

## January 2023

**2022 was a year which saw a tighter oil market and extraordinarily high gas prices. Here, we would like to share our thoughts on 2022 and the outlook for 2023 and beyond.**

### SUMMARY

#### 2022 IN REVIEW

**Fatih Birol, the head of the International Energy Agency, described the situation in 2022 as “the first global energy crisis”, worse than the oil shock of the 1970s because it encompassed oil, gas and electricity. Rising demand, a shortage of investment across the energy supply chain and the supply uncertainties brought by the Russia/Ukraine crisis have driven prices higher, more than offsetting demand concerns arising from slower economic growth. It was a positive environment for oil and gas equities, which significantly outperformed the broader equity market.**

The dominant themes for global oil and gas markets last year were:

**Recovery in oil demand, up by 2.3m b/day (+2%) vs 2021, but still 0.6m b/day behind 2019.** Demand growth was driven largely by the continued rebound of transportation post-COVID, plus significant natural gas to oil switching. Downgrades to demand growth, which originally was expected at 3m+ b/day, came as a function of higher prices causing demand destruction, economic slowdown, COVID resurgence in China and the impact of sanctions on the Russian economy. Chinese demand looks to have fallen by 0.4m b/day, the first average annual decline since 1983.

**OPEC+ have struggled to grow production, falling behind quotas.** The group increased quotas by 3.6m b/day to September, thereby fully unwinding COVID quota reductions. However, they were unable to deliver the plan, even outside Russia. Indeed, the gap between actual production and production quotas increased consistently through the first nine months of the year. Quotas for September 2022 were 43.9m b/day versus actual supply of 40.5m b/day. In October, faced with a weakening demand picture, OPEC+ opted to reduce quotas. Notably, the announcement came with Brent spot prices in the \$80s/bl, indicating a greater willingness on OPEC's part to defend a higher price than in previous cycles.

**Outside OPEC+, there has been limited supply growth, leaving the direction of the oil price in OPEC's hands.** Large non-OPEC project additions were stronger than 2021, but still well below the average of the last decade. For US shale oil, production likely grew by around 0.8m b/day in 2022, but still sits around 0.3m b/day below the November 2019 peak of 10.5m b/day. Shale oil producers added back drilling rigs in 2022, but at a slower pace than in the previous cycle. Instead, equity markets continued to reward companies that prioritised free cashflow and dividends over additional drilling.

**For natural gas, Russia's 'weaponisation' of supplies into Europe kept international prices at extraordinarily high levels.** Many of the transitory gas market issues experienced in 2021 (e.g. surging demand; shortage of coal) moderated, but were trumped by a far more precarious supply situation thanks to the Russia/Ukraine crisis. Russian supply of gas into Europe more than halved, forcing Europe to outbid Asia and Latin America for record volumes of LNG cargoes.

Strength in oil and gas prices (spot and long-dated) led to good returns for energy equities in 2022. The sector (MSCI World Energy Index) finished +46.0%, well ahead of the broad market (MSCI World -18.1%) in USD. The year saw significant outperformance from North American energy companies, especially US supermajors, US oil and gas producers and US refiners. Russian, Chinese, and European energy companies generally underperformed.

### SUMMARY

#### OUTLOOK FOR 2023

**Given the state of the world economy, and questions around Russian supply, 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 path for oil demand** will depend on three key components: the trajectory for Chinese consumption as its economy reopens; the outlook for global aviation as flight activity normalises; and the resilience of demand to a global recession. Overall, the IEA forecasts demand in 2023 of 101.6m b/day, up by 1.7m b/day versus 2022. This would put global oil demand around 1m b/day above its previous peak in 2019, though still 3m b/day below the pre-pandemic run rate. The IEA's forecasts imply that OECD demand will still be around 3% lower than in 2019, versus non-OECD demand 4% ahead of 2019.

**OPEC continues to signal a high degree of flexibility** in 2023 to adjust their production, thereby attempting to put a 'soft' floor under oil prices should demand falter. We believe the oil price desired by OPEC is at around \$75-80/bl, though they will accept a higher outcome if it does not destabilise the global economy. Within the broader OPEC+ group, the trajectory for **Russian oil supply** will be critical. The range of outcomes from the EU embargo on Russian oil and oil products, plus the G7 price cap, is wide; we see good chance that around 1m b/day of Russian oil exports are lost due to these actions.

We expect **moderate growth from US shale production**, with average production rising 0.5m-0.75m b/day versus 2022. Capital discipline and deteriorating capital efficiency are capping growth versus previous cycles. Non-OPEC (ex US shale) will see no major roll-out of large new projects, the cycle having peaked in 2020.

**For natural gas, Chinese re-opening and European security of supply will keep international gas prices elevated**, relative to pre-invasion levels. With plentiful gas in storage, Europe is well placed to weather the 2022/23 winter, but the challenge will be refilling storage this summer, thanks to even lower Russian imports. Shortages will be addressed via expensive LNG imports and demand destruction. Looking further ahead, we see international gas prices deflating to a \$10-14/mcf range (vs \$7-9/ mcf pre-invasion) as new US and Qatari LNG supply comes online and allows Europe to displace almost all Russian gas imports.

**Despite the strength of the energy sector in 2022, energy equity valuations remain attractive.** The MSCI World Energy Index now trades on a price to book ratio of 2.0x, versus the S&P500 at 3.9x. The relative P/B of energy vs the S&P500 remains more than two standard deviations below the long-term relationship.

Oil and gas companies have demonstrated a **meaningful shift towards capital discipline**, manifested in lower levels of reinvestment, lower levels of debt and a return of free cash to shareholders. Assuming a \$80/bl Brent oil price, we forecast an average free cashflow yield for our portfolio in 2023 of around 12%.

**Energy equities offer good upside if our oil price, profitability and free cashflow scenarios play out.** We believe energy equities currently discount an oil price of around \$63/bl. Adopting \$75/bl Brent as a long-term oil price (consistent with the bottom end of OPEC's desired range), we see 30-40% upside across the energy complex.

**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 Guinness Global Energy Fund invests in listed equities of companies engaged in the exploration, production and distribution of oil, gas and other energy sources. The Fund is actively managed and uses the MSCI World Energy Index as a comparator benchmark only.

REVIEW OF 2022

Fatih Birol, the head of the International Energy Agency, described the situation in 2022 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, more than offsetting demand concerns arising from slower economic growth. It was a positive environment for oil and gas equities, which significantly outperformed the broader equity market.

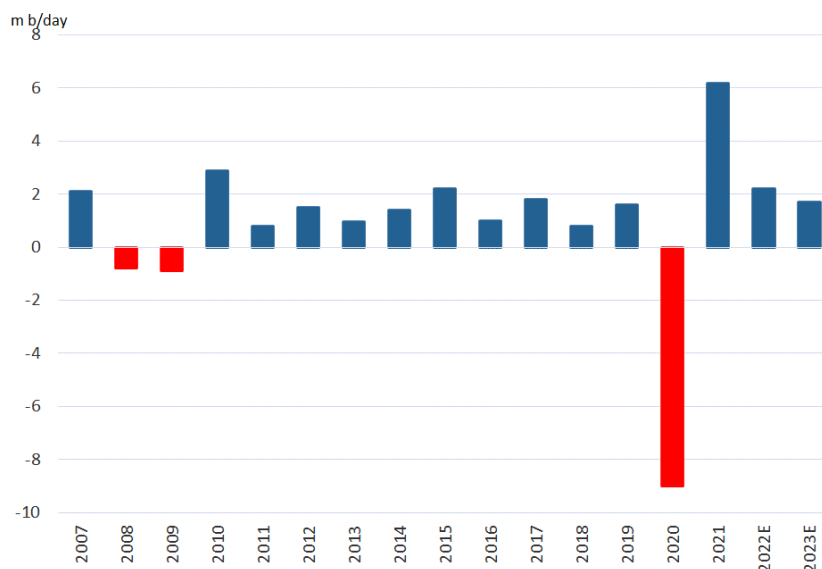
Oil markets

For much of 2021, 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. 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 in May to over \$120/bl. In the second half of the year, spot prices fell below \$100/bl, as global GDP slowdown, China’s zero COVID policy and the US’s Strategic Reserve releases trumped concerns around Russian supply. Brent spot oil finished 2022 trading at \$86/bl, having averaged \$99/bl in the year.

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 2.3m 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, somewhat offset by natural gas to oil switching.

Global oil demand (m b/day)



Source: IEA; Guinness Global Investors

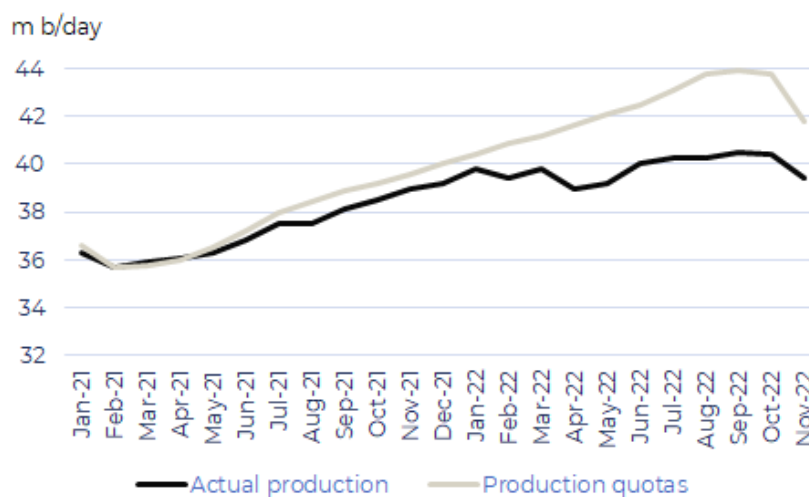
Despite the supply challenges thrown up by the Russia/Ukraine crisis, OPEC+ deviated little from their plan to increase production quotas by 0.4m b/day per month through to September 2022, thereby fully unwinding COVID

## 2023 Outlook for Global Energy

quota reductions. A major challenge for the oil market, however, is that OPEC+ was unable to deliver the plan, even outside Russia. Indeed, the gap between actual production and production quotas increased consistently through the first nine months of the year. Quotas for September 2022 were 43.9m b/day versus actual supply of 40.5m b/day. Beyond Russia, several countries 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.

In October 2022, faced with a weakening demand picture, OPEC+ opted to reduce quotas by 2m b/day. The actual production cut associated with the announcement was around 1m b/day. Notably, the announcement came with Brent spot prices in the \$80s/bl, indicating a greater willingness on OPEC's part to defend a higher price than in previous cycles.

**OPEC+ production vs quotas (m b/day)**



Source: DNB; Guinness Global Investors

The one area of growth in supply has been **US shale oil**, which looks to be up by around 0.8m b/day in 2022. 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. And whilst production is up, the growth rate is far lower than the 2016-19 cycle, driven by lower reinvestment rates and high unit cost inflation.

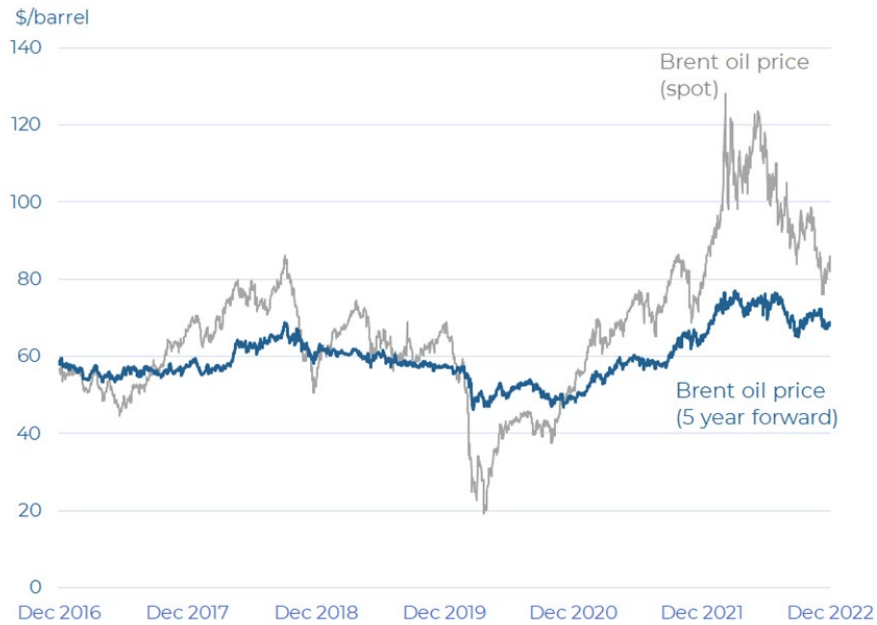
Faced with the prospect of spiralling oil prices, the US and most other IEA members announced plans to release a significant amount of oil from **strategic petroleum reserves (SPRs)**. Combined SPR releases by the US and other IEA members for 2022 amounted to around 280m barrels, or nearly 20% of the IEA's 1.45 bn barrel crude and product SPR inventories. As such, it has been the biggest strategic release in oil market history. The releases have helped to prop up supply, and helped lower spot prices in the second half of the year. 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, for much of the year, there was also 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 drove global refining margins to unusually high levels, though margins then moderated during the final three months of the year.

