery in refining margins.

Portfolio at May 31 2022 (for compliance reasons disclosed one month in arrears)

Guinness Global Energy Fund (31 May 2022)			P/E			EV/EBITDA			Price/Book		
Stock	ISIN	% of NAV	2020	2021E	2022E	2020	2021E	2022E	2020	2021E	2022E
Integrated Oil & Gas											
Exxon Mobil Corp	US32031G1022	5.3%	n/a	18.3x	9.6x	22.2x	8.2x	5.1x	2.4x	2.4x	2.2x
Chevron Corp	US1667641005	5.4%	n/a	20.4x	10.7x	20.6x	8.4x	5.6x	2.5x	2.4x	2.2x
Shell PLC	GB00BP6MXDE	4.4%	47.9x	12.7x	6.1x	8.3x	5.2x	3.4x	1.5x	1.4x	1.2x
Total SA	FR0000120271	4.9%	41.4x	9.1x	4.9x	9.8x	4.7x	2.9x	1.5x	1.4x	1.2x
BP PLC	GB0007980591	4.2%	n/a	8.8x	4.3x	11.9x	4.3x	3.2x	1.5x	1.4x	1.4x
Equinor ASA	NO0010096985	4.4%	69.0x	12.5x	6.6x	6.6x	2.7x	1.6x	3.6x	3.1x	2.5x
ENI SpA	IT0003132476	2.8%	n/a	11.2x	5.0x	6.3x	3.8x	2.6x	1.1x	1.2x	1.0x
Repsol SA	ES0173516115	3.9%	63.6x	9.4x	4.6x	6.9x	4.3x	3.0x	0.9x	1.0x	0.9x
Galp Energia SGPS SA	PTGALOAM000'	3.1%	n/a	20.4x	9.8x	7.5x	5.4x	3.6x	2.5x	2.8x	2.8x
OMV AG	AT0000743059	3.0%	23.1x	6.1x	4.5x	7.5x	3.7x	3.0x	1.2x	1.2x	1.0x
		41.5%									
Integrated / Oil & Gas E&P - Canada											
Suncor Energy Inc	CA8672241079	3.5%	n/a	19.5x	6.6x	18.4x	6.6x	4.1x	2.3x	2.1x	1.7x
Canadian Natural Resources Ltd	CA1363851017	3.5%	n/a	14.0x	7.1x	19.1x	7.1x	4.5x	3.1x	2.7x	2.3x
Cenovus Energy Inc	CA15135U1093	3.7%	n/a	30.0x	8.0x	n/a	7.9x	4.5x	n/a	2.0x	2.1x
Imperial Oil Ltd	CA4530384086	3.6%	n/a	18.8x	7.6x	54.8x	9.5x	5.1x	2.3x	2.2x	1.9x
		14.4%									
Integrated Oil & Gas - Emerging market											
PetroChina Co Ltd	CNE1000003W4	1.5%	33.5x	6.8x	5.9x	4.9x	3.7x	3.3x	0.5x	0.5x	0.5x
		1.5%									
Oil & Gas E&P											
ConocoPhillips	US20825C1045	4.4%	n/a	18.6x	7.7x	27.8x	7.4x	4.2x	4.0x	3.3x	2.8x
EOG Resources Inc	US26875P1012	3.6%	125.0x	15.8x	8.5x	16.7x	7.5x	4.9x	3.9x	3.5x	3.0x
Diamondback Energy Co	US25278X1090	3.7%	50.7x	13.8x	6.1x	15.4x	7.9x	4.4x	2.4x	2.3x	1.8x
Pioneer Natural Resources Co	US7237871071	3.8%	177.9x	21.7x	8.5x	31.3x	10.4x	5.2x	3.9x	2.8x	2.6x
Devon Energy Corp	US25179M1036	4.3%	n/a	22.2x	8.8x	34.0x	9.6x	5.4x	8.9x	5.3x	4.3x
		19.8%									
International E&Ps											
Pharos Energy PLC	GB00B572ZV91	0.1%	n/a	n/a	5.1x	1.7x	2.0x	1.1x	n/a	n/a	n/a
		0.1%									
Midstream											
Kinder Morgan Inc	US49456B1017	2.4%	36.6x	15.5x	17.1x	11.1x	9.7x	10.4x	1.4x	1.5x	1.5x
Enbridge Inc	CA29250N1050	2.9%	23.9x	20.9x	19.3x	15.3x	14.6x	13.3x	2.0x	2.2x	2.2x
		5.2%									
Equipment & Services											
Schlumberger Ltd	AN8068571086	3.6%	71.5x	36.2x	24.5x	18.1x	15.6x	12.9x	5.3x	4.7x	3.9x
Halliburton Co	US4062161017	1.8%	65.2x	37.9x	21.5x	18.0x	15.9x	11.5x	6.7x	6.1x	4.6x
Baker Hughes a GE Co	US05722G1004	1.7%	129.9x	54.7x	31.0x	18.4x	15.6x	12.8x	3.7x	2.3x	2.4x
Helix Energy Solutions Group Inc	US42330P1075	0.6%	n/a	n/a	n/a	5.2x	7.9x	10.9x	0.4x	0.4x	0.5x
		7.8%									
Oil & Gas Refining & Marketing											
China Petroleum & Chemical Corp	CNE1000002Q2	1.0%	10.7x	5.1x	5.4x	5.9x	3.7x	3.8x	0.5x	0.5x	0.5x
Valero Energy Corp	US91913Y1001	4.8%	n/a	73.9x	8.9x	62.9x	15.5x	5.9x	3.1x	2.9x	2.4x
		5.8%									
Research Portfolio											
Deltic Energy PLC	GB00B65YKF01	0.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
EnQuest PLC	GB00B635TG28	0.4%	n/a	5.6x	1.8x	2.9x	2.0x	1.5x	2.7x	18.8x	0.9x
Reabold Resources PLC	GB00B95L0551	0.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sunpower Corp	US8676524064	0.6%	n/a	92.5x	66.4x	102.1x	46.4x	32.9x	252.4x	7.9x	6.5x
Maxeon Solar Technologies Ltd	SGXZ25336314	0.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.4x	n/a
Diversified Energy Company	GB00BYX7JT74	0.4%	6.5x	31.7x	9.7x	7.6x	6.5x	4.8x	1.2x	1.2x	1.4x
		1.7%									
Cash	Cash	2.1%									
Portfolio		100.0%	93.2x	15.4x	7.6x	12.7x	6.4x	4.2x	2.1x	1.9x	1.7x

