

REPORT HIGHLIGHTS

OIL

Brent/WTI fell sharply as demand slump meets OPEC price war

Brent and WTI fell very sharply over the quarter, down to \$21bl/20/bl. The measures introduced to manage the spread of the COVID-19 virus are causing an unprecedented contraction in global oil demand, down at times by an estimated 25m b/day. Oversupply was compounded by OPEC+'s failure in early March to reach agreement on production quotas, leading to increased oil exports in April.

NATURAL GAS

US, European and Asian gas prices weaker

The US natural gas price opened January at \$2.19/mcf (1,000 cubic feet) and traded down over the quarter to \$1.64/mcf. European and Asian gas prices are hovering around \$2.50-\$3/mcf (down from \$5-7/mcf a year ago), hit by the combined impact on demand of a very warm northern hemisphere winter and COVID-19 related economic slowdown.

EQUITIES

Energy underperforms the broad market over the quarter

The MSCI World Energy Index (net return) fell by 44.8% in the first quarter, underperforming the S&P 500 Index which fell by 19.6% over the month (all in US dollar terms).

Performance data quoted represent past performance and does not guarantee future results. The investment return and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. Current performance of the Fund may be lower or higher than the performance quoted. For most recent month-end and quarter-end performance, visit www.qafunds.com/our-funds/global-energy-fund/#fund_performance or call (800) 915-6566.

CHART OF THE QUARTER – Sharp drop in US drilling rig count already in evidence

The collapse in oil prices has put the capital spending budgets of US oil & gas producers under severe strain. Almost all have responded with reduced CAPEX plans, which are already translating into a fall in the number of oil-directed rigs drilling in the key shale basins. The oil rig count started 2020 just below 700 rigs, and has so far dropped to 560 active rigs, and we expect a further drop to below 400 rigs as a likely trough.

US horizontal rig count – weekly change (4 week MAV)



Source: DNB; Guinness Atkinson Asset Management

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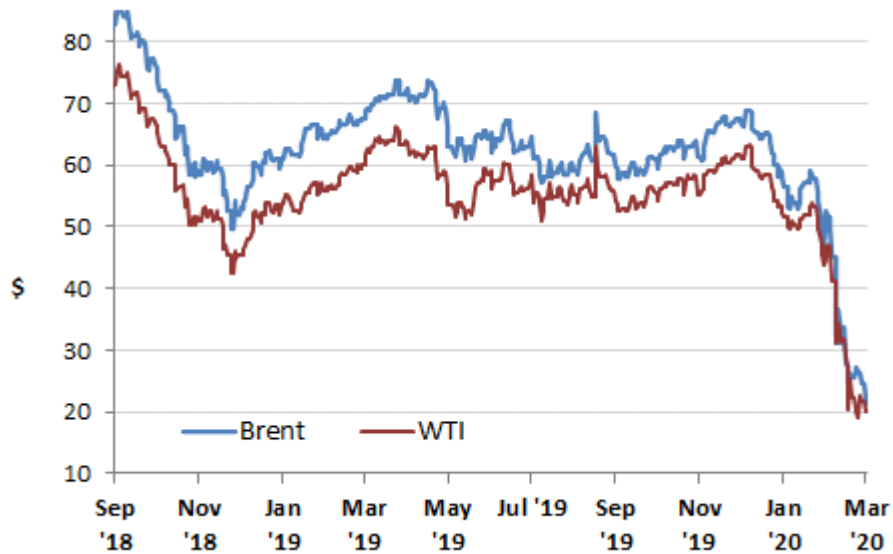
Performance: Guinness Atkinson Global Energy Fund

Portfolio: Guinness Atkinson Global Energy Fund

First Quarter 2020 in Review

i) Oil market

Figure 1: Oil price (WTI and Brent \$/barrel) 18 months September 30, 2018 to March 31, 2020



Source: Bloomberg LP

The West Texas Intermediate (WTI) oil price started March at \$43.8/bl, traded up over the first week of the month (reaching \$47.2/bl on March 3) before falling very sharply after the March 5th and 6th OPEC meeting. WTI dropped

initially on March 9th to \$31.1/bl, before declining further to close the month at \$20.5/bl. WTI has so far averaged \$46/bl in 2020, having averaged \$58/bl in 2019, \$65/bl in 2018 and \$51/bl in 2017.

Brent oil traded in a similar shape, opening at \$47.0/bl, trading up to nearly \$53/bl before falling very sharply and closing the month at \$21.5/bl. Brent has averaged \$50/bl so far in 2020, having averaged \$64/bl in 2019 and \$72/bl in 2018. The gap between the WTI and Brent benchmark oil prices narrowed over the month, ending March at around \$1/bl, versus over \$7/bl on average in 2019.

Factors which weakened WTI and Brent oil prices in the quarter:

- **Major oil demand contraction caused by global reaction to the coronavirus**

The major event in world markets over the first quarter was news of the spread of the novel coronavirus (COVID-19) around most parts of the world. As cases of coronavirus multiply, oil demand has seen an unprecedented contraction, with much of the world's population under restricted movement. Estimates at the end of March suggested that global oil demand was down on certain days by around 20-25%, or 20-25m b/day. Global oil demand averaged just over 100m b/day in 2019, and we expect an annual fall in demand in 2020 of at least 5m b/day.

- **OPEC+ production quotas abandoned, exacerbating oversupply**

OPEC+ met in Vienna in early March with the key discussion point being a response to falling oil demand as a result of the spread of COVID-19. During the meeting, OPEC proposed formally that OPEC and their non-OPEC partners (OPEC+) should cut production by 1.5m b/day, in addition to the 1.7m b/day of production quota cuts already in place. However, Russia disagreed, and the meeting concluded with no agreement around an extension to production quotas, and an abandonment of existing quotas. Over the weekend immediately after the meeting, Saudi Aramco responded to this outcome by launching its official selling prices for April. Discounts to benchmark prices for oil being exported to Asia and Europe were set at record lows, a clear signal that Saudi are prepared to 'punish' Russia for their stance and embark on a price war. Spot oil prices fell by around 25% in the immediate aftermath to OPEC+'s news. The move for the time being to an OPEC+ price war threatens to bring an additional 3-5m b/day of oil supply into the world market.

Factors which strengthened WTI and Brent oil prices in the quarter:

- **Talk of globally coordinated production cuts**

President Trump indicated that the US could meet with Saudi and Russia with the goal of staunching the recent fall in oil prices. Trump said he raised the issue with Russian President Putin and Saudi leader Mohammed Bin Salman. Trump stated: "They're going to get together and we're all going to get together and we're going to see what we can do... the two countries are discussing it. And I am joining at the appropriate time, if need be." In practice, we regard globally coordinated cuts as difficult to achieve. If anything, the US may ratify the production declines that will be happening in any case due to the collapse in oilfield spending.