Moves in **long dated oil** were similar directionally to spot prices, though not as volatile. The five year forward Brent oil price rose over the year from \$64/bl to a high of \$76/bl, before settling back at \$69/bl. We see the increase in longer dated prices reflecting 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 some oil suppliers to increase CAPEX thanks to energy transition pressures; and c) the impact of inflation on future cost of oil supply.

## 2023 Outlook for Global Energy

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



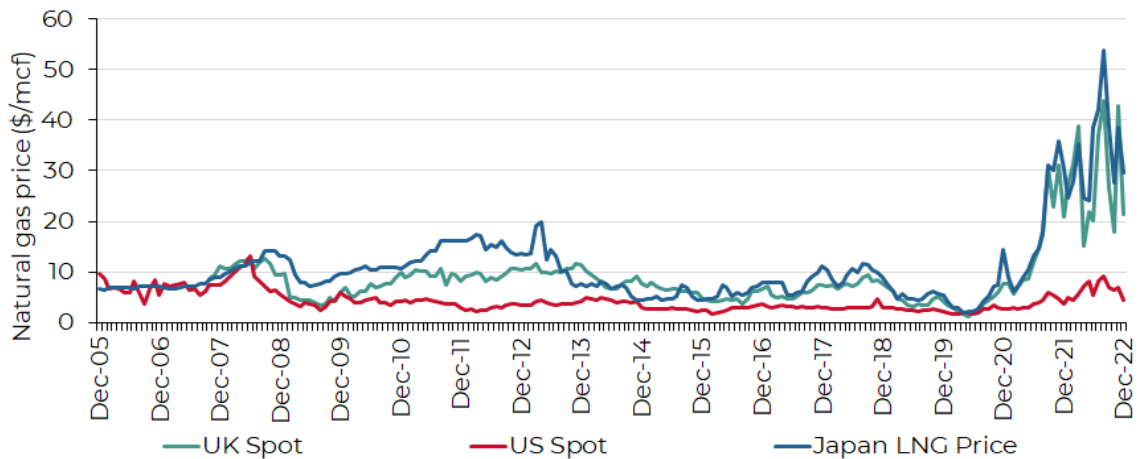
Source: Bloomberg; Guinness Global Investors

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 and a shortage of coal in China all combined to create extraordinarily tight markets.

In 2022, many of these transitory issues improved, but were trumped by a far more precarious gas supply situation thanks to the Russia/Ukraine crisis. Post February's invasion, Russian gas still flowed into Europe over the summer, albeit less than normal. Supply then took a significant leg down in September with the sabotaging of the Nordstream 1 pipeline, which had been bringing Russian gas into Germany. Other pipelines importing Russian gas into Europe remain operational, but overall imports from Russia by the end of the year were running at about half the level reported in 2021.

Against this backdrop, international natural gas prices have remained exceptionally high, with Europe having to outbid other parts of the world for marginal LNG cargoes (Europe imported record levels of LNG in 2022), in an effort to fill gas storage by winter.

### Global natural gas prices (US\$/mcf)



Source: Bloomberg; Guinness Global Investors

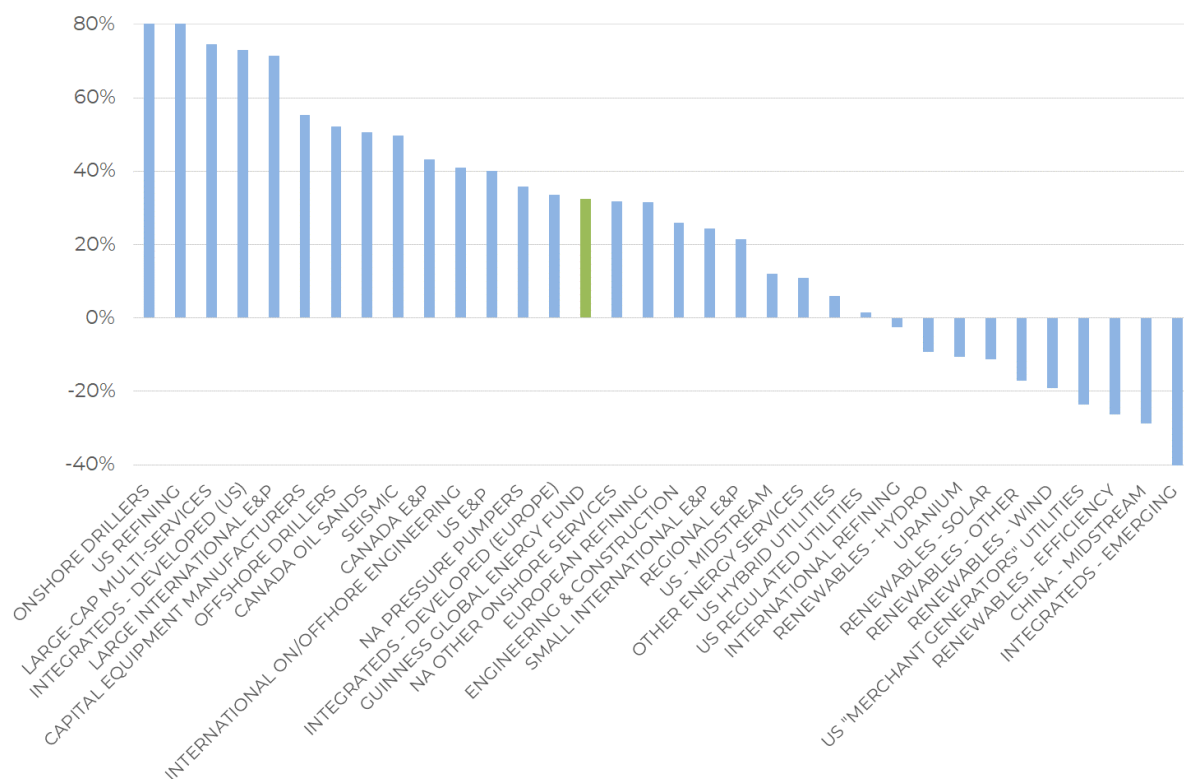
## 2023 Outlook for Global Energy

Strength in oil and gas prices (spot and long-dated) led to good returns for **energy equities** in 2022. The sector (MSCI World Energy Index) finished +46.0%, well ahead of the broad market (MSCI World -18.1%).

As ever, the performance of the MSCI World Energy Index was only part of the story, with 2022 seeing divergence between energy equity subsectors and geographies.

*Past performance does not predict future returns. Returns stated below are in US dollars; returns in other currencies may be higher or lower as a result of currency fluctuations.*

**Global energy equity subsectors: median total return in 2022**



Source: Bloomberg; Guinness Global Investors. Guinness defined subsectors.

A quick tour of some of the main energy sub-sectors paints a picture for the overall performance of energy equities in 2022:

- **US integrated oil and gas companies** were mixed, depending on geography. US super majors (Exxon and Chevron) were exceptional performers, benefitting from the relative strength in the US economy and a valuation rerating well in excess of that enjoyed by international peers. European integrateds lagged US peers despite reporting superior free cashflow yields well above 10-year averages.
- **Exploration and production** also saw mixed results. US E&Ps benefitted from the tightening of oil and gas markets, with the stock market rewarding those that maintained the strongest capital discipline. Higher commodity prices resulted in especially good returns for companies with lower growth but greater operational and financial leverage. International E&Ps were weaker, held back in some cases by the introduction of windfall taxes on extraordinary profits.
- **Oil refiners** in the US were outperformers, but underperformers internationally. US refiners enjoyed record refining margins, driven by a structural shortage of refining capacity and the knock-on impacts of a reduction of Russian oil and oil product in the market. European refiners also enjoyed record refining margins, though somewhat dampened by higher input natural gas costs.
- **Midstream** was an underperformer over the year. With revenues generally linked to pipeline capacity and throughput rather than commodity prices, most midstream companies were relative laggards versus

## 2023 Outlook for Global Energy

producing companies. Pipeline companies exposed to gas generally performed better than those exposed to oil.

- **Energy services** generally outperformed. Large cap diversified service providers performed particularly well, with the announcement of higher international oil spending by core members of OPEC, the build out of new LNG export facilities in the US and Qatar, a shortage of service capacity in the US, plus an expected uptick in offshore spending, all proving positive news.

In 2022 the **Guinness Global Energy Fund** produced a total return of 32.4% (Y class, in USD). This compares to the total return of the MSCI World Energy Index (net return) of 46.0%. Full performance data is shown at the end of this report.

Generally, the story in 2022 was significant outperformance from North American energy companies. On a stock-by stock-basis in the fund, our US shale oil biased E&P companies (Conocophillips +72%; EOG Resources +57%; Devon Energy Corp +51%; Pioneer Natural Resources +39%) were strong performers, enjoying a high degree of operational leverage to rising oil prices. US integrations (Exxon +87%; Chevron +59%) and our US refining holding (Valero +75%), also outperformed, benefitting from exceptional returns in the US refining environment. Another subsector within the fund that outperformed over the year was Canadian integrations (Imperial Oil +38%; Canadian Natural Resources +40%), with high-cost oil sands operations enjoying oil price leverage and growing free cashflow profiles.

The fund's service exposure outperformed (Helix +136%; Schlumberger 81%), with the prospect of rising international oil and gas spending boosting earnings estimates.

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 by 40%.

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 year, we saw:

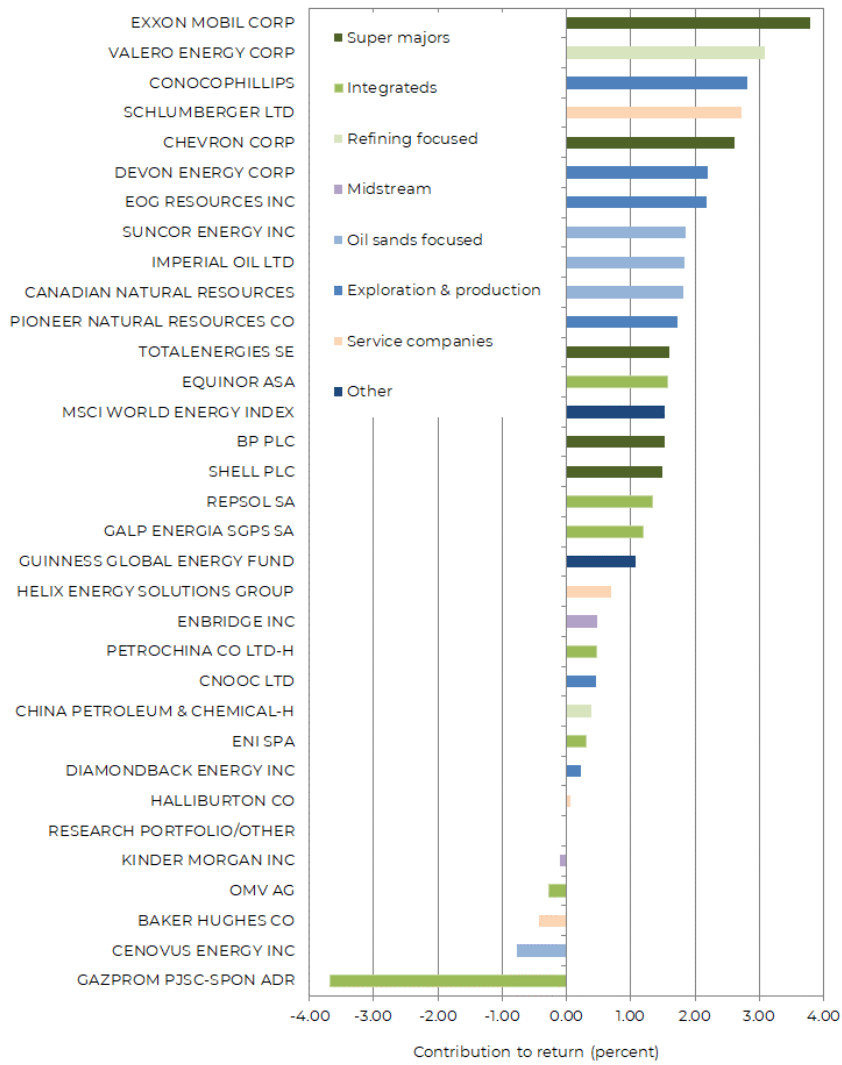
- The exceptional decline in our holding in Gazprom (a 3.8% weight at the start of the year). Our position in Gazprom was sold on 1 March, post Russia's invasion of Ukraine but before the stock was suspended on the London GDR market on 3 March. The decision to sell was a painful one, with Gazprom one of our strongest holdings over the previous five years, but driven by a belief that little value was likely to accrue to Western shareholders of Gazprom in the foreseeable future.
- Higher exposure in the fund to European integrations (e.g. OMV -5%; ENI +10%), which as a group suffered versus North American peers thanks to Russian asset exposure/proximity to Russia.
- Very high weighting in the index to North America (in particular Exxon +87% and Chevron +59%), seen as an energy safe haven in 2022. 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 approximately in-line with the MSCI Energy (All Country) Index (+33.1%), which also includes developing markets in its composition.