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.

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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	2021	2022E	2023E
								IEA	IEA
World Demand	95.3	96.4	98.2	99.5	100.5	91.9	97.6	99.4	101.6
Non-OPEC supply (inc NGLs)	60.3	59.8	60.8	63.5	65.6	63.0	63.7	65.3	65.6
OPEC NGLs	5.2	5.3	5.4	5.5	5.4	5.1	5.1	5.4	5.5
Non-OPEC supply plus OPEC NGLs	65.5	65.1	66.2	69.0	71.0	68.1	68.8	70.7	71.1
Call on OPEC (crude oil)	29.8	31.3	32.0	30.5	29.5	23.8	28.8	28.7	30.5
Congo supply adjustment	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Cabon supply adjustment	0.2	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	0.1
Call on OPEC-10 (crude oil)	29.2	30.7	31.4	29.9	28.9	23.2	28.2	28.1	29.9

Source: Bloomberg; IEA; Guinness Global Investors

Global oil demand in 2019 was 13m b/day higher than the pre-financial crisis (2007) peak. 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. Demand recovered in 2021 by around 5.7m b/day, leaving overall consumption still around 3m b/day below the 2019 peak.

OPEC

The last few 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 late 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 included a cut in production from Russia (a non-OPEC country), creating for the first time the concept of an OPEC+ group.

OPEC-10 oil production to June 2022

('000 b/day)	31-Dec-19	31-May-22	30-Jun-22	Current vs Dec 2019	Current vs last month
Saudi	9,730	10,430	10,450	720	20
Iran	2,080	2,580	2,550	470	-30
Iraq	4,610	4,430	4,420	-190	-10
UAE	3,040	3,100	3,190	150	90
Kuwait	2,710	2,690	2,640	-70	-50
Nigeria	1,820	1,300	1,200	-620	-100
Venezuela	730	680	710	-20	30
Angola	1,390	1,160	1,200	-190	40
Libya	1,110	760	670	-440	-90
Algeria	1,010	1,020	1,020	10	0
OPEC-10	28,230	28,150	28,050	-180	-100