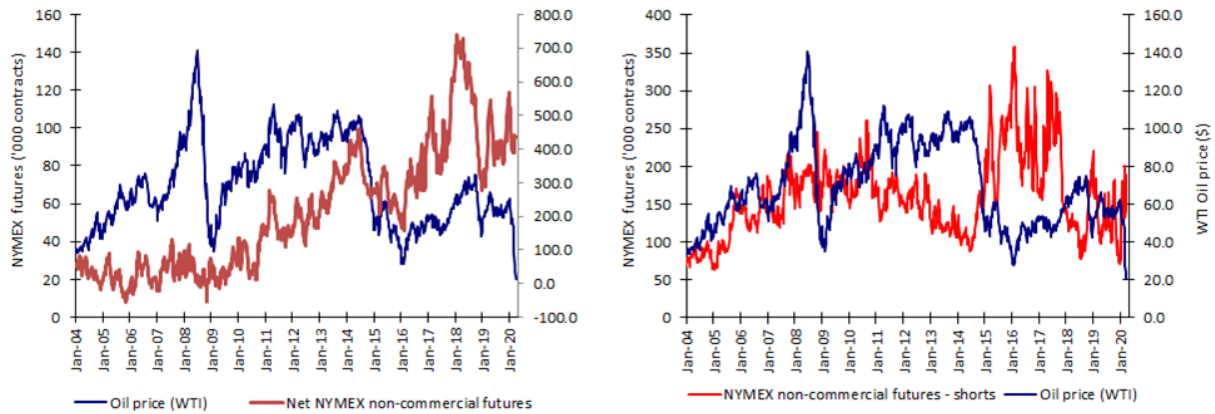
- **US onshore supply down in January (latest data)**

The latest EIA production data showed US onshore oil production decrease in January 2020 (latest data point) by 0.11m b/day, holding year-on-year growth at around 0.8m b/day. The US oil directed rig count has started to drop sharply (down 7% in the final week of March), and we expect this fall to accelerate as the collapse in spot oil prices so far this year feeds through into onshore operations.

Speculative and investment flows

The New York Mercantile Exchange (NYMEX) net non-commercial crude oil futures open position was 435,000 contracts long at the end of March versus 432,000 contracts long at the end of February. 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 to 189,000 contracts at the end of March versus 127,000 at the end of the previous month.

Figure 2: NYMEX Non-commercial net and short futures contracts: WTI January 2004 – March 2020

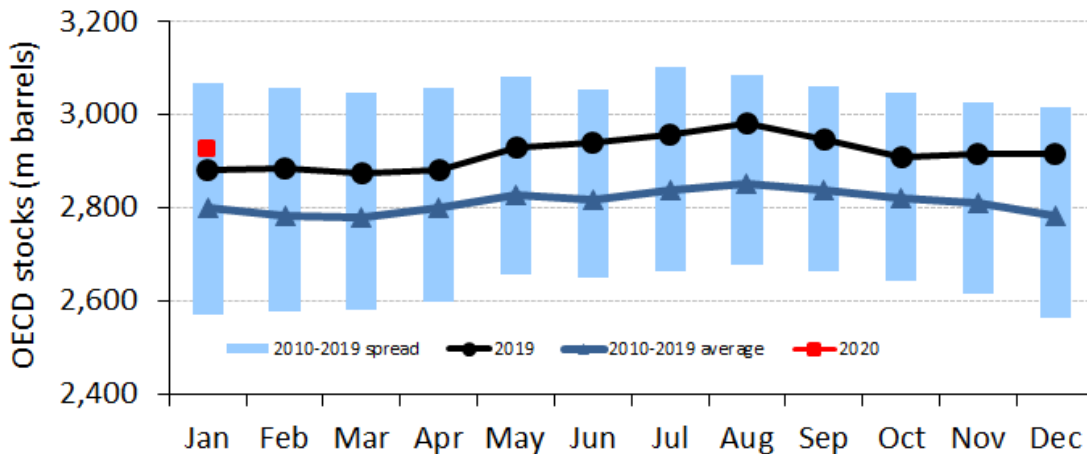


Source: Bloomberg LP/NYMEX/ICE (2020)

OECD stocks

OECD total product and crude inventories at the end of January (latest data point) were estimated by the IEA to be 2,929m barrels, up by 28m barrels versus the level reported for December. This compares to a 10-year average increase for January of 40m barrels, implying that the market was undersupplied. Inventories built in 2019 overall by around 43m barrels (0.12m b/day). The significant oversupply situation currently developing vis the coronavirus and OPEC price war likely sees oil and refined products pushing against maximum inventory levels (c3.3bn barrels) over the next few months.

Figure 3: OECD total product and crude inventories, monthly, 2004 to January 31, 2020



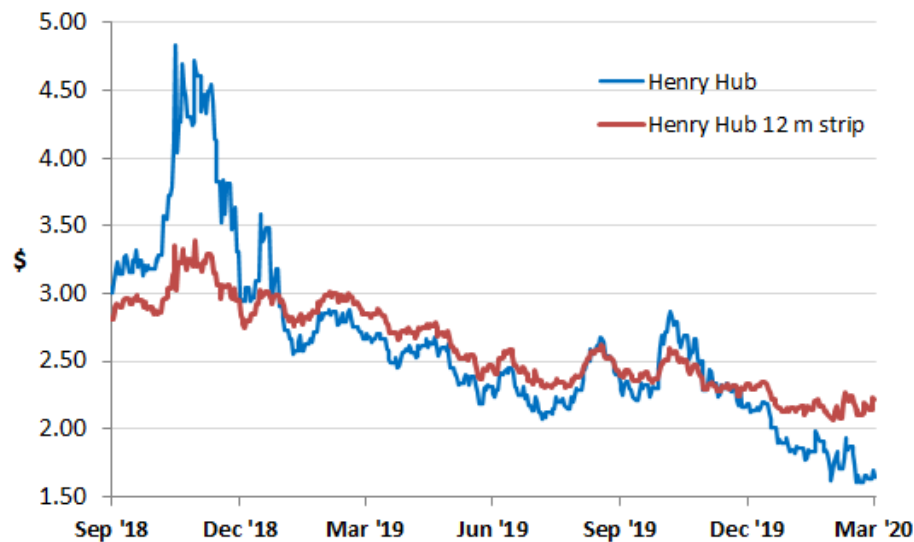
Source: IEA Oil Market Reports (March 2020)

ii) Natural gas market

The US natural gas price (Henry Hub front month) opened March at \$1.61/mcf (1,000 cubic feet), rose to \$1.94 on March 10, then declined steadily again to close at \$1.64/mcf. The spot gas price has averaged \$1.87/mcf so far in 2020, having averaged \$2.53/mcf in 2019, \$3.07 in 2018 and \$3.02 in 2017.

The 12-month gas strip price (a simple average of settlement prices for the next 12 months' futures prices) rose over the month, opening at \$2.06/mcf and closing at \$2.22 /mcf. The strip price averaged \$2.60 in 2019, having averaged \$2.90 in 2018 and \$3.12 in 2017.

Figure 4: Henry Hub gas spot price and 12m strip (\$/Mcf) 18 months September 30, 2018 to March 31, 2020



Source: Bloomberg LP

Factors which weakened the US gas price in the quarter included:

- **Warm US winter dampening heating demand**

The US has generally had a mild winter so far, dampening heating demand for gas. March was no exception, with the first two weeks of the month being 40% and 26% warmer than the same period in 2019. Residential and commercial gas deliveries were down by around 30% over the period versus 2019, and overall demand down by around 15%.

