GUINNESS ATKINSON FUNDS

Energy Brief

October 2019

REPORT HIGHLIGHTS

OIL

Brent and WTI decline; OPEC+ agree to extend existing quotas

Brent and West Texas Intermediate (WTI) both declined over the quarter; Brent was down from $67/bl to $61/bl; WTI fell from $58.5/bl to $54/bl. Drone attacks on various oil processing and production facilities in Saudi Arabia caused oil prices to spike late in the quarter but the disruption was not sufficient to offset market fears over slowing world economic growth (and therefore oil demand growth) and a heavy oil supply/demand balance for 2020.

NATURAL GAS

US gas prices lower; Asian & European prices also weak

Henry Hub prices were broadly flat during the quarter, opening at $2.31/mcf and closing at $2.33/mcf. The US market remains structurally oversupplied although the oversupply reduced from 3 Bcf/day at the start of the quarter to 1 Bcf/day at the end of the quarter. Onshore gas production was 9.3 Bcf/day higher than the previous year as a result of the Marcellus and associated gas production from the Permian. International gas prices continued to remain under pressure.

EQUITIES

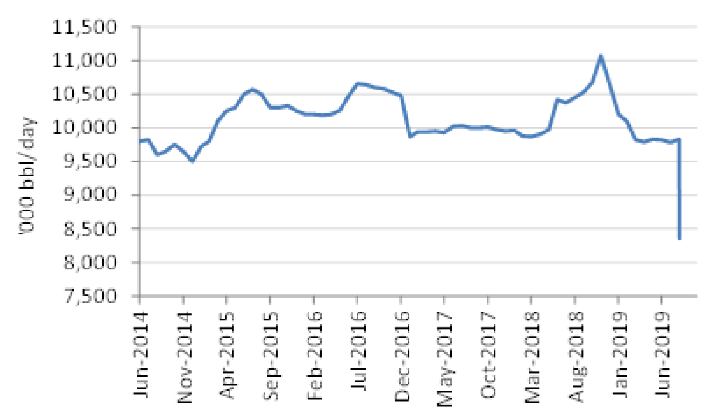
Energy underperforms the broad market

The main index of oil and gas equities, the MSCI World Energy Index, was down by 5.8% in the third quarter of 2019. The S&P 500 Index was up by 1.7% over the same period.

CHART OF THE QUARTER – Saudi oil production down by 1.5mn b/d on drone attacks

The Abqaiq oil processing facility and Khurais oil field in Saudi Arabia were the target of a drone attack during the month. While Saudi Aramco initially shut in 6.4m b/d (million barrels per day) of production, the company provided positive guidance about production returning to pre-attack levels in relatively fast order. According to Bloomberg, Saudi production was down 1.5mn b/d in September (versus August) implying a loss of 3mn b/d of production on average in the second half of September.

Saudi Arabia monthly oil production



Third Quarter 2019 in Review
Manager's Comments
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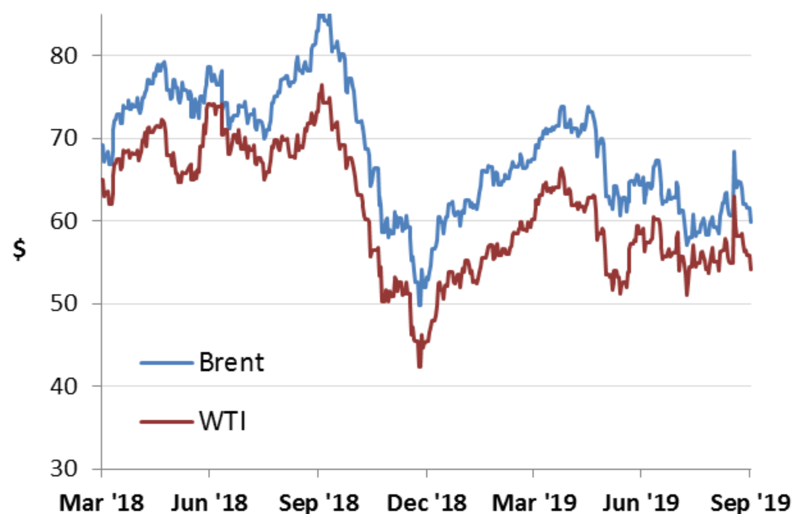
Portfolio: Guinness Atkinson Global Energy Fund
Outlook
Appendix: Oil and Gas Markets, Historical Context

1. Third quarter 2019 in review

i) Oil market

Figure 1: Oil price (WTI and Brent $/barrel) 18 months March 31 2018 to September 30 2019