Source: Bloomberg; Guinness Global Investors

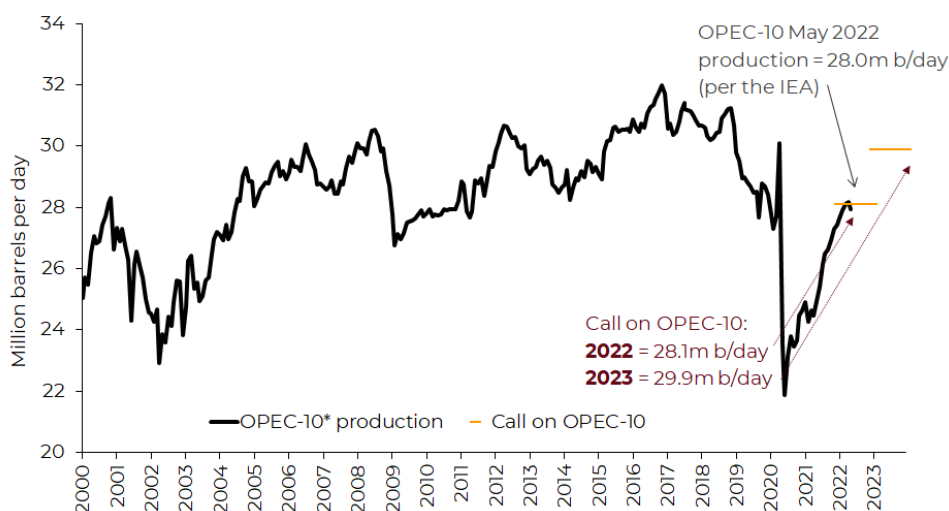
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The 2017-19 period continued to see a volatile time for OPEC with further production cuts necessary to balance ongoing non-OPEC supply growth.

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 gave us confidence that OPEC was looking to do 'what it takes' to keep the market in balance, despite extreme challenges.

OPEC-10 apparent production vs call on OPEC 2000 – 2023



Source: IEA Oil Market Report (June 2022 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.\$75/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 and Russia crises have created particularly challenging conditions, adding to oil price volatility. Longer term, we believe that Saudi seek a 'good' oil price, one that satisfies their fiscal needs. 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 2020, 2018, 2016, 2008, 2006, 2001 and 1998.

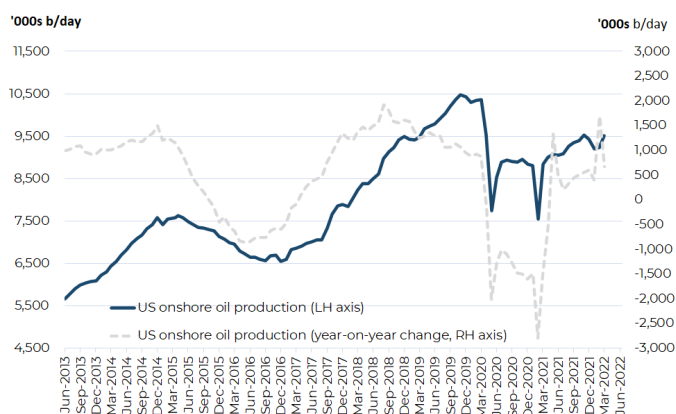
Supply looking forward

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.

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US onshore oil production



Source: EIA; Guinness Global Investors

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. Since 2019, we have seen increased shareholder pressure applied to US E&P companies to improve their capital discipline and to cut their reinvestment rates.

The collapse in oil prices at the start of 2020 to a level well below \$50/bbl changed the landscape, with US E&P companies reducing capital spending further as they attempted to live within their cashflows. Despite a stronger oil price since then, the overall reduction in activity caused average US shale supply to decline in 2021. Production growth is returning in 2022, albeit slower than the previous cycle, as the Russia/Ukraine crisis creates greater space again for US shale barrels in the world market.

Non-OPEC supply growth outside the US has been sustained in recent years, despite lower oil prices, with projects that were sanctioned before 2014 (when oil was \$100/bbl+) continuing to come onstream. However, with a lack of major project additions post 2020, new supply is only strong enough to offset the decline profiles of existing production, causing overall supply to stagnate.

Demand looking forward

The IEA estimate that 2022 oil demand will rise by around 1.8m b/day to 99.4m b/day, still around 1m b/day below the 2019 pre-COVID peak. The spread of the COVID virus globally caused major restrictions to the movement of people, which has now largely reversed, but high prices and slower economic growth are curtailing demand growth in certain sectors.

Post the COVID demand recovery and assuming typical economic growth, we 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.

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 \$75/bbl oil price, the world oil bill as a percentage of GDP is around 3% and this will still be a stimulant of further demand growth. If oil prices persist in a higher range (say around \$100/bbl, representing 4% 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 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 6.1m in 2021, up from 3.1m in 2020. We expect to see strong EV sales growth again in 2022, up to around 9m, or 10% 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

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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 2022 versus recent history.