Factors which strengthened the US gas price in the quarter included:

- **Pending fall in associated gas production**

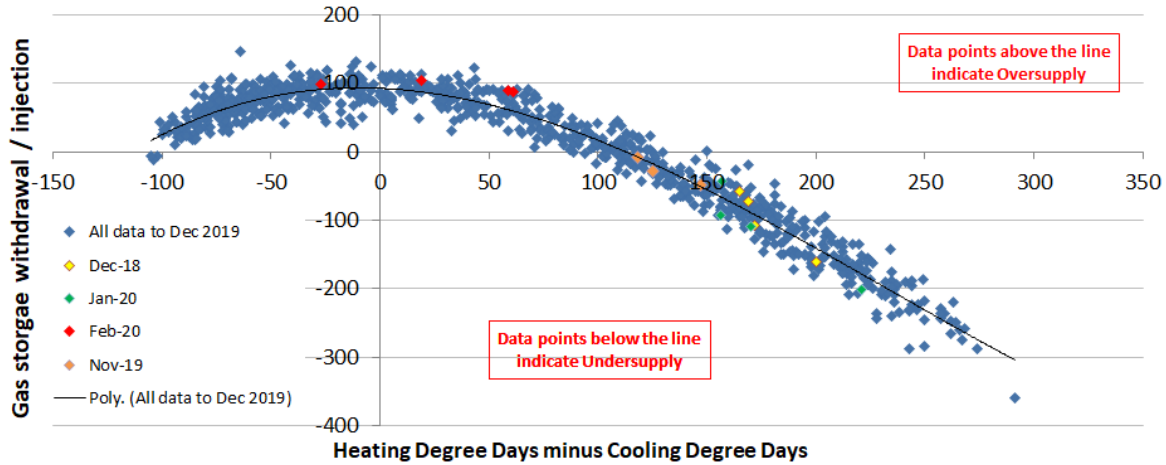
The collapse in US oil prices thanks to coronavirus-related demand issues and the OPEC+ price war have resulted in sharp capex cuts by US shale oil producers. This will result in a decline in US shale oil production in H2 2020 and 2021, which will be accompanied by a decline in associated gas production. On average, 1m b/day of US shale oil production brings around 2.5 Bcf/day of associated gas, so a 2m b/day oil decline would mean gas supply falling by 5 Bcf/day - representing around 5% of the US market.

- **Decrease in US onshore natural gas production**

Onshore US natural gas production averaged 102.7 Bcf/day in January 2020 (the latest available data point), down by 0.7 Bcf/day versus the level reported for December. However, onshore production was still up by

7.7% year-on-year. Rising associated gas supply from shale oil and a pickup of activity in the Marcellus basin are the key reasons for the increase in production over the last twelve months.

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

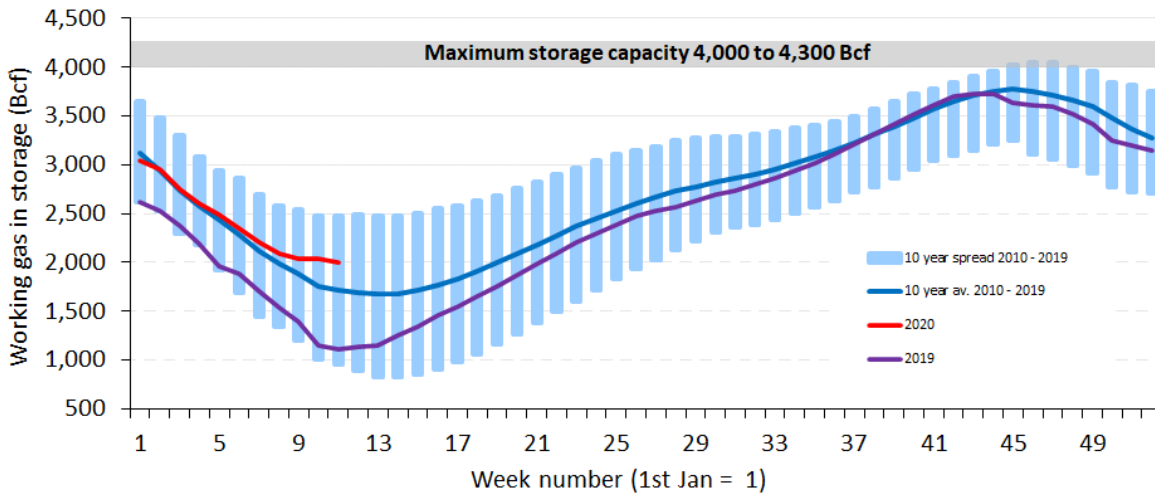


Source: Bloomberg LP; Guinness Atkinson Asset Management

Natural gas inventories

Swings in the balance for US natural gas should, in theory, show up in movements in gas storage data. Natural gas inventories at the end of March were reported by the EIA to be 2.0 Tcf. Current gas in storage is around 0.3 Tcf above the 10-year average, thanks to a wild US winter dampening heating demand. The high visibility of low-cost supply growth kept a cap on prices in 2019 despite the fact that inventories have spent much of the year below the 10-year average level.

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



Source: Bloomberg; EIA (March 2020)

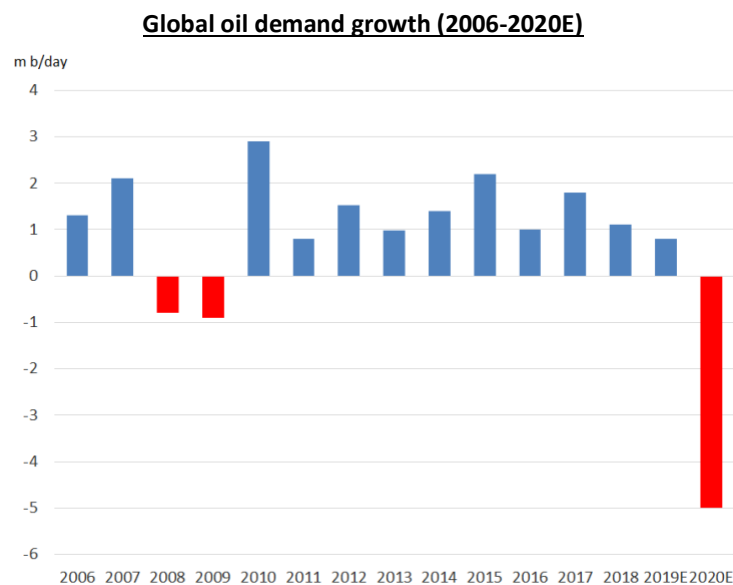
Manager's Comments

It is reasonable to describe current events as the biggest oil shock in living memory. The most analogous shock occurred in 1998, when oil production increased at a time when demand was hit by the Asian financial crisis. But the scale of the demand contraction this time, combined with promised increase from OPEC+ members, is unprecedented. Here, we explore events as they have unfolded, where the oil market goes in the short-term and longer-term, and the implications for energy equities.