The contribution to performance of each position in the fund is summarised in the following chart:

## 2023 Outlook for Global Energy

### Estimated contribution by position for Global Energy Fund in 2022 (in USD)



Source: Bloomberg; Guinness Global Investors



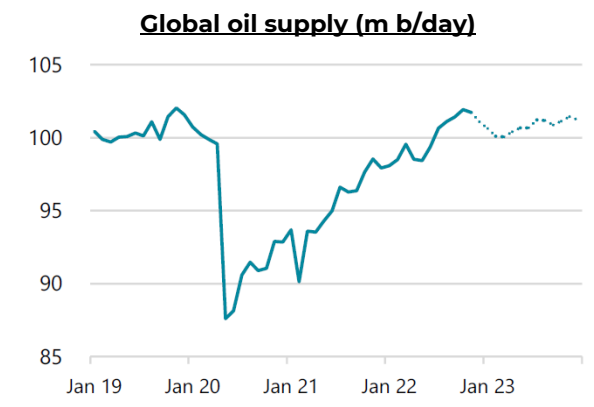
**THE OUTLOOK FOR 2023**

**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. We believe the oil price desired by OPEC is at around \$75-80/bl, though they will accept a higher outcome if it does not destabilise the global economy.**

**Oil supply**

The world’s oil supply grew sharply in 2022, as the OPEC+ group reacted to global demand recovery post the worst of COVID dislocations. Supply rose, on average, by around 4.7m b/day, as OPEC and partners raised their quotas and added 3.0m b/day. Non-OPEC supply (outside OPEC+ members) grew around 1.7m b/day, as capital discipline, especially in the US onshore (shale) sector, held production back.

After nearly three years of increasing oil production post the worst of COVID, the world’s oil supply likely takes a breather in 2023. OPEC+ have reduced 2023 quotas by 2m b/day in anticipation of slowing global oil demand growth while capital discipline and deteriorating capital efficiency in the US onshore (shale) oil patch likely leads to limited growth. Non-OPEC (ex US shale) will have some pockets of growth thanks to newer project developments but there will be no major roll-out of large new projects, the cycle peaking in 2020.



Source: IEA

**OPEC+ oil supply**

OPEC+, led by Saudi, continued their micromanagement of the oil market, balancing supply additions to the recovery in demand seen through much of 2022. It became apparent, however, that OPEC+ production was struggling to keep up with quotas, reflecting underinvestment in oil supply in number of OPEC+ countries, particularly in Africa.

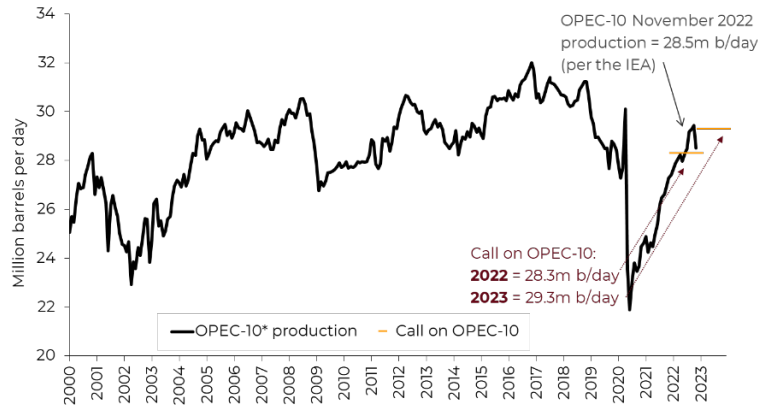
Amid growing global economic uncertainty later in the year, OPEC+ met in early October 2022 and agreed a headline 2m b/day quota cut, effective from November and valid until December 2023 (which has since translated into an actual production cut of around 1m b/day). OPEC provided two reasons for the cut: first, management of short-term demand weakness, and second, a push for higher prices to incentivise new investment. Saudi energy minister Prince Abdulaziz bin Salman commented after the conference “*We have always opted for making sure we are attentive to the market... and to be attentive, you have to be pre-emptive and certainly ahead of the curve, which means you have to be proactive*”.

We believe that the OPEC+ group continue to signal a high degree of flexibility in 2023 to adjust their production, thereby attempting to put a ‘soft’ floor under oil prices should oil demand falter.

## 2023 Outlook for Global Energy

Based on IEA forecasts, the 'call on OPEC-10' in 2023 (i.e. the amount of oil that core OPEC members will need to supply to keep the market in balance) is around 29.3m b/day. This compares to current production of around 28.5m b/day:

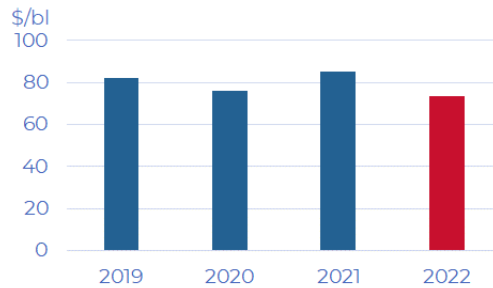
### OPEC-10 production vs call on OPEC-10 according to the IEA (m b/day)



Source: Bloomberg; IEA; Guinness Global Investors

Overall, we believe that Saudi's long-term objective remains to maintain a 'good' oil price, as close to their fiscal breakeven of around \$75-80/bl as possible, without overstimulating non-OPEC supply. The actions taken in recent months represent further steps on that journey. With oil prices at more comfortable levels for the group, we would now expect government expenditures to steadily pick up and for the 'break even oil price' metric to trend higher in the coming years.

### Saudi estimated fiscal breakeven oil prices 2019-22 (\$/bl)



Source: IMF; Guinness Global Investors

Observing the slowing of investment in non-OPEC oil supply, 'core' members of OPEC are embarking on large scale upstream oil and gas investment programmes to help fill any future shortfall. Saudi Aramco is planning to increase production capacity from its current 12m b/day to 12.3m b/day in 2025 and 13m b/day in 2027. In support of this goal, the company has stated plans to double the size of its offshore fleet, to 90 rigs by 2024. It is also seeking co-investors for its \$110bn unconventional gas development at Jafurah, with 200 Tcf of reserves that could be used for petrochemicals feedstock, displacing oil feedstock to be exported. In Kuwait, the Kuwait Petroleum Corporation is starting its first ever offshore oil development in 2023 to support its long-term 4.75m b/day capacity target.

Over many years, we have heard impressive capacity growth targets from OPEC countries, and many have not come to fruition. Even if current growth plans are more successful, OPEC will continue to add supply into the market only when it is required, rather than to create oversupply.

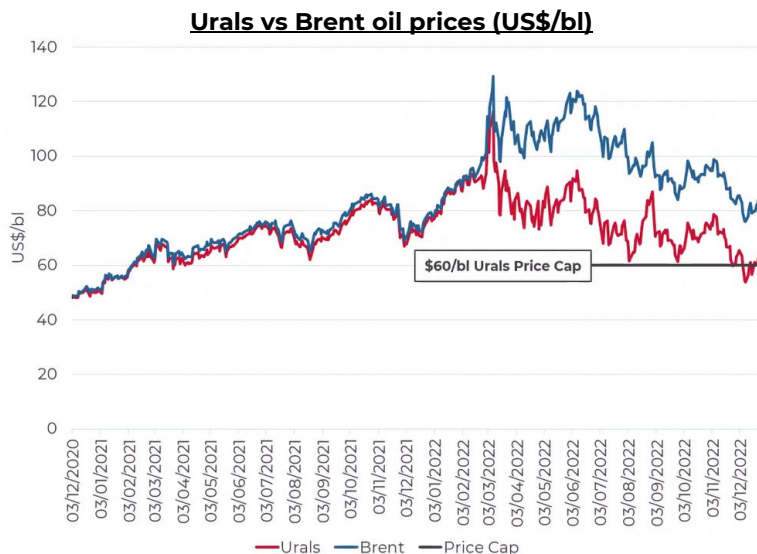
Within the broader OPEC+ group, the trajectory for **Russian oil supply** in 2023 will be critical and, in truth, difficult to predict.

In early December 2022, an EU embargo and G-7 price cap on Russian oil came into force. The EU embargo on Russian crude oil, and subsequent embargo on Russian oil products from February 2023, are designed to stop EU countries from importing Russian crude oil and oil products. They also include a ban on the provision by EU companies of insurance, trading, brokering and other services related to the movement of cargoes of Russian oil.

## 2023 Outlook for Global Energy

If successfully implemented, they should reduce EU imports on Russian oil and oil products (1.4m b/day and 1.0m b/day as of October 2022), to zero by mid-2023.

The G-7 price cap has been designed to mitigate the effect of the EU insurance ban by allowing a group of G-7 and EU countries plus Australia to ship and import Russian Urals oil cargoes as long as the price is below a specific price cap (currently at \$60/bl but adjusted regularly). Historically, Urals has traded at a small discount to Brent but that discount has widened sharply since the invasion leaving Urals trading around \$66/bl at the year-end, a \$20/bl discount to Brent.



Source: Bloomberg

Russia has stated that it will not sell its oil to any country that imposes the price cap. It will attempt to re-route its oil and oil products to markets such as China, India and Turkey, who have already increased their consumption of Russian oil since the Ukraine invasion in 2022. However, China and India may not want to rely on much Russian oil since it already represents significant levels of respective crude oil imports (18% and 25%) and domestic refineries may not be equipped to take more. Redirecting Russian oil from the EU to these more distant markets is also estimated to require as many as 100 extra oil tankers, implying higher transportation fees.

The full impact of the embargo and price cap are not likely to be felt until well into 2023. We note that the Russian government budget assumes a 0.5m b/day fall while the IEA estimates a fall of 1.4m b/day through the first quarter of 2023. The range of outcomes is wide; we see good chance that around 1m b/day of Russian oil exports are lost as a result of these actions.

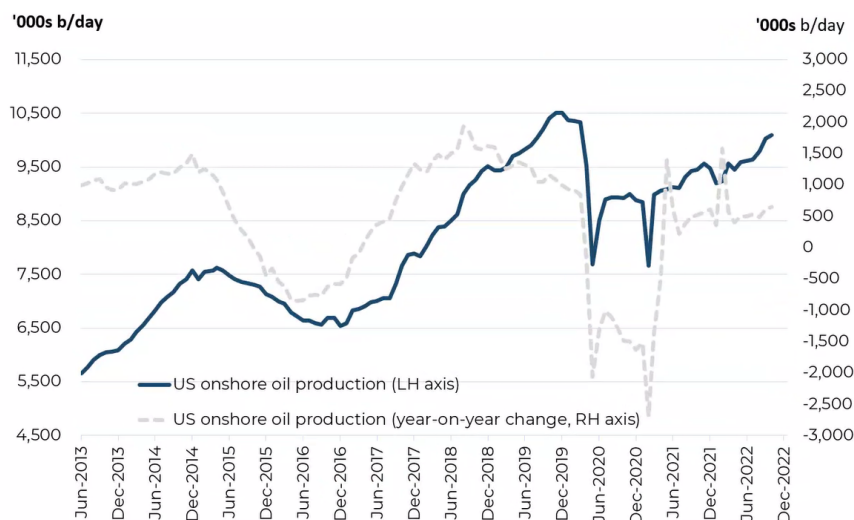
While not appearing likely, we must consider the possibility of some form of negotiated settlement to the Ukraine crisis which could reverse the pressure on Russian oil supply and lead to lower near-term crude oil prices. In this scenario, OPEC+ will be watching global oil balances closely and reacting if needed.

### US onshore (shale) oil supply

For much of the last decade, growth in the US shale industry had been responsible for keeping global oil markets well supplied, forcing OPEC and other allies to hold some of their production back to achieve a stable market. Latest EIA data for October 2022 (published at the start of January 2023) confirmed that whilst production has recovered well from the lows of May/June 2020, it still sits around 0.4m b/day below the November 2019 peak of 10.5m b/day.

## 2023 Outlook for Global Energy

### US onshore oil production 2013-2022 (m b/day)

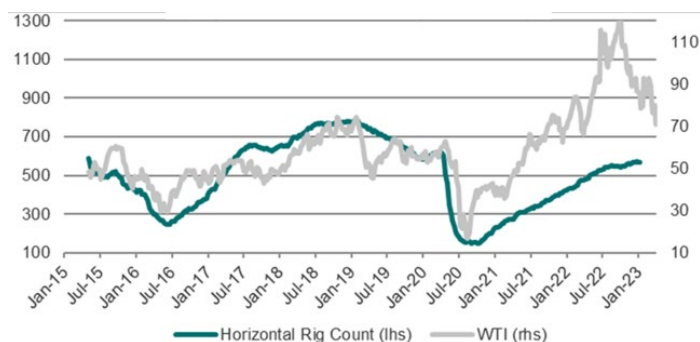


Source: EIA; Bloomberg; Guinness Global Investors

The previous cycle of production growth, between 2016 and 2019, was achieved thanks to near limitless funding from equity and debt markets, combined with a producer mentality that favoured growth over returns. By contrast the rebound in US shale oil production growth since 2020 has been more modest, owing to i) greater capital discipline from E&P companies, with equity markets rewarding companies that prioritised free cashflow and dividends over reinvestment; ii) deteriorating capital efficiency due to inflation; and iii) signs of degrading resource quality.