Average WTI & Brent yearly prices, and changes

Oil price (inflation adjusted)	Est															
12 month MAV	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
WTI	82	104	68	84	99	94	98	93	49	45	51	65	57	40	68	92
Brent	82	103	67	84	115	112	108	99	52	45	54	72	60	42	70	95
Brent/WTI (12m MAV)	82	104	68	84	107	103	103	96	51	45	53	68	59	41	69	94
Brent/WTI y-on-y change	9%	26%	-35%	24%	27%	-4%	0%	-7%	-47%	-11%	17%	30%	-14%	-30%	68%	36%
Brent/WTI (5yr MAV)	61	75	79	82	89	93	93	99	92	80	69	63	55	53	58	66

Source: Guinness Global Investors, Bloomberg

We believe that Saudi's long-term objective remains to maintain a 'good' oil price, something north of \$75/bl. The world oil bill at around \$75/bl represents 3.0% of 2021 Global GDP, under the average of the 1970 – 2015 period (3.4%).

ii) 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	2021	2022E
US natural gas demand:											
Residential/commercial	19.2	22.4	23.4	21.4	20.5	20.9	23.4	23.5	21.3	22.2	21.9
Power generation	24.9	22.3	22.3	26.5	27.3	25.3	29.0	30.9	31.7	30.3	30.5
Industrial	19.7	20.3	20.9	20.6	21.1	21.6	23.0	23.0	22.6	23.0	23.1
Pipeline exports (Mexico)	1.8	1.9	1.9	2.7	3.8	4.0	4.6	5.1	5.4	6.1	6.3
LNG exports	-	-	-	0.1	1.0	2.6	3.4	5.7	7.3	10.3	12.6
Pipeline/plant/other	6.1	6.7	6.3	6.5	6.4	6.5	7.1	7.6	7.7	7.8	8.1
Total demand	71.7	73.6	74.8	77.8	80.1	80.9	90.5	95.8	96.0	99.7	102.5
Demand growth	3.1	1.9	1.2	3.0	2.3	0.8	9.6	5.3	0.2	3.7	2.8

Source: Guinness estimates; GS (June 2022)

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 2021, 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 2021 (including Mexican and LNG exports) was around 99.7 Bcf/day, up by 3.7 Bcf/day versus 2020 and 11 Bcf/day (12%) higher than the 5-year average. The biggest contributors to the growth in demand in 2020 were residential/commercial and LNG exports (opening of new export terminals). Power generation for gas was lower, however.

We expect US demand in 2022, assuming prices average around \$5-6/mcf, to be up by around 3 Bcf/day. 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

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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.

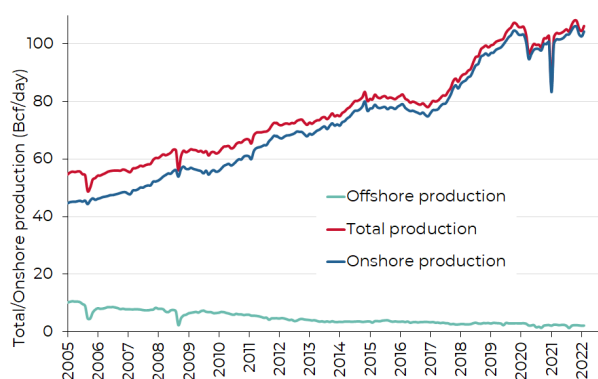
US natural gas supply

Bcf/day	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E
US natural gas supply:											
US (onshore & offshore)	65.7	66.3	70.9	74.2	73.4	73.6	84.0	92.3	9	93.0	95.8
Net imports (Canada)	5.4	5.0	4.9	4.9	5.5	5.8	5.4	4.7	4.4	5.3	5.6
LNG imports & other	0.8	0.6	0.5	0.5	0.4	0.3	0.1	0.1	-	-	0.1
Total supply	71.9	71.9	76.3	79.6	79.3	79.7	89.5	97.1	96.5	98.3	101.5
Supply growth	2.4	-	4.4	3.3	- 0.3	0.4	9.8	7.6	- 0.6	1.8	3.2
(Supply)/demand balance	- 0.2	1.7	- 1.5	- 1.8	0.8	1.2	1.0	- 1.3	- 0.5	1.4	1.0

Source: EIA; GS; 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 151 at the end of May 2022. 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 – 2022 (Lower 48 States)



Source: EIA 914 data (June 2022 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 2021 with the fall of shale oil production, but will rise again in 2022 as shale oil grows again. 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 2021. Moderate growth is likely in 2022.