Source: Bloomberg LP

Spot oil prices, a key driver of the sector, fell over the quarter. The Brent oil price, from oil fields in the North Sea with typically lower transportation costs, started the quarter at $66.6/bl and steady fell in the first half of the quarter, reaching a low of $56/bl in early August, before recovering to just over $60/bl and then spiking to $69/bl as a result of the attacks of Saudi oil facilities on September 14th. Brent closed the quarter at $60.8/bl. Brent has averaged $64.7/bl so far in 2019, down from $72/bl during 2018, but higher than the average level for 2017 ($55/bl). The West Texas Intermediate (WTI), sourced from U.S. oil fields, oil price traded in a similar fashion, falling from $58.5/bl to $54/bl over the quarter.

Longer dated oil prices were also weaker over the period: the five year forward Brent oil price fell from $60.5/bl to $57.6/bl.

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

- **OPEC+ maintaining existing quotas**
  OPEC held their latest meeting on July 1st, and confirmed the extension of current quotas for a further nine months. The 10 participating non-OPEC producers have signed a new Charter of Cooperation which formalizes their involvement. OPEC's effective compliance with their quotas is currently greater than 100%, thanks to outages in Venezuela and Iran. Amongst OPEC members who are producing 'normally', there would be a further 0.4m b/day to come out of the market if individual country quotas were adhered to.

- **Attacks on Saudi oil production and processing facilities causing lower OPEC production**
  After a number of drone attacks in the region in the second quarter of 2019, September witnessed a 'black swan' event in the oil industry with Saudi Arabia's Khurais oil field and its Abqaiq oil processing facility being targeted in a drone attack. Saudi shut in 5.7 million barrels a day of black oil production and 0.7 million barrels a day of natural gas liquids, representing around 6% of total world oil and liquids supply. OPEC production, according to Bloomberg, fell during September by 1.6mn b/d versus August, averaging 28.32 mb/d in September. Saudi represented the lion's share of the production fall, with production down by 1.5mn b/d on average over the quarter, representing a total loss of 45 million barrels of production.

- **US onshore supply growth relatively weak in the quarter (latest data)**
  The latest EIA production data showed a 62,000 b/day oil production increase in July 2019 (latest data point) after reporting a decline of 9,000 b/day in June and growth of 57,000 b/day in May. Year-on-year growth has now fallen to 1.15m b/day. Onshore rig operators in the US have signaled that they expect a further decline in the rig count over the next few months, increasing expectations that US shale oil production growth will start to falter. There is typically a 5-6 month lag from rig count change to production change.

- **Slowing US onshore drilling and fracturing activity**
  The US oil directed rig count continued to fall (from 793 rigs to 713 rigs over the quarter and now down 175 rigs (20%) from the peak of 888 rigs in November 2018. While the US onshore continues to grow, full year growth expectations are being moderated and it is now likely, in our opinion, that the US disappoints on production growth relative to expectations at the beginning of the year.

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

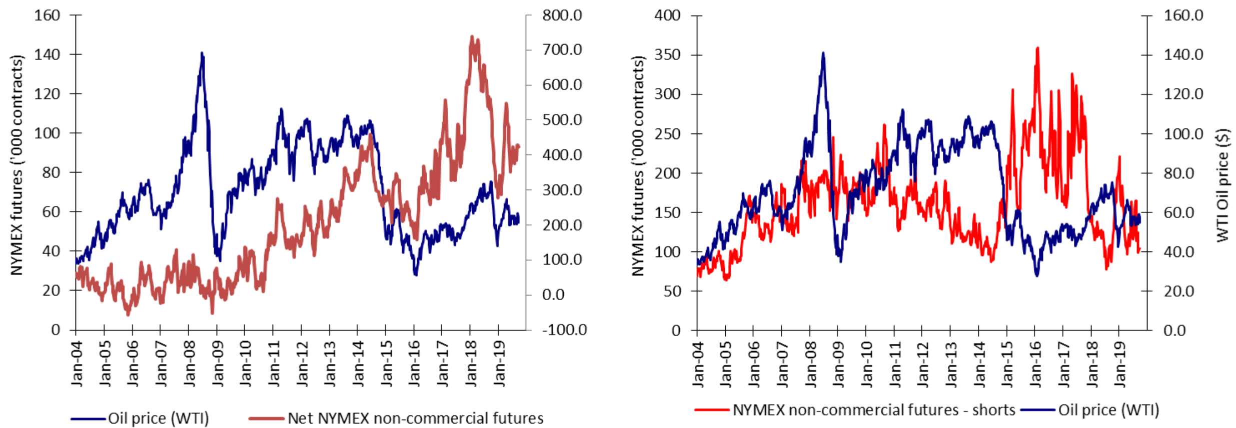
- **Non-OPEC (ex-US) supply growth looking stronger**
  Current estimates suggest that non-OPEC (ex US onshore) supply growth in 2020 will be around 0.8m b/day, the highest level since 2014. In Norway, the large Johann Sverdrup offshore project is coming onstream ahead of time, and will contribute around 0.3m b/day in 2020. Meanwhile, Brazil is expected to add around 0.4m b/day next year, as slowing production declines in the Campos basin combine with a series of new FPSO's (floating production and storage offloading) coming into operation in the Santos basin.