In terms of **drilling activity**, shale oil producers have been adding back drilling rigs at a slower rate, with the drilling rig count for oil perhaps 300 lower than would have been expected, given the trajectory of oil prices.

### US horizontal rig count vs WTI oil price (oil price moved forward by 12 weeks)



Source: DNB

With regard to **deteriorating capital efficiency**, we have seen the breakeven economics for shale wells increase sharply over the past 18-24 months because of raw material and service cost inflation, compounded by a pause in the long-term trend of drilling and production efficiency improvements.

- US onshore **service cost inflation** appears to have been around 15-20% in 2022 and indications for 2023 are for a further 10-20% inflation due to higher pricing for raw materials, sand, chemical costs, labour, trucking, steel, and service costs.
- In terms of **drilling and production efficiencies**, it appears that shale productivity gains may have peaked in 2022. Initial production rates across all the key shale basins have deteriorated in 2022 by around 5% on average versus 2021, falling back to levels seen in 2020 or 2019. While this shift is interesting, we treat the data with some caution. It could partially be explained by greater involvement of private operators (with potentially lower quality resource opportunities) or the industry's focus on running down its inventory of drilled-but-uncompleted wells.

## 2023 Outlook for Global Energy

Time will tell but, on our estimates, service cost inflation and deteriorating capital efficiency have led to breakeven shale oil prices rising around 10% in 2021 and 15% in 2022 to reach around \$60/bl WTI. Cost inflation and lower drilling and production efficiencies likely see this trend higher in 2023.

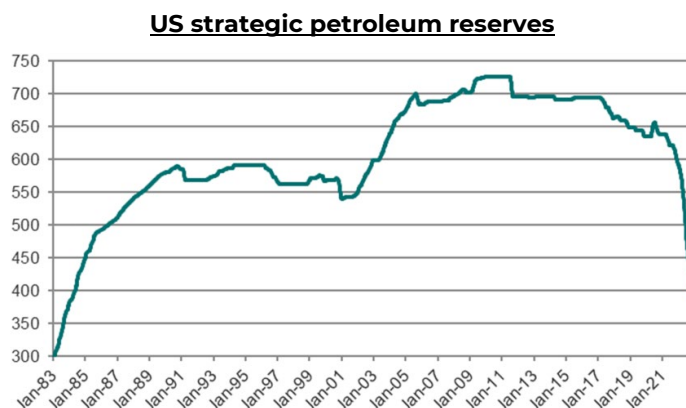
Concluding on US onshore (shale) supply, we see a more muted growth outlook in 2023, averaging around 0.5m-0.75m b/day with the industry persisting in its focus on free cashflow yields, deleveraging, increasing returns to shareholders and consolidation. This expectation is lower than 2022 growth of 0.8m b/day and significantly less than the annual average from 2017-19.

Ultimately, US supply will continue to be watched closely by OPEC. If shale oil grows at this manageable level - a level that does not exceed (normalised) global oil demand growth - then OPEC will feel they retain control of the market.

### US strategic petroleum reserves

While not technically new supply, we also consider here the fact that the US strategic petroleum reserve has been drawn substantially during 2022, effectively adding to US commercial oil supply. By the end of 2022, we estimate that the SPR drew at a rate of nearly 0.8 m b/day since March 2022, or an annual average rate of 0.6m b/day – equivalent to the growth of the US shale system and essentially doubling US supply growth to around 1.2m b/day.

SPR releases ended in December 2022, with the US administration indicating that it is mothballing future SPR releases (including those mandated for 2023) and commencing a refilling programme when WTI trades at around \$70/bl. The swing from significant SPR releases to possible refilling represents a major tightening of US oil balances.



Source: EIA; Bloomberg; Guinness Global Investors

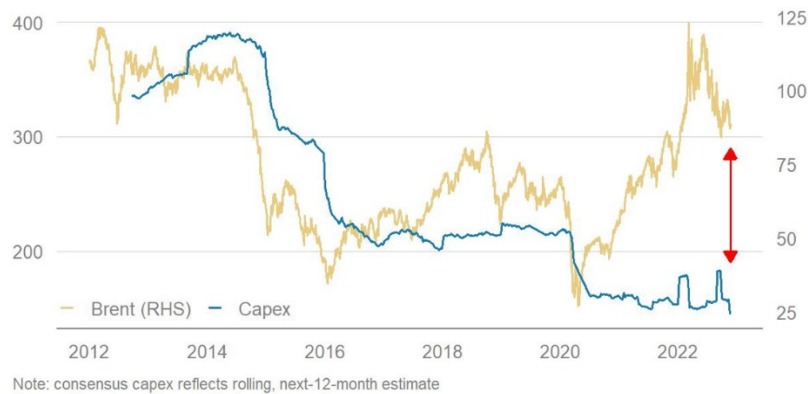
### Non-OPEC (ex US onshore) oil supply

Despite representing over half of world oil supply (estimated 50m b/day in 2022), non-OPEC (ex US-onshore) production receives relatively little attention.

We have witnessed a sustained period of underinvestment, predominantly as a result of lower oil prices, and this theme is likely to continue through 2023. On our estimates, real upstream oil and gas capital expenditure was likely around 30% lower in 2022 than it was on average between 2011 and 2014. Typically, upstream investment follows movements in the oil price, with a lag of maybe 12-18 months, but analysis from Morgan Stanley below shows that this relationship appears to have broken down since 2020. Reduced levels of investment raise concern over the long-term growth potential of non-OPEC (ex US). Moreover, even if investment picks up today we will not see new growth for three of four more years.

## 2023 Outlook for Global Energy

### Upstream oil and gas capital expenditure for the 119 largest listed oil and gas companies (LHS, US\$bn) versus oil price (RHS, \$/b)



Source: Bloomberg, Morgan Stanley

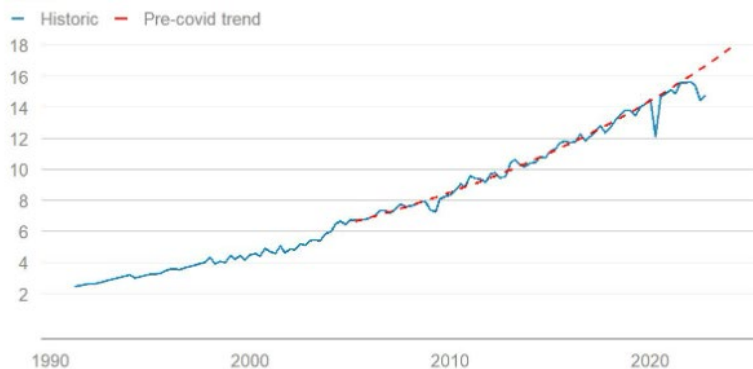
## Oil demand

According to the IEA, global oil demand for 2022 will end up rising by around 2.3m b/day. This compares to forecast growth at the start of the year of 3.3m b/day.

Looking ahead to 2023, the path for oil demand will vary region by region and within oil product group. Here, we consider three key components of 2023 demand: the trajectory for Chinese oil demand; the outlook for global aviation; and the resilience of global oil demand to a global recession.

In **China**, the zero COVID policy has limited economic activity and transportation and resulted in Chinese oil demand being down in 2022 for the first time in over 30 years. With China now re-opening, there will be short-term softness in demand as the COVID wave passes, but eventually we see as much as 2m b/day of oil demand recovery should the country return to its pre-COVID trend level of activity. This represents a significant tailwind for global oil demand.

### Chinese oil demand (m b/day) and pre-COVID trend oil demand

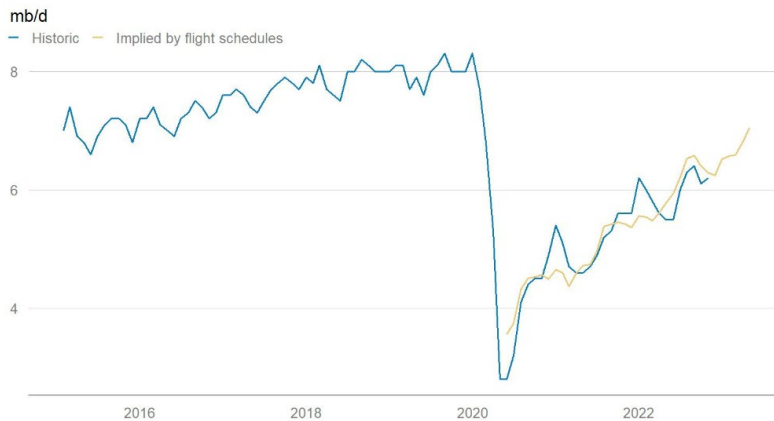


Source: Morgan Stanley

**Jet fuel demand for aviation** remains the weakest oil product group relative to pre-COVID trends. At 6.3m b/day, global jet fuel demand is still approximately 2m b/day below 2019 levels. Current schedules for commercial flights suggest an increase to around 7m b/day by 2Q 2023. Beyond that, a recovery to pre-COVID trends would suggest a further 1-1.5m b/day of demand recovery, although we note that this would be contingent on sentiment towards global air travel returning to pre-pandemic levels. Longer-term, we see good reason to expect that a large share of this pent-up aviation demand reappears.

## 2023 Outlook for Global Energy

### Global jet fuel demand and demand implied by flight schedules



Source: Morgan Stanley, S&P Global Platts, Bloomberg

It is difficult to say precisely how oil demand will fare in a **recessionary environment**, because each recession is different. However, one of the factors that is often misunderstood is precisely how resilient oil demand is throughout the cycle. For example, it is notable that during the Global Financial Crisis (GFC) in 2008-09, oil demand declined only 0.8m and 0.9m b/day respectively and a strong rebound in 2010 of 2.9m b/day saw oil demand back above pre-GFC levels. In the 2000-01 recession, global oil demand growth slowed but stayed positive on an annual basis, averaging 0.8m b/day in 2000 and 0.9m b/day in 2001 before rebounding to 1.7m b/day in 2003. In the 1992-93 recession, oil demand contracted slightly, averaging -0.2m b/day in 2003, before recovering sharply to 1.6m b/day in 1994.

Combining the factors described here, the IEA forecasts demand in 2023 of 101.6m b/day, up by 1.7m b/day versus 2022. This would put global oil demand around 1m b/day above its previous peak in 2019 although still around 3m b/day below the pre-pandemic run rate. The IEA's forecasts imply that oil demand in the OECD region will still, on average, be around 3% lower in 2023 than in 2019. By contrast, demand in the non-OECD region in 2023 is expected to be around 4% ahead of 2019.