Oil demand: an implosion

Global oil demand in the first quarter of 2020 is estimated to have contracted by around 3m b/day, much of which relates to COVID-19 mitigation measures in China. Today, it is reported that 118 countries, representing 92% of global GDP, have enacted some form of social distancing. As a result, transportation is taking a disproportionate hit. An examination of the structure of vehicle miles traveled (VMT) in the US provides a useful illustration. Normally, around 40% of all US VMT are for leisure or holidays; around 20% for shopping; around 20% for commuting; and around 20% for other activities. Given the restraints around all of these activities in the US and in other parts of the world, and the near shutdown of international air travel, it is plausible that as much as 25m-30m b/day of demand sits in abeyance.

Building an accurate picture of annual global oil demand for 2020 depends of course on the path of the COVID-19 crisis, and that is unknowable. But at this stage, it is hard to build a picture that doesn't see 2020 demand down by at least 5m b/day. By comparison, global oil demand contracted by around 1m b/day in each of 2008 and 2009, before bouncing by nearly 3m b/day in 2010.



Source: IEA; Guinness Atkinson Asset Management

OPEC+ price war

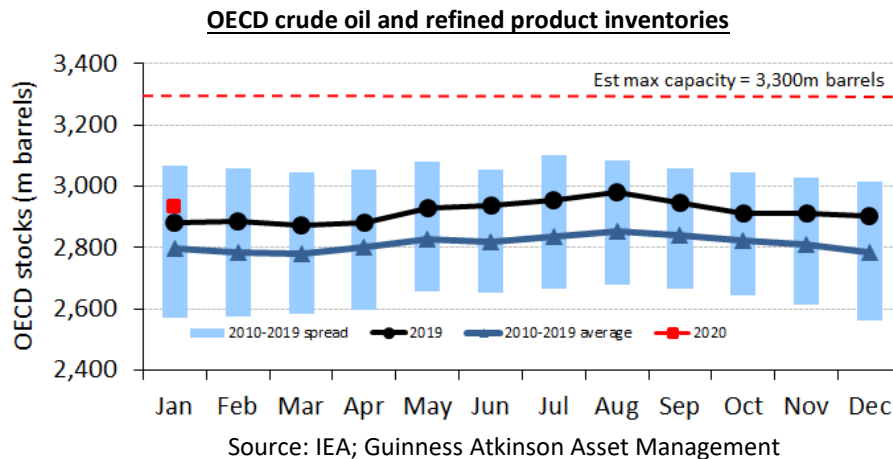
OPEC+ met in Vienna on March 5th and 6th with the key discussion point being a response to falling oil demand as a result of the spread of COVID-19. During the meeting, OPEC proposed formally that OPEC and their non-OPEC partners (OPEC+) should cut production by 1.5m b/day, in addition to the 1.7m b/day of production quota cuts already in place. However, Russia disagreed, and the meeting concluded with no agreement around an extension to production quotas, and an abandonment of existing quotas.

Over the weekend immediately after the meeting, Saudi Aramco responded to this outcome by launching its official selling prices for April at record discounts to benchmark prices. This has been a clear sign that Saudi were prepared to “punish” Russia for their stance and embark on a price war. The subsequent promises from OPEC members and Russia for the amount of supply they would add to the market in April came to around 4.5m b/day. Over half of this was promised by Saudi alone (2.4m b/day). It is important to recognize that most of these additional barrels are already contracted and “on the water” and won’t arrive in places like the US until June.

The scale of OPEC+’s supply additions to the market would normally be enough alone to create significant downward pressure on the oil price. As it happens, they have arrived at a time when the demand shock is much greater. Together, they create an oversupply picture that, other things being equal, runs in excess of 20m b/day.

The question of storage – where can the oversupply go?

The extreme level of oversupply that the market faces in the coming months raises the issue of where excess oil can go. Across the world, we estimate that there is around 900m barrels of spare storage capacity, of which around 400m barrels is in the OECD and around 500m in the non-OECD.



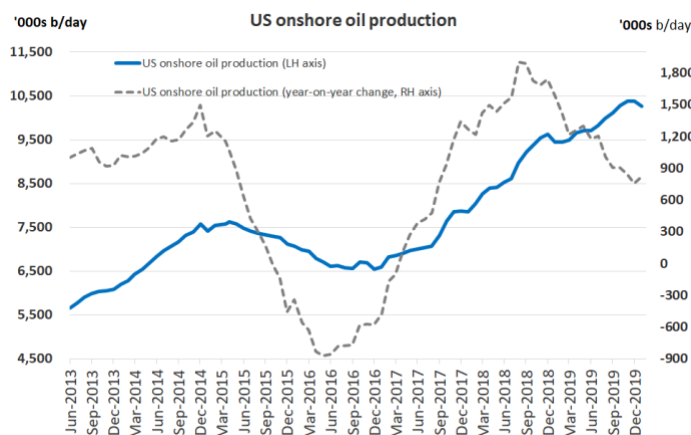
Assuming an excess of supply over demand of, say, 20m b/day, in theory it would take around 45 days to reach maximum storage levels. By way of context, the rate of implied storage fills in the OECD of 300m barrels (say 50% of the 20m b/day x 30 days) is nearly four times larger than the highest monthly inventory build, which occurred in 2004.

However, the reality is that much of the marginal storage around the world is unlikely to be accessed as the bottleneck of crude transportation networks will reach capacity first. With no physical access to markets, producers will therefore be forced to shut-in production, regardless of economics or reservoir management issues.

Non-OPEC supply response

The fall in oil prices to current levels will create a two-fold response from non-OPEC producers: one driven by geology and the other investment led. The geology behind onshore conventional oil is such that oilfield pressure tends to degrade when production is shut-in. The fields most affected are likely to be mature, depleted and heavier/sourer reservoirs in places like the US, Canada, Russia and Latin America. The scale of production loss could be anything up to 5m b/day.

For US shale oil, there is less risk of permanent damage from production shut-ins, but the fall in capital expenditure by US E&P companies, when combined with high natural decline rates, will result in a meaningful drop in production.



Source: EIA; Guinness Atkinson Asset Management

In the 2015/16 period, when oil prices fell from \$100/bl to \$50/bl, total US onshore production declined by 1m b/day (15%). The subsequent rapid rebound in production post 2016 was achieved thanks to equity and debt markets that kept on giving. The same is not true today, and even in the run-up to March's oil price collapse, producers were showing better (or forced) capital discipline that was already slowing supply. The downcycle doesn't spell the end of US shale, but production declines will only cease with WTI back above \$50/bl.

What path for the oil market in the shorter-term?

The extent of oil oversupply globally is putting extreme pressure on physical oil markets. Oil production therefore needs to be halted in certain areas, and this will be achieved either by coordinated action (i.e. quotas), or by uncoordinated shut-ins by the most distressed producers.

On April 2, President Trump signaled that "he hopes and expects" a 10m b/day supply cut to be led by Saudi and Russia. An emergency OPEC+ meeting was then scheduled for April 6, then delayed to April 9. There are tentative plans for that to be followed by a meeting of G20 energy ministers on April 10.