- **Global oil demand expectations remaining under pressure**
  The IEA released in its September Oil Market Report early data showing that global oil demand in July grew by around 1.3m b/d yoy (year- over-year). While this is a supportive level of demand growth, it comes on the heels of some poor demand data for June (demand was only up 0.2m b/d yoy) and a sluggish first half of 2019 as a whole. The oil market remains very focused on demand growth expectations and the IEA's expectation of 1.1m b/d for 2019 requires a sustained recovery in the second half of 2019 data.

Speculative and investment flows

The New York Mercantile Exchange (NYMEX) net non-commercial crude oil futures open position was 424,000 contracts long at the end of September versus 379,000 contracts long at the end of June. The net position peaked in February 2018 at 739,000 contracts long. Typically, there is a positive correlation between the movement in net position and movement in the oil price. The gross short position fell to 104,000 contracts at the end of September versus 118,000 at the end of June.

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

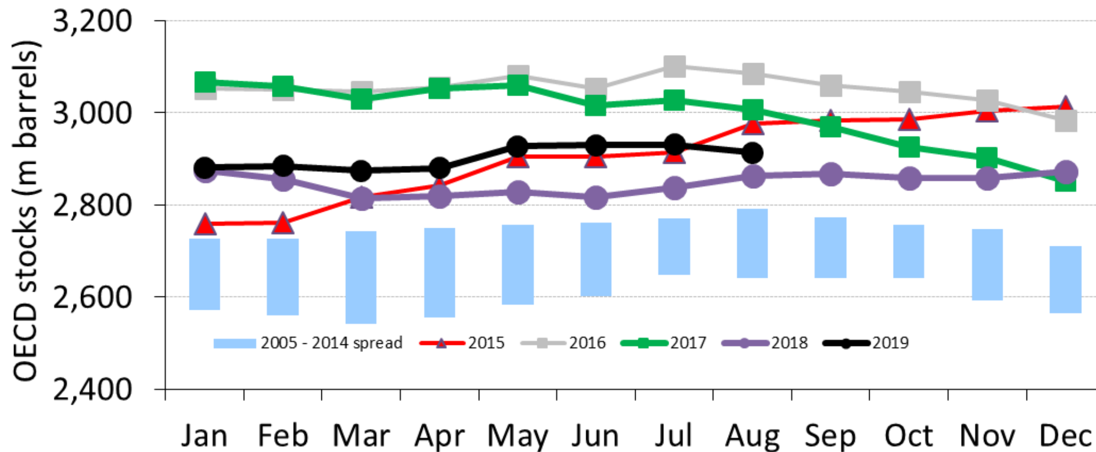


Source: Bloomberg LP/NYMEX/ICE (2019)

OECD stocks

OECD (Organization for Economic Co-operation and Development) total product and crude inventories at the end of August (latest data point) were estimated by the IEA to be 2,914m barrels, down by 14m barrels versus the level reported for May. This compares to a 10-year average increase for the period of 23m barrels, implying that the market was undersupplied over the quarter by just under 0.5m b/day. Inventories have built since the start of the year by around 32m barrels.