### World oil demand 2007-23E

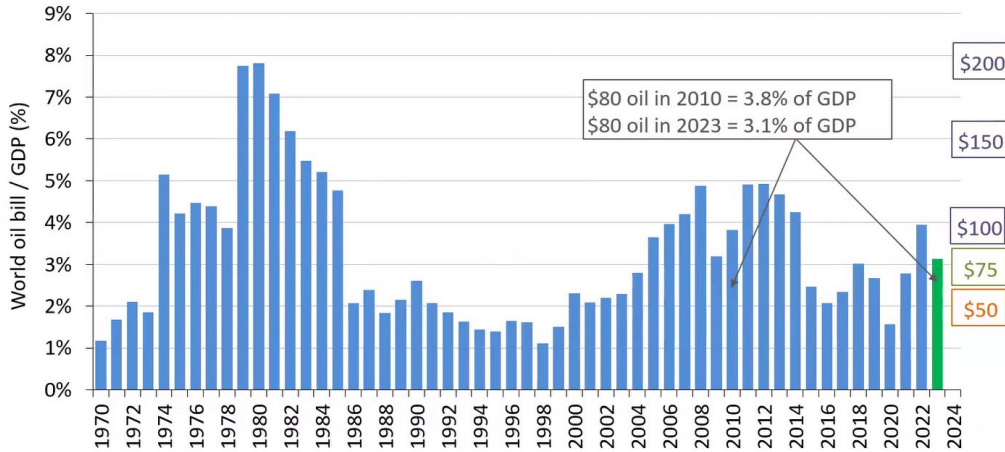
|                                  | 2007        | 2008        | 2009        | 2010        | 2011        | 2012        | 2013        | 2014        | 2015        | 2016        | 2017        | 2018        | 2019         | 2020        | 2021        | 2022E       | 2023E        |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|--------------|
| <b>OECD demand</b>               |             |             |             |             |             |             |             |             |             |             |             |             |              |             |             | IEA         | IEA          |
| North America                    | 25.8        | 24.5        | 23.7        | 24.1        | 24.0        | 23.6        | 24.2        | 24.2        | 24.6        | 24.9        | 25.1        | 25.4        | 25.4         | 22.4        | 24.3        | 25.0        | 25.1         |
| Europe                           | 15.6        | 15.5        | 14.7        | 14.7        | 14.3        | 13.8        | 13.6        | 13.5        | 13.8        | 14.0        | 14.4        | 14.3        | 14.3         | 12.4        | 13.1        | 13.6        | 13.7         |
| Pacific                          | 8.7         | 8.3         | 8.0         | 8.2         | 8.2         | 8.5         | 8.3         | 8.1         | 8.1         | 8.1         | 8.1         | 8.0         | 7.9          | 7.2         | 7.4         | 7.4         | 7.6          |
| <b>Total OECD</b>                | <b>50.1</b> | <b>48.3</b> | <b>46.4</b> | <b>47.0</b> | <b>46.5</b> | <b>45.9</b> | <b>46.1</b> | <b>45.8</b> | <b>46.5</b> | <b>47.1</b> | <b>47.7</b> | <b>47.7</b> | <b>47.7</b>  | <b>42.0</b> | <b>44.8</b> | <b>46.1</b> | <b>46.5</b>  |
| <i>Change in OECD demand</i>     | 1.2         | -1.8        | -1.9        | 0.6         | -0.5        | -0.6        | 0.2         | -0.3        | 0.7         | 0.6         | 0.6         | 0.0         | 0.0          | -5.7        | 2.8         | 1.3         | 0.4          |
| <b>NON-OECD demand</b>           |             |             |             |             |             |             |             |             |             |             |             |             |              |             |             |             |              |
| FSU                              | 4.0         | 4.2         | 4.0         | 4.1         | 4.4         | 4.6         | 4.5         | 4.6         | 4.6         | 4.4         | 4.7         | 4.7         | 4.7          | 4.6         | 4.9         | 4.9         | 4.7          |
| Europe                           | 0.7         | 0.7         | 0.7         | 0.7         | 0.7         | 0.7         | 0.7         | 0.7         | 0.7         | 0.7         | 0.8         | 0.8         | 0.8          | 0.7         | 0.8         | 0.8         | 0.8          |
| China                            | 7.6         | 7.7         | 7.9         | 8.9         | 9.3         | 9.9         | 10.4        | 10.8        | 11.6        | 12.0        | 12.5        | 13.0        | 14.1         | 14.2        | 15.4        | 15.0        | 15.8         |
| India                            | 2.9         | 3.1         | 3.2         | 3.3         | 3.5         | 3.7         | 3.7         | 3.8         | 4.2         | 4.4         | 4.8         | 5.0         | 5.1          | 4.6         | 4.8         | 5.2         | 5.3          |
| Other Asia                       | 6.9         | 6.8         | 7.1         | 7.5         | 7.6         | 7.6         | 7.9         | 8.0         | 8.3         | 8.8         | 8.9         | 9.0         | 9.0          | 8.1         | 8.6         | 8.8         | 9.1          |
| Latin America                    | 5.3         | 5.6         | 5.7         | 6.1         | 6.2         | 6.5         | 6.6         | 6.8         | 6.7         | 6.5         | 6.4         | 6.3         | 6.3          | 5.4         | 5.9         | 6.1         | 6.1          |
| Middle East                      | 6.4         | 6.7         | 7.1         | 7.3         | 7.5         | 7.9         | 8.0         | 8.4         | 8.5         | 8.4         | 8.3         | 8.2         | 8.8          | 8.1         | 8.5         | 9.0         | 9.1          |
| Africa                           | 3.3         | 3.3         | 3.4         | 3.5         | 3.5         | 3.8         | 3.8         | 3.9         | 4.2         | 4.2         | 4.2         | 4.2         | 4.1          | 3.8         | 4.0         | 4.2         | 4.1          |
| <b>Total Non-OECD</b>            | <b>37.1</b> | <b>38.1</b> | <b>39.1</b> | <b>41.4</b> | <b>42.7</b> | <b>44.8</b> | <b>45.6</b> | <b>47.4</b> | <b>48.8</b> | <b>49.3</b> | <b>50.4</b> | <b>51.1</b> | <b>52.9</b>  | <b>49.5</b> | <b>52.8</b> | <b>53.8</b> | <b>55.2</b>  |
| <i>Change in non-OECD demand</i> | 1.7         | 1.0         | 1.0         | 2.3         | 1.3         | 2.1         | 0.8         | 1.8         | 1.4         | 0.5         | 1.1         | 0.7         | 1.8          | -3.4        | 3.3         | 1.0         | 1.4          |
| <b>Total Demand</b>              | <b>87.2</b> | <b>86.4</b> | <b>85.5</b> | <b>88.4</b> | <b>89.2</b> | <b>90.7</b> | <b>91.7</b> | <b>93.1</b> | <b>95.3</b> | <b>96.3</b> | <b>98.1</b> | <b>98.9</b> | <b>100.5</b> | <b>91.5</b> | <b>97.7</b> | <b>99.9</b> | <b>101.6</b> |
| <i>Change in demand</i>          | 2.1         | -0.8        | -0.9        | 2.9         | 0.8         | 1.5         | 1.0         | 1.4         | 2.2         | 1.0         | 1.8         | 0.8         | 1.6          | -9.0        | 6.2         | 2.2         | 1.7          |

Source: IEA; Guinness Global Investors

Globally, we believe that oil remains a 'good value' commodity. Based on Brent oil price of around \$80/bl in 2023, we calculate that the world would spend around 3.1% of GDP on oil, in line with the 30-year average of around 3%. We believe that oil would need to increase to over \$120/bl, reflecting 5%+ of world GDP in 2023, if it were to have a noticeable negative impact on the global economy.

## 2023 Outlook for Global Energy

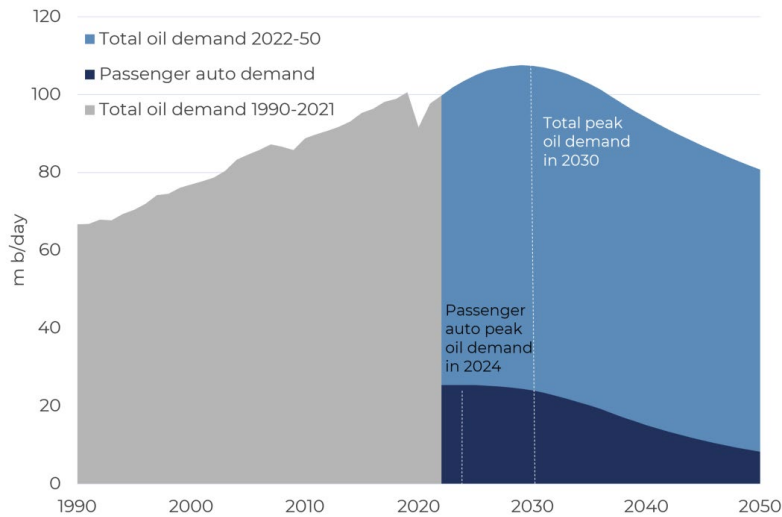
### The world oil 'bill' as a percentage of GDP



Source: IEA; Bloomberg; Guinness Global Investors

Looking longer term, the key issue for global oil demand is the electrification of personal transportation. In 2022, we saw continued strong take up of electric vehicles (EVs), with global EVs sales rising to around 13% of total auto sales, versus 6% in 2021. We believe that oil product demand (gasoline and diesel) for personal transportation will peak in the mid-2020s, shortly after improvements in battery technology allow EVs to be price competitive with internal combustion engine vehicles on an unsubsidised basis. We expect the other areas of global oil demand, such as petrochemicals and aviation, to continue to grow with global GDP, and the net of this activity suggests a peak in global oil demand around 2030, somewhere around 105-110m b/day.

### World Oil Demand (1990-2050E)



Source: IEA; Guinness Global Investors

## Oil inventories and conclusions

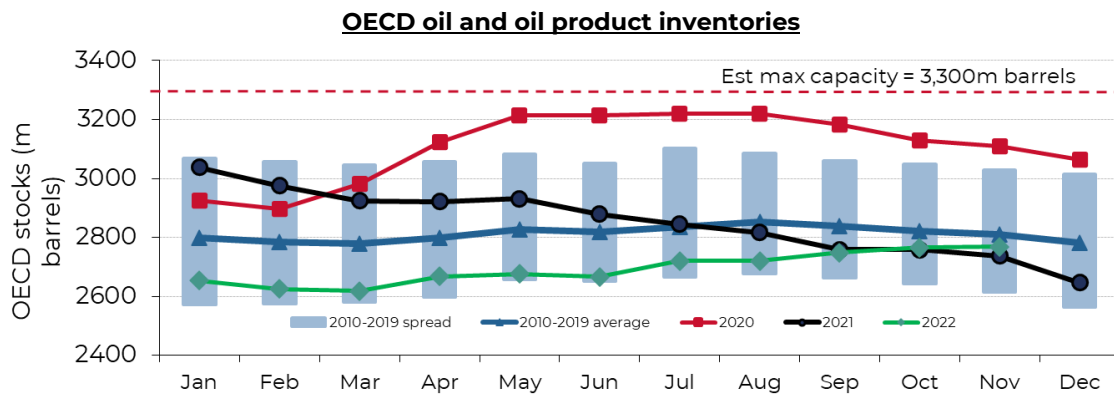
As of November 2022, OECD oil and oil product inventories stood at an estimated 2.77bn barrels, around 30m barrels higher than November 2021 and around 40m barrels below the 10-year average.

The evolution of inventories in 2023 will be dynamic, depending on price, OPEC delivery, Russian outcomes, strategic petroleum reserve movements, corporate behaviour and macro-economic factors. Our base case for 2023, making assumptions for the key sensitivities discussed in this report, is that the world oil market will be kept roughly in balance by OPEC, but with a greater prospect of market looseness in 1H 2023, followed by tighter



## 2023 Outlook for Global Energy

conditions in 2H 2023 as China recovers post a COVID re-opening and the full effect of the Russian embargo takes hold.



Source: IEA; Guinness Global Investors

OPEC+'s task in the months ahead is to continue to be dynamic with its supply in reaction to oil demand that will be erratic in the face of the headwinds of a slowing global economy but tailwinds on post COVID normalisation.

Longer term, once COVID recedes and the world economy normalises, there is the question of where oil prices settle back to. We believe that Saudi's long-term objective remains to maintain a 'good' oil price, as close to their fiscal breakeven of \$70-80/bl as possible. We model a Brent oil price of \$80/bl for 2023 since this represents a world oil bill of around 3.1% of 2023 Global GDP, below the average of the 1970 – 2015 period (3.4%). Faltering non-OPEC supply suggests they are well positioned to keep control of the market, though Saudi will be mindful that excessively high prices may bring new supply from somewhere. Beyond 2023, we feel that \$75/bl is a sensible Brent oil price, one that allows world oil demand to continue to grow; that incentivises an acceptable amount of non-OPEC and US onshore (shale) oil growth; and that satisfies core OPEC budgetary requirements.

## Natural gas markets

### US natural gas

The Henry Hub spot gas price was pulled higher in 2022 as a result of the tightness in international energy markets, averaging \$6.56/mcf for the year versus \$3.72/mcf in 2021 and \$2.13/mcf in 2020.

Key features of the US gas market in 2022 were:

- **Strong demand for LNG exports**, as Europe tried to replace Russian gas. Exports would have been greater were it not for an explosion at the large Freeport LNG facility in June that took the facility offline for the remainder of the year;
- **Higher residential/commercial and industrial demand**, as the economy continued to recover post COVID. Despite the higher gas price in 2022, gas demand for power generation grew because coal fired power generation economics suffered from higher coal prices;
- **Strong supply growth** driven by greater levels of associated gas production as well as higher drilling activity (Baker Hughes gas directed rig count was up 50% in 2022 vs 2021)

The outlook for natural gas in the US in 2023 is likely to be defined by various factors:

- A more **muted underlying gas demand outlook** as industrial gas demand strength is offset by weaker power generation demand (as a result of higher prices);
- **LNG exports rising** to 12.9 Bcf/day for 2023 (+16% YoY), with the growth driven by Freeport returning to full service (starting 1Q 2023) and a full year of Calcasieu Pass volumes.

## 2023 Outlook for Global Energy

- **Greater supply from the Haynesville and Appalachia** as well as associated gas out of the Permian thanks to higher oil and gas prices.

Beyond 2023, we expect to see a material increase in US LNG export capacity as higher international gas prices incentivise new LNG export investment. Proposed projects imply capacity growth of around 7-8 Bcf/day by the end of 2025 and a further 5-6 Bcf/day in 2026, bringing total export capacity to around 28 Bcf/day by 2026 (versus LNG exports of 11.1 Bcf/day in 2022).