A key sticking point in the negotiations is that Saudi and Russia both want the US to be party to the cuts. There is also hope of involvement from Canada, Brazil and Norway (among others), and clearly it will be a challenging diplomatic task to achieve agreement across so many participants.

Saudi have delayed announcement of their Official Selling Prices for May, until the outcome of these negotiations is known.

An agreement at some point in the next few days is possible, but we must acknowledge that given the scale of oversupply today, it will be too little and too late to fully offset a very difficult period ahead for crude oil and oil producers. But if an agreement can be reached, it would lessen the inventory overhang for the second half of 2020 and accelerate the pace of rebalancing.

And where do oil prices settle to longer-term?

For as long as there are major restrictions on movement globally, the contraction in oil demand will be in excess of any organized supply reduction measures that OPEC, Russia and other partners decide on. Longer term, once the COVID-19 crisis passes, there is the question of where oil prices settle back to. We approach this by considering the pros and cons of various price levels:

- i) **Oil prices at \$30/bl.** Economically, an oil price at this level could be sustained by Russia for a period, given the \$170bn sovereign wealth fund (plus \$300bn other reserves) that have been built up while oil prices were higher. But the list of reasons against \$30/bl is much longer. It would cause financial distress for Saudi (they will run an 18% budget deficit in 2020 at this price, and the \$/Riyal peg likely gets quickly pressurized) and other OPEC members; it would eventually break Russia; it would cause US shale oil supply to fall sharply and remain low; other non-OPEC supply would decline; and post COVID-19, there would be a strong demand stimulus thanks to low price. So on balance, we do not see prices settling longer-term at this level.
- ii) **Oil prices at \$45-50/bl.** Russia has an estimated fiscal breakeven oil price of \$45/bl, so this price level is likely sustainable for them longer term. We expect that it would also cause non-OPEC supply to stagnate, allowing OPEC barrels which are currently on the sidelines (Venezuela and Iran) back into the market. Against this, it is still a price that is fiscally uncomfortable for nearly all OPEC members, including Saudi, even assuming a higher level of market share.
- iii) **Oil prices at \$60/bl+.** An oil price at this level would be preferable for Saudi and other members of OPEC. Pre the COVID-19 crisis, it is arguable that a price much above \$60/bl would still incentivize too much non-OPEC supply growth. There is a school of thought now, though, that the structural damage to non-OPEC supply through the COVID-19 episode will be sufficient to put OPEC back in control over the market. As Goldman Sachs describe it, “paradoxically, the demand shock could ultimately create an inflationary oil supply shock of historic proportions because so much oil production will be forced to be shut in”.

Our belief is that, for the reasons described here, an oil price stuck at very low levels (\$30/bl) is unlikely. Whether the price settles back at \$45-50/bl or \$60+/bl depends largely on the impairment to non-OPEC supply that occurs this year, and the access to capital for US shale in the future. If non-OPEC supply sustains reasonably, then OPEC may have to settle for \$45-50/bl. But if non-OPEC supply is held back, then the door opens for OPEC to take control of the market again, as they did for much of the 1998-2008 period.

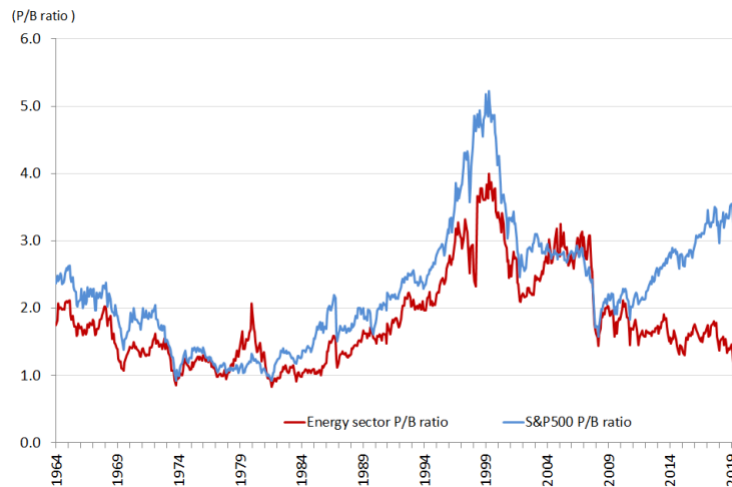
Energy equities

The heavy fall in crude prices last quarter has been accompanied by sharp declines in oil equities, as the market adjusts to the lack of support for oil prices. The fall in share prices have pushed the price-to-book ratio for the

energy sector below 1x for the first time since the mid-1980s. Indeed, the price-to-book for the sector, at 0.85x has bounced off the mid-March low of 0.65x but remains lower than at any other time in last 80 years.

We believe our portfolio now discounts a Brent oil price in the low \$40s/bl, and WTI price of around \$40/bl.

Price to book ratio of S&P 500 vs energy sector (Dec 31 1965- Mar 312020)



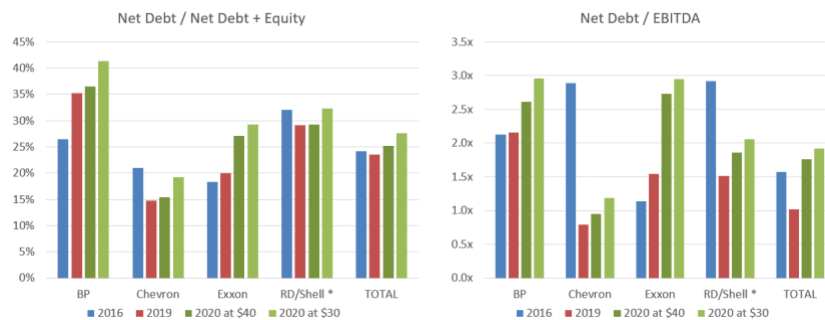
Sources: Bernstein; Bloomberg; Guinness Atkinson Asset Management

Energy sector is MSCI World Energy Index from Dec 31 1995, and basket of large-cap energy stocks for the period December 31 ,1965 to December 31, 1995

One of the key debates that has been reignited by the collapse in oil prices is the question of whether the oil majors will be able to sustain their dividends. Our analysis suggests they are generally in good shape to weather a \$30/bl oil price this year, and possibly next, but a sustained very low price would result in cuts. However, even with a modest Brent recovery to \$40/bl, we think the current dividends could be sustained for longer.

At \$30/bl Brent in 2020, BP looks the most stretched, with gearing (net debt/net debt + equity) rising to around 40%. In the European group, Total looks the most comfortable, its gearing remaining below 30%. Chevron and Exxon start this downturn with cleaner balance sheets, though Exxon is due to outspend cashflows more than its peers, resulting in the sharpest rise in gearing ratio (a measure of financial leverage that demonstrates the degree to which a firm's operations are funded by equity capital versus debt financing.)