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



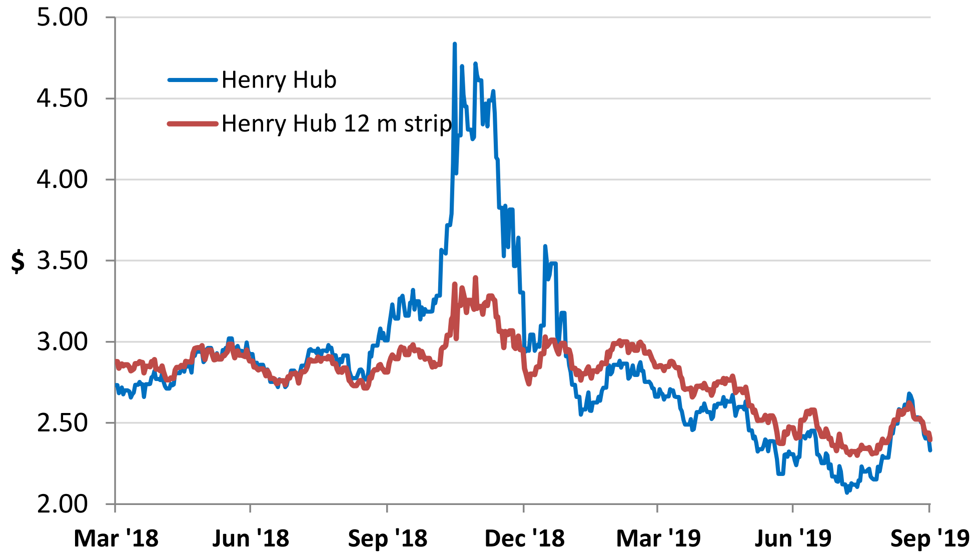
Source: IEA Oil Market Reports (September 2019 and older)

ii) Natural gas market

The US natural gas price (Henry Hub front month) opened July at $2.31/mcf (1,000 cubic feet) and traded in a $2.10-2.70/mcf range before closing the month broadly unchanged at $2.33/mcf. The spot gas price has averaged $2.57/mcf so far in 2019, which compares to an average gas price of $3.07/mcf in 2018, $3.02 in 2017 and $2.55/mcf in 2016.

The 12-month gas strip price (a simple average of daily settlement prices for the next 12 months' futures contracts for the same commodity) fell slightly over the quarter, opening at $2.47/mcf and closing at $2.39/mcf. The strip price averaged $2.90 in 2018, $3.12 in 2017, $2.84 in 2016 and $2.86 in 2015.

Figure 4: Henry Hub gas spot price and 12month gas strip price ($/Mcf) March 31 2019 to September 30 2019



Source: Bloomberg LP

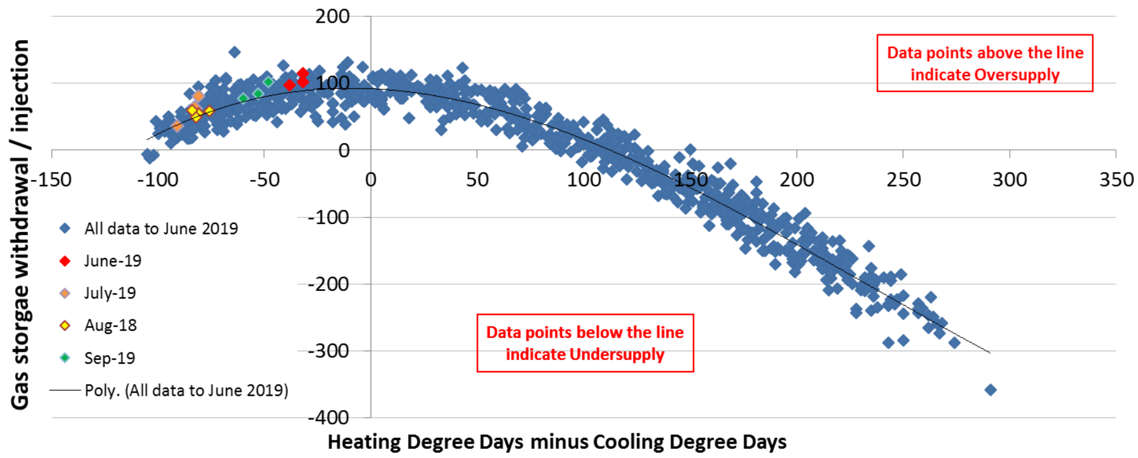
Factors which weakened the US gas price in the quarter included:

- **Structurally oversupplied market**
  Adjusting for the impact of weather in the quarter, the most recent movements of gas in storage suggest the market is, on average, operating at a surplus of around 1 Bcf/day (as indicated by the green dots in figure 5). The market was in a 3 Bcf/day oversupplied situation at the start of the quarter.

- **Increase in US onshore natural gas production**
  Onshore US natural gas production averaged 99.2 Bcf/day in July 2019 (the latest available data point), up by 1.5 Bcf/day versus the level reported for April; production grew steadily over the quarter. Onshore gas production is now 9.3 Bcf/day up on the level reported twelve months earlier. Rising associated gas supply from shale oil and a pickup of activity in the Marcellus basin are the key reasons for the rise in production while a slowdown in US natural gas demand growth will also put further pressure on the supply/demand balance.