### US natural gas demand model (2012 – 2023E)

| Bcf/day                        | 2012         | 2013        | 2014         | 2015         | 2016         | 2017        | 2018        | 2019         | 2020         | 2021        | 2022E        | 2023E        |
|--------------------------------|--------------|-------------|--------------|--------------|--------------|-------------|-------------|--------------|--------------|-------------|--------------|--------------|
| <b>US natural gas demand:</b>  |              |             |              |              |              |             |             |              |              |             |              |              |
| Residential/commercial         | 19.2         | 22.4        | 23.4         | 21.4         | 20.5         | 20.9        | 23.4        | 23.5         | 21.5         | 21.5        | 23.1         | 23.1         |
| Power generation               | 24.9         | 22.3        | 22.3         | 26.5         | 27.3         | 25.3        | 29.0        | 30.9         | 31.7         | 30.9        | 32.6         | 31.0         |
| Industrial                     | 19.7         | 20.3        | 20.9         | 20.6         | 21.1         | 21.6        | 23.0        | 23.1         | 22.3         | 22.5        | 23.0         | 23.8         |
| Pipeline exports (Mexico)      | 1.8          | 1.9         | 1.9          | 2.7          | 3.8          | 4.0         | 4.6         | 5.1          | 5.4          | 5.9         | 5.8          | 6.0          |
| LNG exports                    | -            | -           | -            | 0.1          | 1.0          | 2.6         | 2.8         | 4.8          | 6.4          | 9.7         | 11.1         | 12.9         |
| Pipeline/plant/other           | 6.1          | 6.7         | 6.3          | 6.5          | 6.4          | 6.5         | 7.0         | 7.8          | 7.7          | 7.8         | 8.1          | 8.5          |
| <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>89.8</b> | <b>95.2</b>  | <b>95.0</b>  | <b>98.3</b> | <b>103.7</b> | <b>105.3</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>8.9</b>  | <b>5.4</b>   | <b>- 0.2</b> | <b>3.3</b>  | <b>5.4</b>   | <b>1.6</b>   |
| <b>US natural gas supply:</b>  |              |             |              |              |              |             |             |              |              |             |              |              |
| US (onshore & offshore)        | 65.7         | 66.3        | 70.9         | 74.2         | 73.4         | 73.6        | 84.3        | 91.4         | 91.1         | 91.8        | 97.3         | 101.1        |
| Net imports (Canada)           | 5.4          | 5.0         | 4.9          | 4.9          | 5.5          | 5.8         | 5.4         | 4.7          | 4.4          | 5.1         | 5.5          | 5.5          |
| 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>89.8</b> | <b>96.2</b>  | <b>95.5</b>  | <b>96.9</b> | <b>102.9</b> | <b>106.6</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>10.1</b> | <b>6.4</b>   | <b>- 0.7</b> | <b>1.4</b>  | <b>6.0</b>   | <b>3.7</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>-</b>    | <b>- 1.0</b> | <b>- 0.5</b> | <b>1.4</b>  | <b>0.8</b>   | <b>- 1.3</b> |

Source: EIA; Bloomberg; Goldman Sachs; Morgan Stanley; Guinness Global Investors

The US natural gas price since 2010 has mainly fluctuated between \$2 and \$4/mcf. The extremes of this range have tended to coincide with warm and cold winters, and any sustained recovery over \$3.50/mcf has generally been muted by strength in gas supply. With inflationary pressures, we estimate that new onshore supply has an incentive price of around \$4-4.50/mcf but note that higher international prices will likely help to keep US gas prices above the incentive price through 2023 and beyond. Accordingly, we estimate a Henry Hub price of around \$6/mcf this year that will trend back to around \$4.50/mcf in subsequent years.

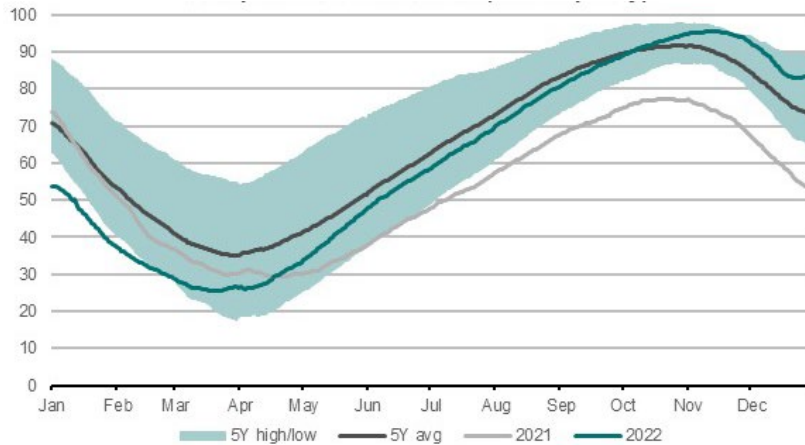
### International natural gas

2022 will be remembered as a year in which security of supply fears in Europe, resulting from the Russian invasion of Ukraine, forced dramatically higher international LNG and pipeline gas prices. Elevated prices will be needed for a number of years to incentivise the replacement of lost Russian natural gas production capacity.

In the short-term, it is worth reflecting on how successful the EU has been in refilling gas inventories into the 2022/23 winter, despite the loss of Nordstream gas pipeline imports in September and lower wind power generation and French nuclear power generation in the second half of 2022. Demand destruction and reliance on expensive LNG imports have been critical. Having previously been the 'market of last resort' for global LNG, Europe represented 25% of global LNG demand in 2022 (up from 16% in 2021) while a 28% decline in industrial consumption has led to a fall in overall natural gas demand of 18%yoy. Europe has also been helped by a particularly warm start to the 2022/2023 winter as well as a 20% decline in Chinese LNG demand, with China not bidding for 'uncommitted' LNG and instead relying on its long-term contracted LNG supply.

## 2023 Outlook for Global Energy

### European natural gas inventories (% of capacity)



Source: DNB, Guinness Global Investors

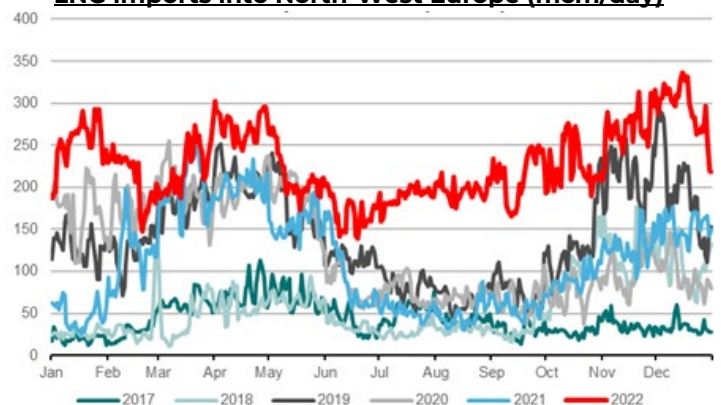
How does the international gas market evolve in 2023 and beyond? Simply speaking, the challenge for natural gas balances in Europe this year is likely to be greater than last year, thanks to even lower Russian imports. As in 2022, this will have to be resolved via a combination of higher LNG imports and pipeline imports and greater levels of demand destruction.

In terms of new supply options, UK production remains in slow decline, Dutch authorities are maintaining their plan to shut down the massive Groningen field in 2023 and Norway and Algeria have now exhausted most of their ability to maximise near term pipeline supplies. This means that 2023 will be another year of significant reliance on the global LNG, with the European call on LNG likely to increase by as much as 50m tonnes.

However, there is very little spare LNG capacity globally in 2023. The United States is the largest LNG exporter in the world and is operating at full available capacity and Australia – the second biggest LNG exporter in the world – is considering plans to limit LNG exports amid fears that the country could face a shortfall. Despite this, Germany is starting its first LNG regassification unit (the Hoegh Esperanza FSRU with 6m tonnes per annum capacity) and has two further FSRUs in construction. With China potentially reopening in 2023, we see reasonable likelihood that its LNG demand increases by at least 10mtpa in 2023 (and potentially a further 15mtpa in 2024). LNG will not be as easily available in 2023 as it was in 2022.

With supply so severely constrained, prices likely remain elevated and cause further demand destruction, in excess of what has already been suffered in 2022. Even with this happening, we see reasonable chance of going into winter 2023/24 with below normal inventory levels.

### LNG imports into North-West Europe (mcm/day)



Source: DNB, Guinness Global Investors

Longer term there are reasons for optimism around supply. Natural gas is an abundant resource and high prices are already incentivising major new investment. Over the last twelve months, we have seen a significant step up in new LNG project development activity, especially in Qatar and the US. Indicative economics suggest these new

## 2023 Outlook for Global Energy

LNG export projects will deliver LNG into European markets for between \$10-14/mcf (compared to historical European natural gas prices of around \$6-9/mcf pre-invasion).

In Qatar, Qatar Energy moved quickly to partner with a number of oil and gas majors to develop the “North Field East” expansion project. This latest expansion project is planned to be the single largest project in the history of the LNG industry with 6 individual 8mtpa trains. The expansion project is expected to cost nearly \$30 billion and will increase Qatar's LNG production capacity from the current 77mtpa to 126mtpa. First LNG is expected in 2027. However, even if the entire six train project were delivered to Europe, the additional 48mtpa of LNG would represent only 40% of the EU's Russian imports in 2021.

In the US, Venture Global LNG announced financing and a final investment decision for the \$13.2bn Plaquemines LNG facility around 20 miles south of New Orleans in Louisiana. Despite lacking full financing, construction started in 2021 meaning that first LNG can be expected in 2024. First phase capacity is expected to be around 13.2mtpa (around 12% of EU Russian gas imports). Various other facilities will reach final investment decision over the next year or two, that could push U.S. LNG exports to 25+ Bcf/day by late in the decade.

In summary, the combined forces of Chinese re-opening and European security of supply will keep international gas prices elevated, relative to pre-invasion levels, in 2023. In the absence of significant near-term supply options, high prices will encourage demand destruction and switching to other energy sources. Looking further ahead, we see LNG prices deflating to a \$10-14/mcf range as new US and Qatari LNG supply sources come online and allow Europe to displace almost all Russian gas imports.

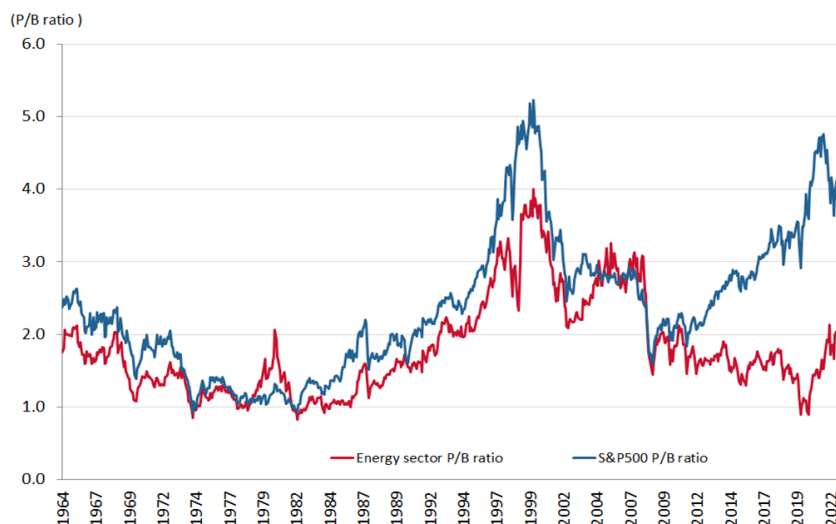
## 2023 Outlook for Global Energy

### Energy equities

Rises in oil and natural gas prices, combined with an improved refining environment, resulted in strong returns for energy equities in 2022. The sector (MSCI World Energy Index) finished +46.0% in USD, significantly ahead the broad market (MSCI World -18.1% in USD) and outperforming all other MSCI sectors. However, valuation still appears attractive relative to the return on capital employed from the sector that we expect in coming years.

The rise in energy equities last year lifted the price-to-book (P/B) ratio for the energy sector at the end of December 2022 to around 2.0x, versus the S&P 500 trading at 3.9x. On a relative P/B basis versus the S&P500, therefore, the valuation of energy equities now sits at around 0.5x, still more than two standard deviations below the long-term relationship.

#### P/B of energy sector versus S&P 500



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). Historically the two measures are closely correlated, a topic we return to later in this section.

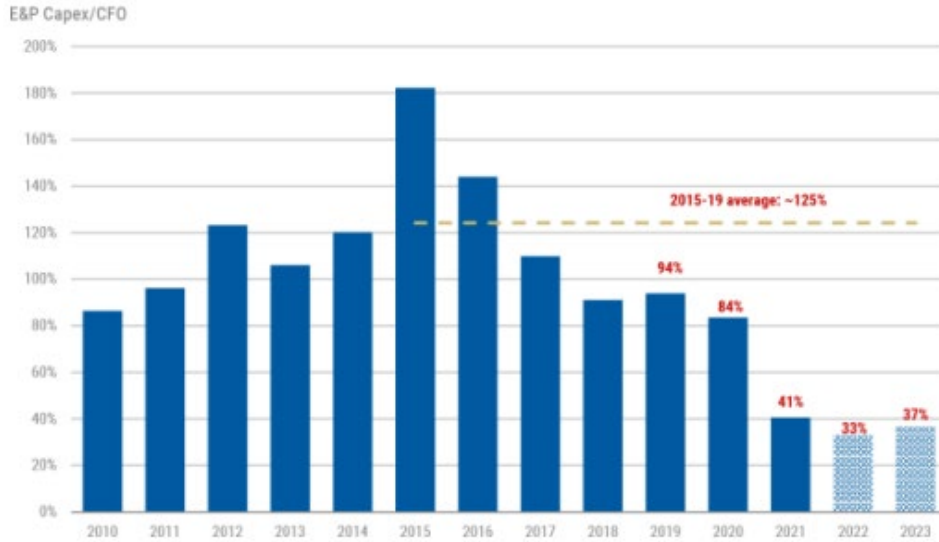
### The rise of free cashflow in the sector

Strong oil prices, alongside high natural gas prices and robust refining margins, have formed a bullish backdrop for operating cashflows in the sector, which in 2022 were significantly higher than generated in 2021. In general, this continues to translate into muted levels of reinvestment, lower levels of debt and a return of free cash to shareholders.