Oil & gas super-majors: gearing ratios (2016/2019/2020)



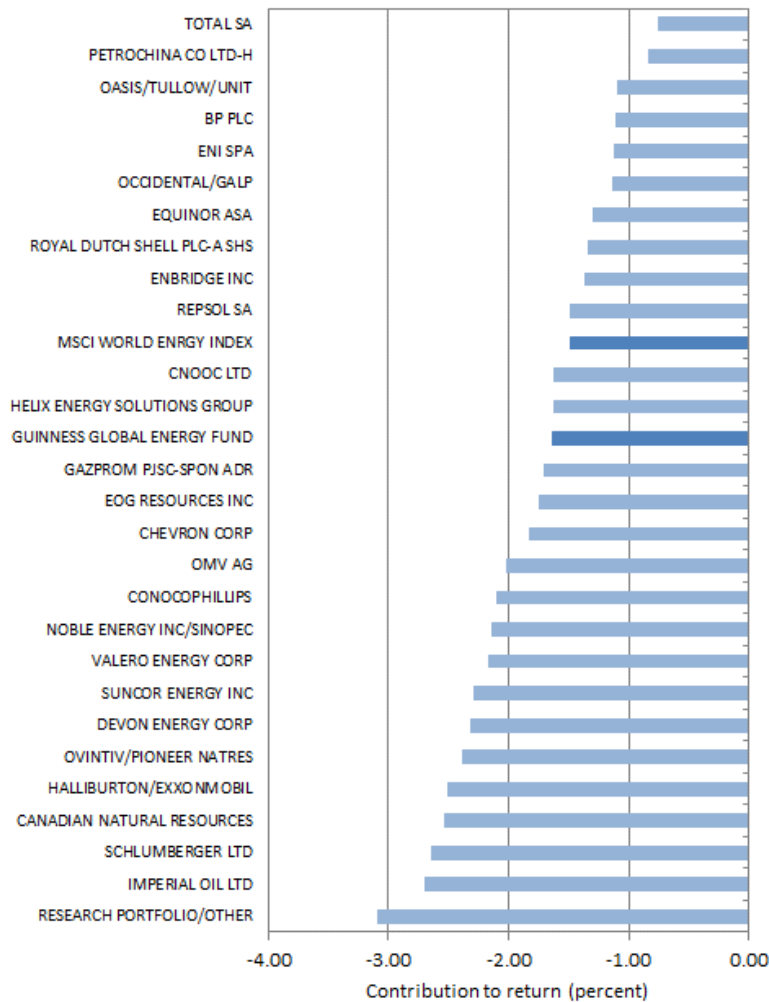
Sources: Bloomberg; Guinness Atkinson Asset Management

Our global energy portfolio is tilted as much as it has been in its 21-year history to large caps and majors, who are best placed in the energy sector to weather the downturn. Our priority remains balance sheet work: ensuring that the oil producers we own have strong enough liquidity to come through a period of low prices (\$20-40/bl) without becoming financially distressed.

Performance – Guinness Atkinson Global Energy Fund

The first quarter of 2020 was negative for global equities. The MSCI World Energy Index (Net Return) was down by 44.8%, underperforming the MSCI World Index which was down by 21.1%. The Guinness Atkinson Global Energy Fund was down by 49.0%, underperforming the energy index by 4.2%. The indicative contribution of each individual position held in the fund over the end of the quarter (total return in USD), excluding research holdings, can be seen in the chart below:

Fund: indicative contribution from holdings, December 31, 2019 to March 31, 2020



Performance as of March 31, 2020 (inception date is June 30, 2004)

| Inception date 6/30/04 | Full Year 2016 | Full Year 2017 | Full Year 2018 | Full year 2019 | YTD 2020 | 1 year (annualized) | 3 years (annualized) | 5 years (annualized) | 10 years (annualized) | Since Inception (annualized) |
|---|----------------|----------------|----------------|----------------|----------|---------------------|----------------------|----------------------|-----------------------|------------------------------|
| Global Energy Fund | 27.04% | -1.06% | -18.92% | 10.40% | -48.98% | -51.07% | -21.19% | -15.49% | -7.93% | 0.69 |
| MSCI World Energy NR Index | 26.56% | 4.97% | -15.84% | 11.45% | -44.79% | -46.23% | -16.98% | -11.16% | -4.36% | 0.84 |
| MSCI World Energy Small Cap Index (NR) | 36.48% | -12.29% | -31.54% | -2.77% | -62.29% | -69.18% | -37.57% | -27.79% | -15.93% | -5.54 |
| S&P 500 Index | 11.76% | 21.82% | -4.37% | 31.48% | -19.60% | -6.99% | 5.09% | 6.71% | 10.91% | 7.52 |

Source: Bloomberg

Expense ratio: 1.60% (gross) 1.45% (net)

Performance data quoted represent past performance and does not guarantee future results. The investment return and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. Current performance of the Fund may be lower or higher than the performance quoted. For most recent month-end and quarter-end performance, visit www.qafunds.com/our-funds/global-energy-fund/#fund_performance or call (800) 915-6566.

Portfolio – Guinness Atkinson Global Energy Fund

The following companies were sold from the portfolio in the quarter:

- Halliburton (US focused diversified energy services provider)
- Occidental Petroleum (US focused E&P company)
- Ovintiv (US focused E&P company)
- Oasis Petroleum (US focused E&P company)
- Tullow Oil (West Africa focused E&P company)

The following companies were purchased for the portfolio in the quarter:

- Galp (European integrated oil & gas company)
- Sinopec (Chinese integrated oil & gas company)
- Exxon (US integrated oil & gas company)
- Pioneer Resources (US focused E&P company)

In general, the switches can be characterized as a move away from North American shale oil & gas companies with higher operating costs and weaker balance sheets than average for our portfolio. In their place, we have moved to

larger, better capitalized international oil & gas companies, which are likely to weather better the current storm in oil prices.

Sector Breakdown

The following table shows the asset allocation of the Fund as of **March 31, 2020**.

| Asset allocation as %NAV | Current | Change | Last year end | | | Previous year ends | | | | |
|----------------------------|--------------|--------------|---------------|--------------|--------------|--------------------|--------------|--------------|--------------|--------------|
| | Mar-20 | | Dec-19 | Dec-18 | Dec-17 | Dec-16 | Dec-15 | Dec-14 | Dec-13 | Dec-12 |
| Oil & Gas | 96.3% | -2.5% | 98.7% | 96.7% | 98.4% | 96.7% | 95.1% | 93.7% | 93.6% | 98.6% |
| Integrated | 60.3% | 9.5% | 50.8% | 46.4% | 42.9% | 46.4% | 41.5% | 37.3% | 38.4% | 39.1% |
| Exploration & Production | 20.3% | -10.0% | 30.3% | 35.8% | 36.9% | 35.8% | 36.5% | 36.2% | 35.2% | 41.6% |
| Drilling | 0.0% | -0.1% | 0.1% | 2.2% | 1.9% | 2.2% | 1.5% | 3.3% | 7.0% | 7.4% |
| Equipment & Services | 3.5% | -6.1% | 9.6% | 8.6% | 9.5% | 8.6% | 11.4% | 13.4% | 9.8% | 7.1% |
| Storage & Transportation | 4.6% | 0.6% | 4.0% | 0.0% | 3.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Refining & Marketing | 7.6% | 3.7% | 3.9% | 3.7% | 3.7% | 3.7% | 4.2% | 3.5% | 3.1% | 3.4% |
| Solar | 1.0% | -0.2% | 1.2% | 0.9% | 1.4% | 0.9% | 4.7% | 3.7% | 2.6% | 1.2% |
| Coal & Consumable Fuels | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Construction & Engineering | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.2% | 0.6% |
| Cash | 2.8% | 2.7% | 0.1% | 2.4% | 0.2% | 2.4% | 0.2% | 2.6% | 2.6% | -0.4% |

Source: Guinness Atkinson Asset Management

Basis: Global Industry Classification Standard (GICS)

Holdings are subject to change at any time.