  It is worth noting that this level of production growth is being achieved despite the natural gas oriented drilling rig count falling to 146 (from 173 rigs at the start of the quarter and down 43 rigs, 23%, from the same period in 2018). In addition, the level of US liquefied natural gas (LNG) Exports continues to grow, now at 6.2 Bcf/day in September 2019, nearly double the level achieved in September 2018.

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



Source: Bloomberg LP; Guinness Atkinson Asset Management

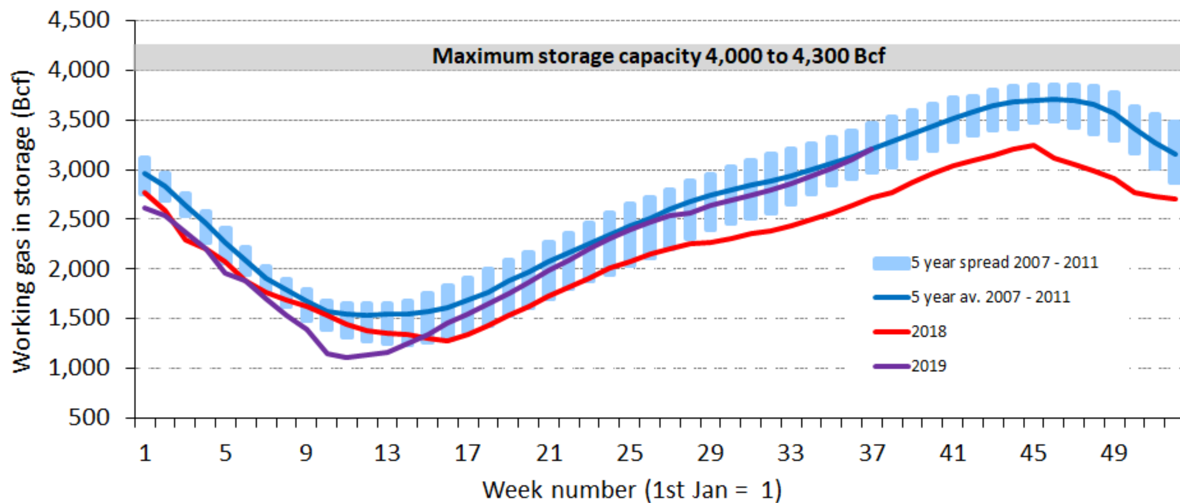
Factors which strengthened the US gas price in the quarter included:

- **Coal to gas switching**
  With gas prices below $2.50/mcf over the summer, we believe there has been significant gas to coal switching by US power utilities. Rystad Energy forecasts that natural gas-fueled generation will hit a record 38% share of total US electrical power generated in 2019. This is almost two and a half times the level seen in 2008.

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 September were reported by the EIA to be 3.2 Tcf (trillion cubic feet). Current gas in storage is in line with the 10 year average as a result of strong demand plus increasing volumes of gas exported via LNG offsetting strong onshore production growth. The high visibility of low cost supply growth for 2019 is keeping a cap on prices 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)