Considering, firstly, the US exploration and production sector, and after several years of focusing on production growth at the expense of return on capital and free cashflow, the sector is demonstrating a meaningful shift towards capital discipline. Nearly all US E&P companies stuck to the constrained capital reinvestment rates that they laid out at the start of 2022. Generally, we see companies currently spending 35-40% of cashflow on capital spending, which compares to the average reinvestment rate between 2015 and 2019 of around 125%. A lack of new debt being available has contributed to the slowdown in spending, but it has also been driven by the stock market rewarding those E&Ps that are embracing capital restraint over those that have continued to spend.

## 2023 Outlook for Global Energy

### US E&P sector: capital expenditure as % of cashflow from operations (2010-2023)

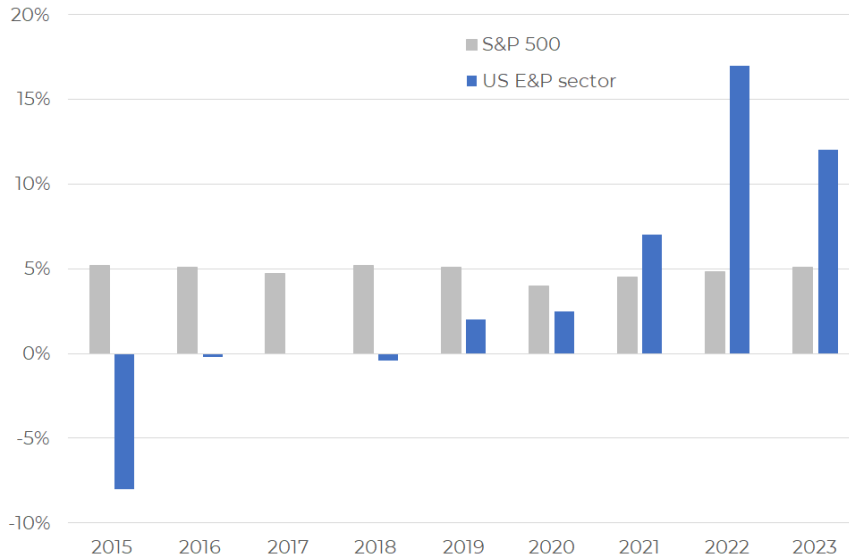


Sources: Morgan Stanley; Guinness Global Investors

The sector is contending with cost inflation, particularly in areas like the Permian Basin in Texas, where activity has rebounded the most. Companies have noted a lack of service capacity availability, in particularly a shortage of new pressure pumping fleets coming into the market, which have pushed unit costs higher by 15-20%. Nevertheless, spending budgets are under control, and this is translating into a major uptick in free cashflow.

## 2023 Outlook for Global Energy

### Free cashflow yield: US E&P sector vs S&P 500



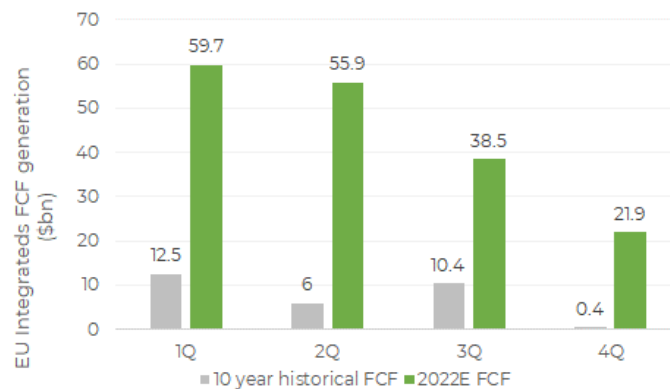
Sources: Morgan Stanley; Guinness Global Investors. Assumes \$92/\$77 WTI in 2022/23

The route by which free cashflow is being returned to shareholders has varied. The approach attracting most attention is the variable dividend, employed over the last 12-18 months by Devon Energy and Pioneer Natural Resources (both in our portfolio). The variable dividend framework, in which a percentage of excess free cashflow beyond base dividends is returned to shareholders, has been received favourably. We see it as providing transparency, clear through-cycle alignment between producers and shareholders, and should tie companies better to being capital disciplined. Other companies, such as EOG Resources, have relied on special dividends as their preferred mechanism for returning cash, though our sense is that there is a preference in the market for a codified rather than discretionary framework.

Looking ahead into next year, and assuming an average WTI price of \$77/bl, we expect that most E&Ps will be looking to grow their production by around 0-5%, which would be consistent with continued capital restraint. Capital expenditure budgets are likely to be higher to achieve that production, but overall free cashflow will be boosted by below market oil price hedges that will be rolling off for many companies.

For the large integrated oil and gas companies, positive momentum in key macro drivers (oil prices, gas prices, refining margins) have paved the way for higher cash returns. These effects are particularly evident for the European integrated oil & gas companies, where quarterly free cashflow returns this year are likely to be a multiple of the 10-year average historical free cashflow for the group:

### European integrateds FCF generation: 2022 vs 10 year average (\$bn)



Source: Goldman Sachs; Guinness Global Investors

## 2023 Outlook for Global Energy

In the first half of 2021, the EU integrateds focused on financial de-gearing, but balance sheet strength is now largely complete, with all companies reaching their gearing or net debt targets. The sector has therefore shifted its focus to incremental cash returns to shareholders. Given valuation metrics are depressed versus history, much of the return is coming in the form of share buybacks. Buybacks for the group in 2022 are estimated to have been around \$80bn, more than the buybacks reported in total for the previous four years.

As a group, we saw the super-majors covering their dividend by around two times in 2022, versus only around half cover in 2020. Ongoing capital discipline is supporting the lowest 'oil breakeven price' (i.e. oil price required to cover capex and dividends) in recent history for the group, sitting at around \$45/bl.

### Energy transition among the oil & gas large caps

The large integrated oil and gas companies historically have shown an ability and willingness to adapt to energy transitions. The latest transition is no different, with an acceleration of investments in and targets linked to low carbon activities. The shift is far more marked for the EU large oil groups, with Exxon, Chevron and Conocophillips in the US lagging.

The route to lower carbon intensity for these companies is taking many forms, but the key transition activities are likely to be:

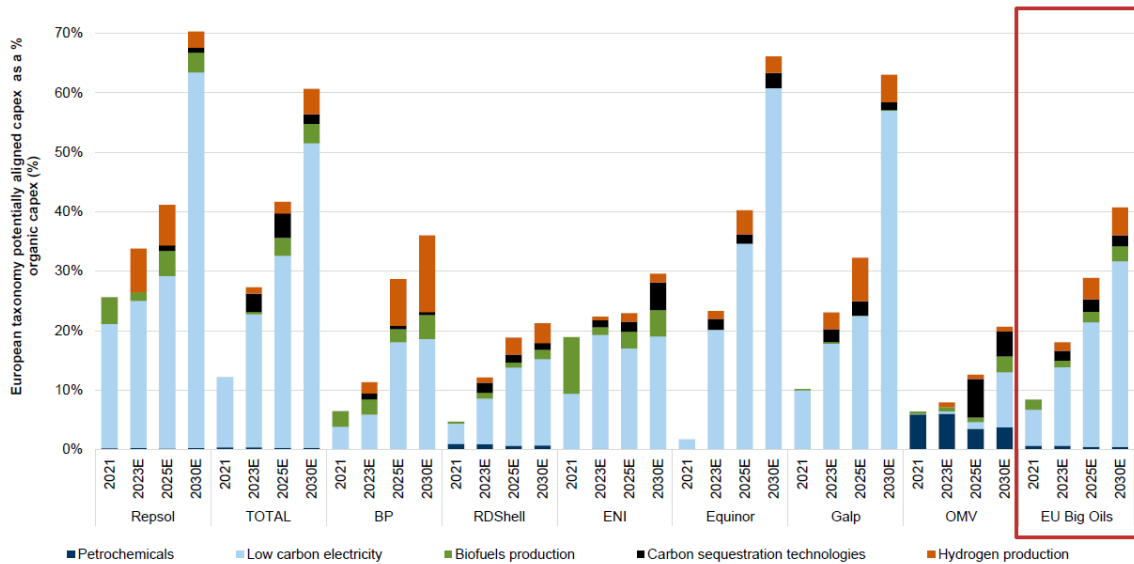
- **Significant expansion of low carbon electricity divisions.** This is likely to be a combination of renewable power capacity (solar; onshore & offshore wind) and growing power retail and trading capabilities.
- **Expansion in petrochemicals.** The petrochemicals industry is relevant to the net zero route in that it forms a non-combustion market for hydrocarbons.
- **Scaling up in biofuels.** This will be a combination of renewable natural gas and renewable liquids, with various end markets particularly in power and transportation.
- **Carbon sequestration.** As carbon capture activities ramp up, these should achieve better economies of scale.
- **Green hydrogen.** Cleaner hydrogen is emerging as a key technology to decarbonise at the higher end of the cost curve, especially in power and gas-intensive industrial processes.

The pace and ambition of large cap oil companies in their pursuit of renewable generation capacity varies considerably. By 2025, for example, it looks likely that Total and Repsol will be spending over 40% of their capital budgets on activities that will be deemed 'green' under EU taxonomy, whilst Shell and ENI will still be around 20%.



## 2023 Outlook for Global Energy

### European big oils: EU taxonomy 'green' capex as a % of total capex



Source: Goldman Sachs; Guinness Global Investors

By contrast, for Exxon and Chevron, less than 10% of capital spending in 2025 is likely to align with 'green' taxonomy. And much of this spending will be directed to advancing biofuels and carbon capture and storage. Notably, Exxon holds interests in around one third of the world's CCS capacity. Whilst Chevron retains a small renewable portfolio consisting of legacy wind and solar projects, Chevron's New Energies business focuses instead on renewable fuels. Renewable fuel volumes are expected to treble by 2025, with the ambition of producing 100k b/day of renewable diesel and sustainable aviation fuel by 2030 (supported by its recent acquisition of Renewable Energy Group). The company is also investing in two of the world's largest carbon dioxide injection projects: the Quest CCS project in the Canadian oil sands and the Gorgon Project in Australia.

For all the interest around big oils and their potential transition to renewable and other low carbon technologies, we must recognise that it will be a long journey. Even with the scale of Total's plans, for example, we estimate that only around 20-25% of the company's enterprise value in 2030 will be represented by its low-carbon business. That said, the value of low carbon businesses for some of Europe's smaller integrations is already meaningful – over 20% of Repsol's enterprise value is already estimated to be in low carbon businesses, for example, something we think the market gives little credit for.

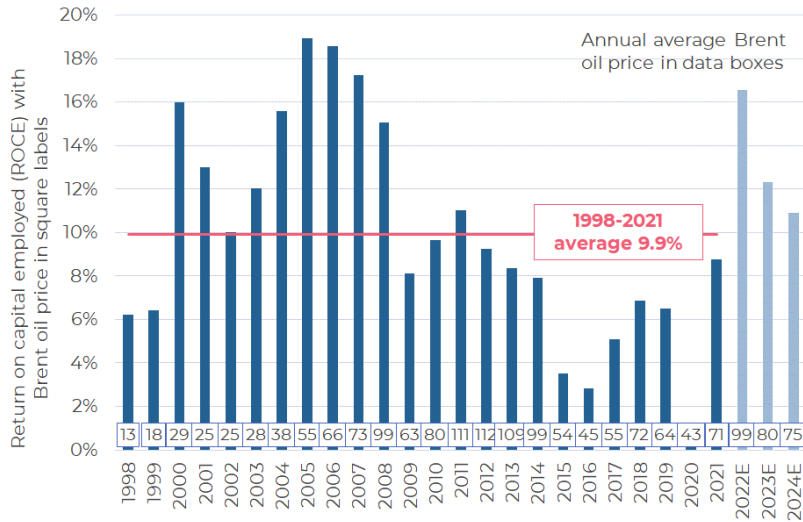
## 2023 Outlook for Global Energy

### Valuation of the Guinness Energy portfolio

Looking ahead, we make the following observations for the Guinness Global Energy portfolio:

- 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%. With the Brent oil price averaging of \$99/bl in 2022, we see ROCE rising to over 15%, whilst using a more conservative long-term oil price in 2023/24 of \$80/bl/\$75/bl brings ROCE back to 11-12%:

#### Return on Average Capital Employed (ROCE) for Guinness global energy portfolio

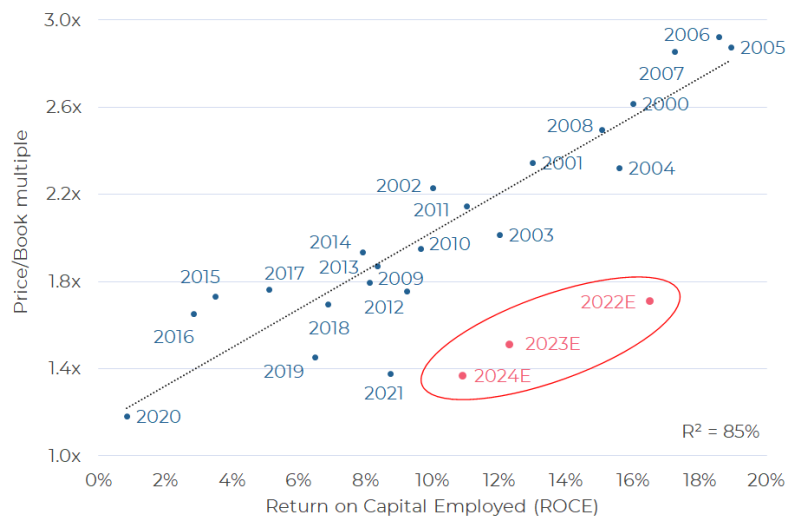


Source: Guinness Global Investors

The stock market has historically valued energy companies based on their sustainable levels of profitability (generally a combination of both ROCE and FCF Return) whether it is delivered by self-help improvements or via increases in the long-term oil price.