Portfolio Holdings

Our integrated and similar stock exposure (c.59%) is comprised of a mix of mid cap, mid/large cap and large cap stocks. Our four large caps are Chevron, BP, Royal Dutch Shell and Total. Mid/large and mid-caps are ENI, Equinor, Repsol and OMV. As of March 31, 2020 the median P/E ratio of this group was 9.0x 2019 earnings. We also have two Canadian integrated holdings, Suncor and Imperial Oil. Both companies have significant exposure to oil sands in addition to downstream assets.

Our exploration and production holdings (c.19%) give us exposure most directly to rising oil and natural gas prices. We include in this category non-integrated oil sands companies, as this is the GICS approach. The stock here with oil sands exposure is Canadian Natural Resources. The pure E&P stocks have a bias towards the US (EOG, Pioneer and Devon), with one other name (ConocoPhillips) having a mix of US and international production. One of the key metrics behind a number of the E&P stocks held is low enterprise value / proven reserves.

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

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

We have modest exposure to oil service stocks, which comprise around 5% of the portfolio. The stocks we own are mainly diversified internationally (Helix and Schlumberger).

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

Portfolio as of March 31, 2020

| Guinness Atkinson Global Energy Fund (31 March 2020) | | | Total return (USD) | | | | | | | | P/E | | | EV/EBITDA | | |
|--|--------------|--------------|--------------------|---------|----------|----------|--------|---------|---------|----------|-------|-------|--------|-----------|-------|-------|
| Stock | ISIN | % of NAV | Market Cap USD | 1 month | 3 months | 6 months | 1 year | 3 years | 5 years | 10 years | 2019 | 2020E | 2021E | 2019 | 2020E | 2021E |
| Integrated Oil & Gas | | | | | | | | | | | | | | | | |
| Exxon Mobil Corp | US30231G1022 | 4.5% | 158,538 | -44.8% | -44.8% | -50.6% | -44.8% | -47% | -45% | -21% | 16.2x | 37.1x | 16.8x | 5.7x | 7.8x | 6.3x |
| Chevron Corp | US1667641005 | 4.0% | 131,680 | -39.2% | -37.6% | -38.7% | -39.2% | -24% | -15% | 39% | 11.5x | 51.7x | 23.9x | 4.4x | 7.3x | 5.8x |
| Royal Dutch Shell PLC | GB00B03MLX29 | 4.9% | 134,616 | -38.1% | -37.0% | -39.3% | -38.1% | -18% | -17% | 11% | 8.4x | 16.7x | 10.9x | 3.8x | 5.3x | 4.6x |
| Total SA | FR0000120271 | 5.5% | 100,058 | -27.4% | -23.1% | -25.8% | -27.4% | -10% | 3% | 19% | 9.0x | 16.4x | 11.3x | 4.4x | 5.4x | 4.7x |
| BP PLC | GB0007980591 | 5.2% | 83,795 | -30.6% | -30.4% | -37.3% | -30.6% | -11% | -9% | -24% | 9.0x | 18.9x | 12.1x | 4.1x | 5.2x | 4.5x |
| Equinor ASA | NO0010096985 | 4.4% | 42,934 | -36.3% | -32.4% | -39.6% | -36.3% | -16% | -10% | -11% | 8.3x | 23.7x | 11.4x | 2.6x | 3.1x | 2.5x |
| ENI SpA | IT0003132476 | 4.8% | 36,527 | -34.8% | -33.9% | -39.4% | -34.8% | -27% | -22% | -21% | 10.6x | 27.9x | 13.3x | 3.0x | 4.2x | 3.4x |
| Repsol SA | ES0173516115 | 4.0% | 13,858 | -41.6% | -39.8% | -43.0% | -41.6% | -29% | -33% | -27% | 6.2x | 10.9x | 6.6x | 3.5x | 4.6x | 3.9x |
| Galp Energia SGPS SA | PTGALOAM0009 | 4.3% | 9,250 | -31.8% | -24.3% | -25.3% | -31.8% | -16% | 28% | -12% | 14.9x | 16.3x | 12.5x | 5.3x | 5.6x | 4.7x |
| OMV AG | AT0000743059 | 4.0% | 8,996 | -50.8% | -48.6% | -47.1% | -50.8% | -23% | 21% | 7% | 4.8x | 7.7x | 5.7x | 3.1x | 4.0x | 3.4x |
| | | 45.4% | | | | | | | | | | | | | | |
| Integrated / Oil & Gas E&P - Canada | | | | | | | | | | | | | | | | |
| Suncor Energy Inc | CA8672241079 | 3.8% | 22,942 | -51.1% | -48.7% | -48.9% | -51.1% | -43% | -36% | -37% | 7.1x | n/a | 22.9x | 3.7x | 7.4x | 5.4x |
| Canadian Natural Resources Ltd | CA1363851017 | 3.0% | 14,419 | -57.1% | -47.3% | -47.8% | -57.1% | -54% | -47% | -52% | 5.7x | n/a | 35.4x | 3.9x | 8.2x | 5.8x |
| Imperial Oil Ltd | CA4530384086 | 3.4% | 8,045 | -57.3% | -56.4% | -57.8% | -57.3% | -61% | -69% | -67% | 6.2x | n/a | 31.6x | 4.1x | 11.8x | 6.5x |
| | | 10.1% | | | | | | | | | | | | | | |
| Integrated Oil & Gas - Emerging market | | | | | | | | | | | | | | | | |
| PetroChina Co Ltd | CNE1000003W8 | 4.0% | 111,359 | -27.0% | -28.7% | -41.0% | -27.0% | -45% | -62% | -56% | 10.0x | 49.0x | 19.8x | 4.6x | 5.8x | 5.0x |
| Gazprom PJSC | US3682872078 | 3.7% | 53,325 | -43.6% | -32.8% | 10.3% | -43.6% | 25% | 30% | -37% | 2.9x | 5.8x | 4.2x | 3.5x | 4.3x | 3.7x |
| | | 7.7% | | | | | | | | | | | | | | |
| Oil & Gas E&P | | | | | | | | | | | | | | | | |
| ConocoPhillips | US20825C1045 | 3.0% | 31,649 | -52.3% | -45.1% | -52.7% | -52.3% | -34% | -43% | 10% | 8.4x | 66.0x | 18.8x | 2.6x | 4.4x | 3.8x |
| EOG Resources Inc | US26875P1012 | 2.7% | 19,863 | -57.0% | -51.2% | -61.8% | -57.0% | -62% | -59% | -17% | 7.4x | 21.5x | 18.6x | 3.1x | 4.3x | 4.3x |
| Pioneer Natural Resources Co | US7237871071 | 3.1% | 10,892 | -53.3% | -43.6% | -53.3% | -53.3% | -62% | -56% | 28% | 8.9x | 17.1x | 18.2x | 3.9x | 5.0x | 5.0x |
| Devon Energy Corp | US25179M1036 | 1.7% | 2,485 | -73.1% | -70.8% | -77.6% | -73.1% | -83% | -88% | -88% | 5.0x | n/a | n/a | 2.2x | 3.5x | 4.0x |
| | | 10.5% | | | | | | | | | | | | | | |
| International E&Ps | | | | | | | | | | | | | | | | |
| CNOOC Ltd | HK0883013259 | 3.7% | 46,241 | -37.0% | -31.3% | -40.6% | -37.0% | 2% | -5% | -3% | 5.7x | 16.5x | 10.3x | 2.4x | 3.6x | 2.9x |
| Pharos Energy PLC | GB00B572ZV91 | 0.5% | 56 | -78.5% | -81.1% | -82.0% | -78.5% | -90% | -92% | -96% | 9.3x | n/a | n/a | 0.9x | 1.1x | 1.0x |
| | | 4.1% | | | | | | | | | | | | | | |
| Midstream | | | | | | | | | | | | | | | | |
| Enbridge Inc | CA29250N1050 | 4.6% | 54,961 | -25.8% | -14.6% | -14.7% | -25.8% | -17% | -23% | 82% | 15.4x | 16.0x | 14.7x | 11.6x | 12.2x | 11.5x |
| | | 4.6% | | | | | | | | | | | | | | |
| Equipment & Services | | | | | | | | | | | | | | | | |
| Schlumberger Ltd | AN8068571086 | 2.6% | 17,047 | -66.0% | -59.4% | -67.2% | -66.0% | -80% | -81% | -73% | 9.3x | 15.2x | 16.3x | 4.9x | 6.0x | 6.3x |
| Helix Energy Solutions Group Inc | US42330P1075 | 0.6% | 204 | -83.0% | -79.7% | -79.3% | -83.0% | -79% | -89% | -87% | 4.6x | 16.6x | 820.0x | 2.5x | 2.9x | 3.3x |
| | | 3.3% | | | | | | | | | | | | | | |
| Oil & Gas Refining & Marketing | | | | | | | | | | | | | | | | |
| China Petroleum & Chemical Corp | CNE1000002Q2 | 3.7% | 71,359 | -18.2% | -17.1% | -32.1% | -18.2% | -24% | -17% | 31% | 7.4x | 12.1x | 9.7x | 4.9x | 5.9x | 5.3x |
| Valero Energy Corp | US91913Y1001 | 3.9% | 16,736 | -51.0% | -45.7% | -44.2% | -51.0% | -23% | -14% | 234% | 9.2x | 13.3x | 7.5x | 4.9x | 6.2x | 4.6x |
| | | 7.6% | | | | | | | | | | | | | | |
| Research Portfolio | | | | | | | | | | | | | | | | |
| Cluff Natural Resources PLC | GB00B65YKF01 | 0.4% | 11 | -58.5% | -53.7% | -71.9% | -58.5% | -73% | -86% | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| EnQuest PLC | GB00B635TG28 | 0.4% | 156 | -65.8% | -58.4% | -60.4% | -65.8% | -78% | -76% | -92% | 1.0x | n/a | 3.5x | 2.5x | 4.3x | 3.8x |
| JXN Oil & Gas PLC | GB0004697420 | 0.6% | 35 | -33.2% | -41.5% | -69.6% | -33.2% | -15% | -52% | -95% | n/a | n/a | n/a | n/a | n/a | n/a |
| Reabold Resources PLC | GB00B95L0551 | 0.5% | 28 | -57.6% | -68.1% | -43.6% | -57.6% | -55% | -84% | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Shandong Molong Petroleum Machinery C | CNE1000001N1 | 0.2% | 263 | -33.0% | -37.0% | -54.8% | -33.0% | -69% | -83% | -85% | n/a | n/a | n/a | n/a | n/a | n/a |
| Sunpower Corp | US8676524064 | 1.0% | 780 | -35.0% | -53.8% | -22.1% | -35.0% | -17% | -84% | -73% | n/a | n/a | 13.7x | 13.7x | 11.8x | 7.9x |
| Unit Corp | #N/A | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Diversified Gas & Oil Company | GB00BYX7JT74 | 0.7% | 676 | -19.9% | -14.0% | -27.9% | -19.9% | 65% | n/a | n/a | 6.4x | 7.0x | 9.0x | 5.0x | 5.0x | 5.7x |
| | | 3.8% | | | | | | | | | | | | | | |
| Cash | | 2.8% | | | | | | | | | | | | | | |