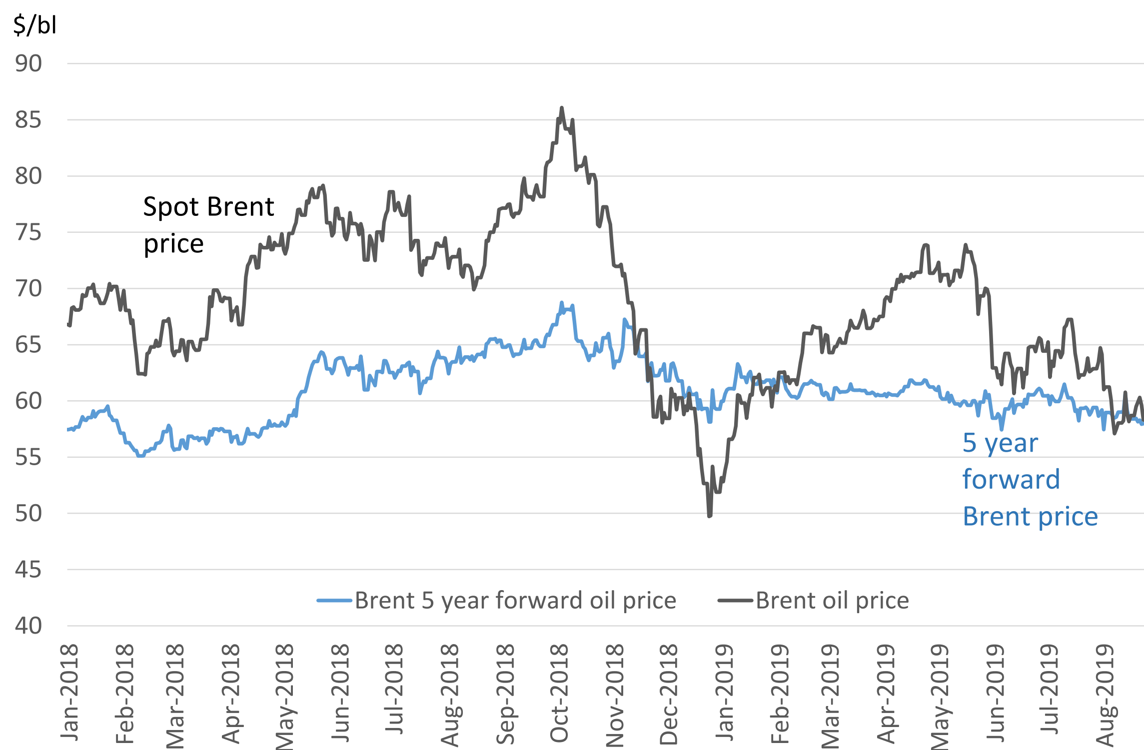


Source: Bloomberg; EIA (September 2019)

1. MANAGER'S COMMENTS

A rocky summer has taken sentiment towards crude oil and energy equities back to early 2016 levels and the outlook for both looks complex. A potential loosening of the oil market in 2020, caused by growth in non-OPEC supply, remains a headache for OPEC, who have vowed to 'do what it takes' to maintain prices at or above current levels. Energy equity valuations are discounting the lowest oil price since before the 2008/09 Financial Crisis, but the market is seeking a clearer view on the supply-demand balance, before it is prepared to respond positively.

Underperformance from energy equities over the summer has been driven by a slide in the oil futures curve. The five year forward Brent oil price sat just above $60/bl for most of the first half of 2019, but has drifted lower, down to around $57/bl at the end of August. The spot oil price has also pulled back, now about flat since the start of the year.



Source: Bloomberg; Guinness Atkinson (Sept 2019)

In the nearer term, demand concerns tied to global economic slowdown seem foremost in investors' minds. We see the sluggishness of longer dated oil prices being driven, however, by the resilience of non-OPEC supply, both US shale oil and offshore projects outside the US. Here we explore the demand/supply factors at play, and the implications for our portfolio.

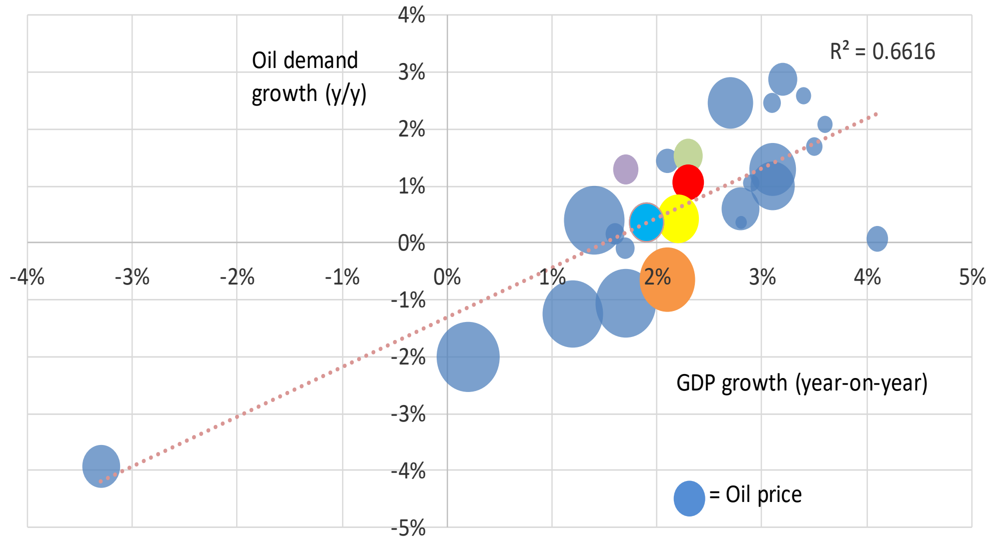
Oil demand *(2019: +1.1m b/day; 2020: +1.3m b/day)*

Oil demand growth so far in 2019 has been weak. According to the IEA, oil demand increased by 0.52m b/day year-on-year in the first five months of the year (data not yet available for June/July), the slowest pace of growth for this period since 2008. This appears linked to an economic slowdown in a number of large economies, with lower trade and weaker manufacturing output. There have been some country specific factors too: Indian demand has been unusually weak thanks to widespread maintenance across the naphtha refining industry, while Saudi's demand has been impacted by ongoing oil-to-gas switching.