Overall, if the price averages in the \$5-\$6/mcf range, we expect a rise in average onshore gas supply in 2022, up by around 2-3 Bcf/day versus 2021.

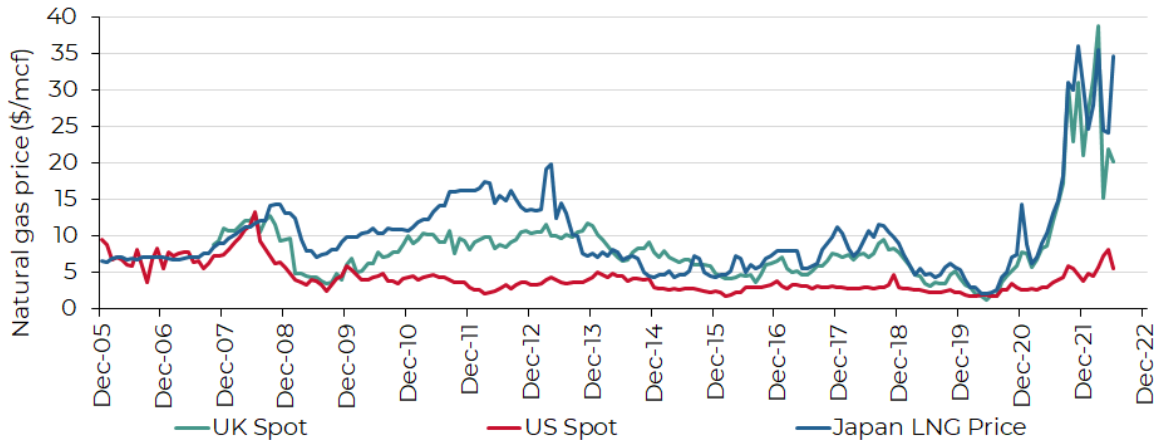
Outlook for US LNG exports – global gas arbitrage

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

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a proxy to the European traded gas price – has moved to a significant premium to the US gas price (c.\$20-25/mcf versus c.\$6-8/mcf). Asian spot LNG prices have also been extraordinarily strong, averaging over \$10/mcf in 2021 and up over \$30/mcf on a spot basis at the end of June. There have been many factors at play, in particular the strong post-COVID demand recovery, and a shortage of Russian imports into Europe. The implied economics for US LNG exports into Europe and Asia are attractive assuming international prices are at least \$5/mcf higher than Henry Hub.

International gas prices to June 2022

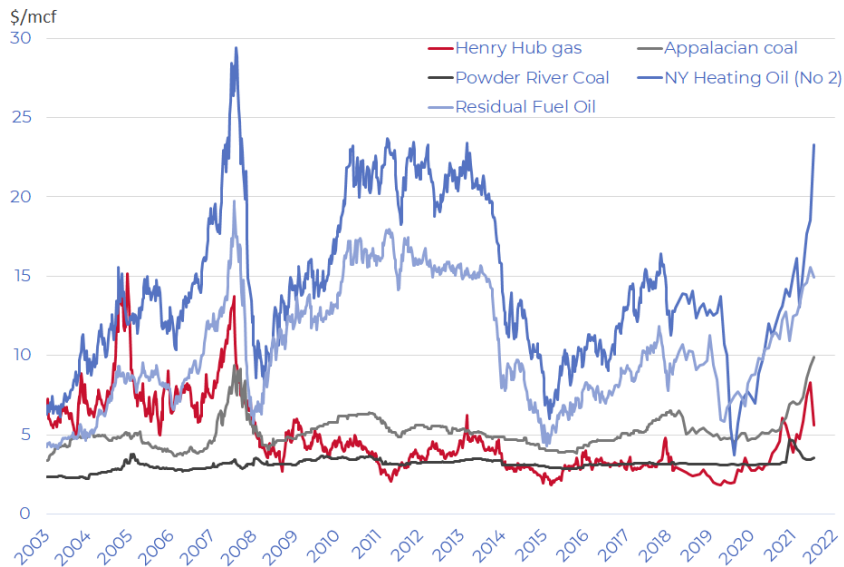


Source: Bloomberg; Guinness Global Investors (July 2022)

Relationship with oil and coal

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 Global Investors (July 2022)