Current valuation implies that the ROCE of our companies will stay at about 6%. If ROCE remains at 11-12% and the market were to pay for it sustainably, it would imply an increase in the equity valuation of around 30-40%.

#### ROCE vs P/B multiple for Guinness global energy portfolio

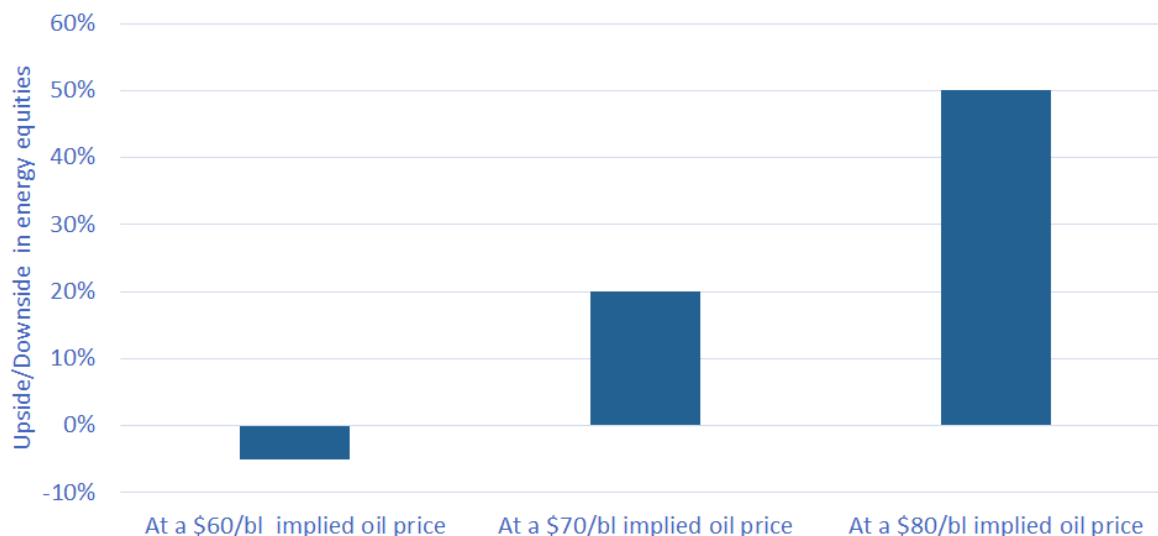


Source: Guinness Global Investors

## 2023 Outlook for Global Energy

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 December, we estimate that the valuation of our portfolio of energy equities reflected a long-term Brent/WTI oil price of around \$63/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 20% upside while there would be around 50-55% upside at a long-term oil price of \$80/bl Brent:

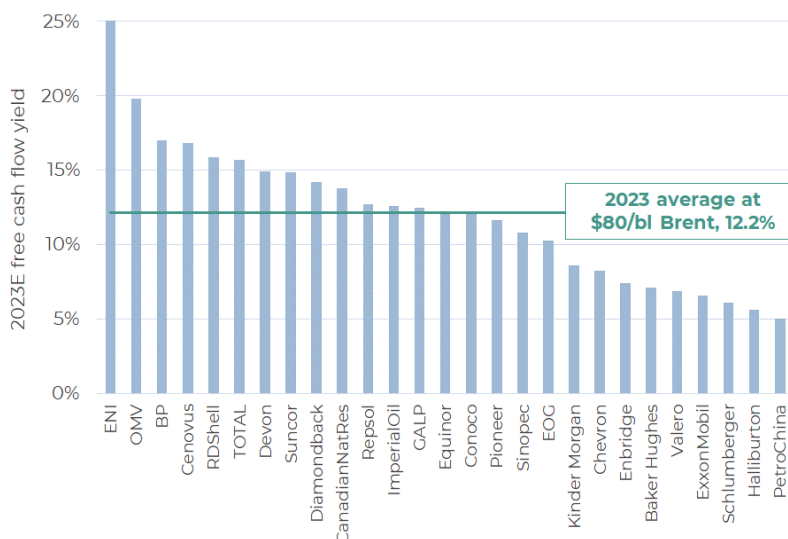
### Upside/downside for Guinness Global Energy portfolio (1-year view)



Source: Guinness Global Investors

We wrote earlier about the emergence of significantly stronger free cashflows in the sector, thanks to better commodity prices and greater capital discipline. Translating these thoughts to our portfolio, we see high free cashflow yields across most subsectors of the portfolio, and particularly for companies with upstream operations:

### Guinness Global Energy portfolio: estimated FCF yield in 2023 (%) based on \$80/bl Brent

















Source: Guinness Global Investors

In our portfolio, we currently combine the themes of attractive free cash flow for mid to large caps, higher ROCE for the super majors, undervalued international gas exposure and tighter international service markets as key areas of exposure:

## 2023 Outlook for Global Energy

### Key themes in the Guinness Global Energy portfolio

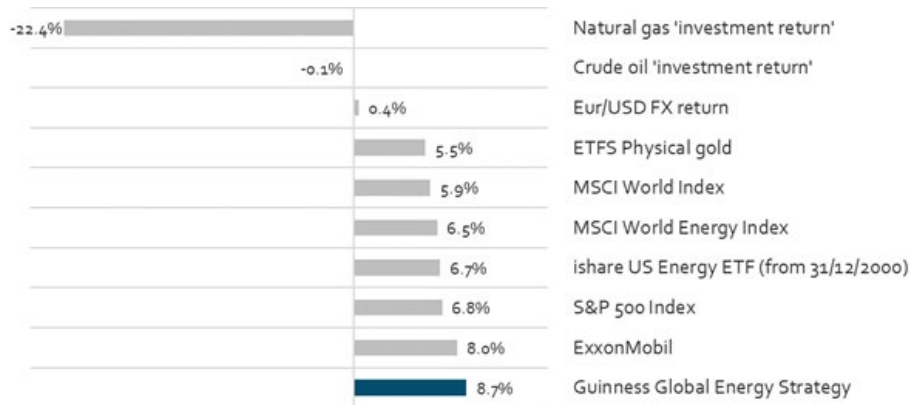
| Theme                                     | Example holdings  | Weighting (%) |
|---|---|---------------|
| 1 Higher quality large cap oil & gas      |     | 27.7%         |
| 2 Oil & gas majors                        |    | 26.6%         |
| 3 North American shale exposure           |    | 19.0%         |
| 4 Refining-focused                        |     | 8.7%          |
| 6 Rising international oil & gas spending |     | 9.0%          |
| 5 Undervalued international natural gas   |     | 5.8%          |
| 7 Other (incl cash)                       |   | 3.2%          |
|   |   | 100.0%        |

Source: Bloomberg, Guinness Global Investors

Specialist global energy sector equity funds have historically provided the best exposure to an improving energy market. Finally, we are pleased to note that the Guinness Energy strategy outperformed the other potential energy investment 'routes' since inception in December 1998.

### Total return (annualised), in USD, Dec 1998 to end Dec 2022

Past performance does not predict future returns



Source: Bloomberg, Guinness Global Investors

**Will Riley, Jonathan Waghorn, Jamie Melrose & Dan Hobster**

**January 2023**

## 2023 Outlook for Global Energy

### Guinness Global Energy Strategy performance

#### Performance (in USD) as at 31.12.2022

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. Past performance does not predict future returns.

| Cumulative returns  | YTD    | 1 year | 3 years ann. | 5 years ann. | Launch of strategy* ann. (31.12.98) |       |       |
|---|--------|--------|--------------|--------------|-------------------------------------|-------|-------|
| <b>Guinness Global Energy Fund<sup>1</sup> (Class Y, 0.99% OCF)</b> | -      | 32.4%  | 7.7%         | 1.9%         | 8.7%                                |       |       |
| <b>MSCI World Energy NR Index</b>                                   | -      | 46.0%  | 11.9%        | 5.6%         | 6.5%                                |       |       |
| Calendar year returns   | 2022   | 2021   | 2020         | 2019         | 2018                                | 2017  | 2016  |
| <b>Guinness Global Energy Fund<sup>1</sup> (Class Y, 0.99% OCF)</b> | 32.4%  | 44.5%  | -34.7%       | 9.8%         | -19.7%                              | -1.3% | 27.9% |
| <b>MSCI World Energy NR Index</b>                                   | 46.0%  | 40.1%  | -31.5%       | 11.4%        | -15.8%                              | 5.0%  | 26.6% |
|   | 2015   | 2014   | 2013         | 2012         | 2011                                | 2010  | 2009  |
| <b>Guinness Global Energy Fund<sup>1</sup> (Class Y, 0.99% OCF)</b> | -27.6% | -19.1% | 24.4%        | 3.0%         | -13.7%                              | 15.3% | 61.8% |
| <b>MSCI World Energy NR Index</b>                                   | -22.8% | -11.6% | 18.1%        | 1.9%         | 0.2%                                | 11.9% | 26.2% |
|   | 2008*  | 2007*  | 2007*        | 2005*        | 2004*                               | 2003* | 2002* |
| <b>Guinness Global Energy Fund<sup>1</sup> (Class Y, 0.99% OCF)</b> | -48.2% | 37.9%  | 37.9%        | 62.3%        | 41.0%                               | 32.3% | 6.7%  |
| <b>MSCI World Energy NR Index</b>                                   | -38.1% | 29.8%  | 29.8%        | 28.7%        | 28.1%                               | 25.9% | -6.4% |
|   | 2001*  | 2000*  | 1999*        |              |                                     |       |       |
| <b>Guinness Global Energy Fund<sup>1</sup> (Class Y, 0.99% OCF)</b> | -4.1%  | 39.6%  | 22.5%        |              |                                     |       |       |
| <b>MSCI World Energy NR Index</b>                                   | -7.2%  | 6.0%   | 22.0%        |              |                                     |       |       |

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.

#### <sup>1</sup>TB Guinness Global Energy Fund

UK investors should be aware that the Guinness Global Energy Fund is 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.guinnessgi.com](http://www.guinnessgi.com). Please contact [info@guinnessgi.com](mailto: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](http://www.guinnessgi.com).

## 2023 Outlook for Global Energy

### IMPORTANT INFORMATION

**Issued by Guinness Global Investors**, a trading name of Guinness Asset Management Limited, which is authorised and regulated by the Financial Conduct Authority.

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.

#### Documentation

The documentation needed to make an investment, including the Prospectus, the Key Information Document (KID) / Key Investor Information Document (KIID) and the Application Form, is available in English from [www.guinnessgi.com](http://www.guinnessgi.com) or free of charge from:-

- the Manager: Link Fund Manager Solutions (Ireland) Ltd (LFMSI), 2 Grand Canal Square, Grand Canal Harbour, Dublin 2, Ireland; or,
- the Promoter and Investment Manager: Guinness Asset Management Ltd, 18 Smith Square, London SW1P 3HZ.

LFMSI, as UCITS Man Co, has the right to terminate the arrangements made for the marketing of funds in accordance with the UCITS Directive

#### Investor Rights

A summary of investor rights in English is available here:

<https://www.linkgroup.eu/policy-statements/irish-management-company/>

#### Residency

In countries where the Fund is not registered for sale or in any other circumstances where its distribution is not authorised or is unlawful, the Fund should not be distributed to resident Retail Clients. **NOTE: THIS INVESTMENT IS NOT FOR SALE TO U.S. PERSONS.**

#### Structure & regulation

The Fund is a sub-fund of Guinness Asset Management Funds PLC (the "Company"), an open-ended umbrella-type investment company, incorporated in Ireland and authorised and supervised by the Central Bank of Ireland, which operates under EU legislation. If you are in any doubt about the suitability of investing in this Fund, please consult your investment or other professional adviser.

#### Switzerland

This is an advertising document. The prospectus and KIID for Switzerland, the articles of association, and the annual and semi-annual reports can be obtained free of charge from the representative in Switzerland, Carnegie Fund Services S.A., 11, rue du Général-Dufour, 1204 Geneva, Switzerland, Tel. +41 22 705 11 77, [www.carnegie-fund-services.ch](http://www.carnegie-fund-services.ch). The paying agent is Banque Cantonale de Genève, 17 Quai de l'Île, 1204 Geneva, Switzerland.

#### Singapore

The Fund is not authorised or recognised by the Monetary Authority of Singapore ("MAS") and shares are not allowed to be offered to the retail public. The Fund is registered with the MAS as a Restricted Foreign Scheme. Shares of the Fund may only be offered to institutional and accredited investors (as defined in the Securities and Futures Act (Cap.289)) ('SFA') and this material is limited to the investors in those categories

**Telephone calls** will be recorded and monitored.