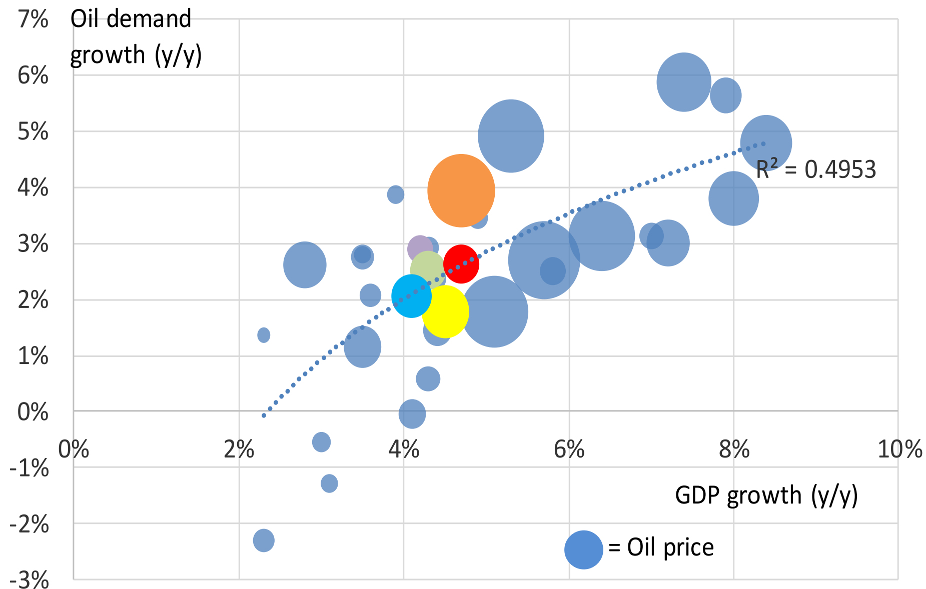
A recovery in demand growth in the second half of 2019 is expected, such that the IEA still peg their overall 2019 demand growth estimate at 1.1m b/day, but it will require global GDP growth to hold up to the IMF's current forecast of 3.2%, for this to be achieved.

Broadly speaking, oil demand growth tends to be a function of GDP growth and oil price:

OECD GDP(x) vs OECD oil demand (y) vs oil price



Non-OECD GDP (x) vs non-OECD demand (y) vs oil price



2014 oil price = $98
2015 oil price = $48
2016 oil price = $43
2017 oil price = $55
2018 oil price = $72
2019 oil price = $60

Source: Bloomberg; IMF; Guinness Atkinson (Sept 2019)

We do not believe there has been any structural decoupling of oil demand and GDP, so to put this another way, if oil demand growth this year finished up at around 0.5m b/day, it would imply that global GDP growth in 2019 was running at closer to 2.5%, rather than the IEA's 3.2%.

Looking ahead to 2020, the IEA are forecasting global oil demand growth of 1.3m b/day, which is consistent with global GDP growing at around 3.5%. At the margin, there will also be a demand bump from the introduction of IMO (International Maritime Organization) 2020 rules. IMO 2020 is a regulation that forces ships to reduce (or scrub) the use of high sulphur fuel oil, and will cause part of the global shipping fleet to shift to lower sulphur distillates. This in turn pressures the global refining complex: more middle distillate barrels will be demanded, causing greater overall refined product output.

Post any economic slowdown, we expect global oil demand growth to remain in the 1-1.5m b/day range for some time to come.