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.

Forecasts are inherently limited and cannot be relied upon. Holdings are subject to change.

The Fund's investment objectives, risks, charges and expenses must be considered carefully before investing. The statutory and summary prospectuses contain this and other important information and can be obtained by calling 800- 915-6565 or visiting www.gafunds.com. Read and consider it carefully before investing.

The Fund's holdings, industry sector weightings and geographic weightings may change at any time due to ongoing portfolio management. References to specific investments and weightings should not be construed as a recommendation by the Fund or Guinness Atkinson Asset Management, Inc. to buy or sell the securities. Current and future portfolio holdings are subject to risk.

Mutual fund investing involves risk and loss of principal is possible. The Fund invests in foreign securities, which involve political, economic, currency risks, greater volatility, and differences in accounting methods. These risks are greater for emerging markets. The Fund invests in smaller and mid-cap companies, which involve additional risks such as limited liquidity and greater volatility than investments in larger companies. The Fund's focus on the energy sector to the exclusion of other sectors exposes the Fund to greater market risk and potential monetary losses than if the Fund's assets were diversified among various sectors.

MSCI World Energy Index is the energy sector of the MSCI World Index (an unmanaged index composed of more than 1400 stocks listed in the US, Europe, Canada, Australia, New Zealand, and the Far East) and as such can be used as a broad measurement of the performance of energy stocks.

MSCI World Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed markets.

The S&P 500 Index is a broad-based unmanaged index of 500 stocks, which is widely recognized as representative of the equity market in general.

One cannot invest directly in an index.

The Henry Hub pipeline is the pricing point for natural gas futures on the New York Mercantile Exchange.

Price to earnings (P/E) ratio (PER) reflects the multiple of earnings at which a stock sells and is calculated by dividing current price of the stock by the company's trailing 12 months' earnings per share

The New York Mercantile Exchange is the world's largest physical commodity futures exchange.

Enterprise Value, or EV for short, is a measure of a company's total value, often used as a more comprehensive alternative to equity market capitalization

Standard Deviation (SD) is applied to the annual rate of return of an investment to measure the investment's volatility. Standard deviation is also known as historical volatility and is used by investors as a gauge for the amount of expected volatility.

Debt/EBITDA is a measure of a company's ability to pay off its incurred debt. This ratio gives the investor the approximate amount of time that would be needed to pay off all debt, ignoring the factors of interest, taxes, depreciation and amortization.

Opinions expressed are subject to change, are not guaranteed and should not be considered investment advice.

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