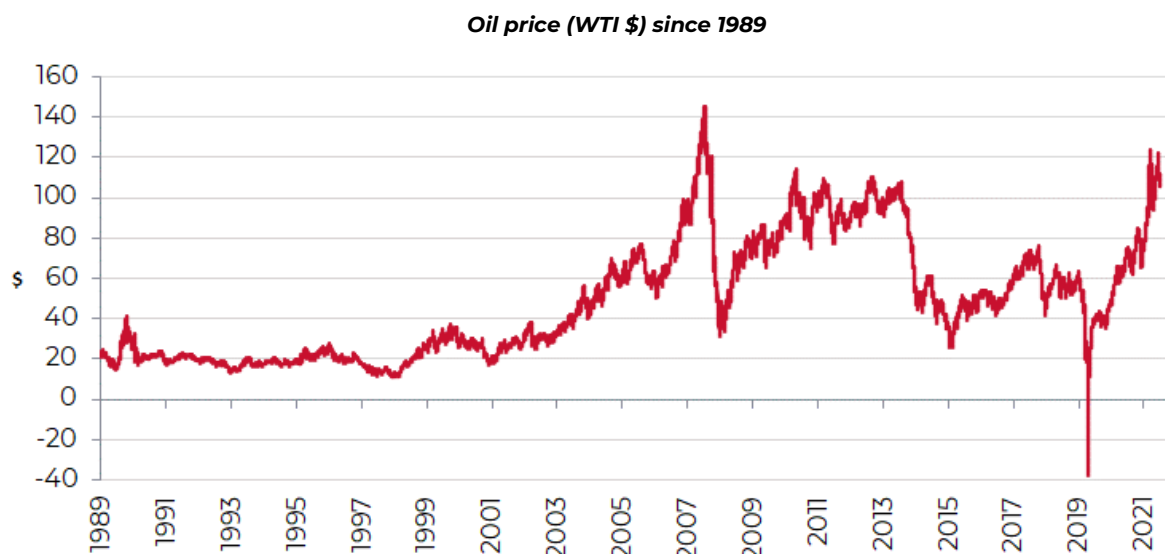
Conclusions about US natural gas

The US natural gas price was held back in the 2010s 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 \$3.71/mcf in 2021, up from \$2.13/mcf in 2020, and we suspect that the (full cycle) marginal cost of supply is now around \$4-5/mcf.

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More controlled growth in associated gas supply over the next couple of years should allow gas prices to stay closer to the full cycle cost level.

6. APPENDIX Oil and gas markets historical context



Source: Bloomberg LP

For the oil market, the period since the Iraq Kuwait war (1990/91) can be divided into four 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.

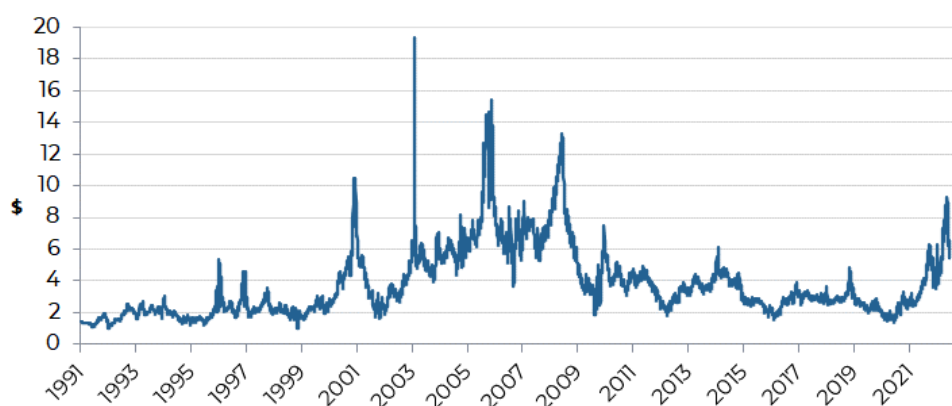
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Continued expectations of a supply crunch by the end of the decade, coupled with increased speculative activity in oil markets, contributed to the oil price surging past \$90 in the final months of 2007 and as high as \$147 by the middle of 2008. This 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) **2014-2020:** 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 range 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.
- 4) **2021-:** Underinvestment in new oil capacity in the 2015-2020 period catalysed the start of a new cycle in 2021, pushing prices above \$75/bl.

North American gas price since 1991 (Henry Hub \$/Mcf)



Source: Bloomberg LP (30 June 2022)

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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