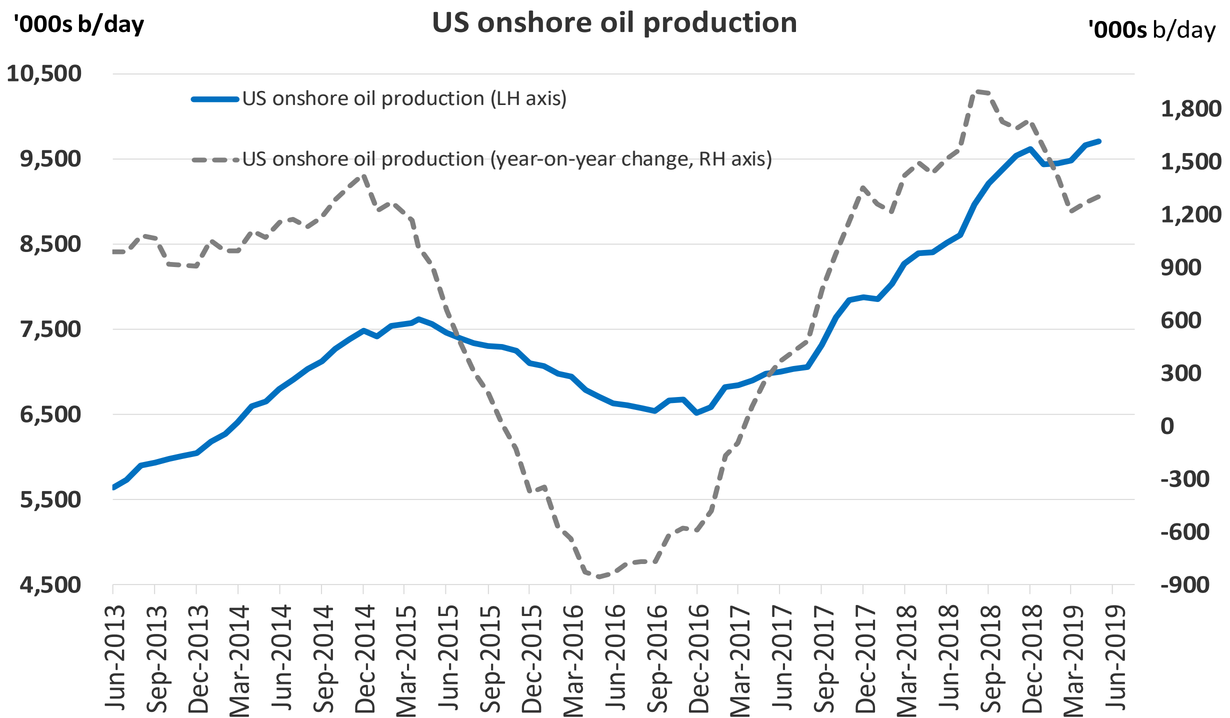
Oil supply

Assuming no change to OPEC policy for the final four months of the year, world oil supply in 2019 looks to be growing by around 0.2m b/day. This comprises:

- US onshore supply growth (including natural gas liquids) of 1.6m b/day
- Rest of non-OPEC supply growth of 0.3m b/day
- OPEC supply decline of 1.8m b/day

US onshore (2019: +1.6m b/day; 2020: +1.2m b/day)

US onshore oil and NGL (natural gas liquid) supply is behaving broadly as expected. The acceleration in growth that we saw in 2018 (up 2.2m b/day, including NGLs) was a function of price. With WTI averaging in the high $60s, there was incentive and cashflow to increase the level of drilling activity. This has reversed in 2019, with a WTI price in the mid $50s, and coupled with investor pressure for capital discipline, has caused producers to retrench. Production growth in 2019 has therefore slowed to around 1.6m b/day.



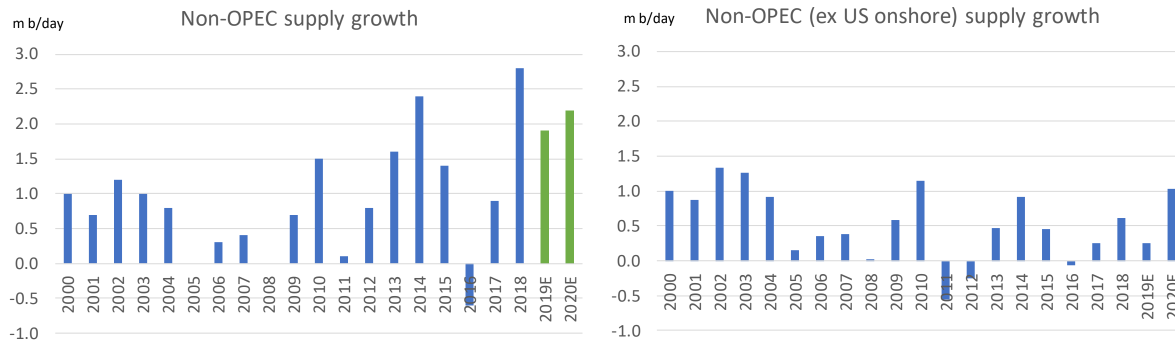
Source: EIA; Bloomberg; Guinness Atkinson (Sept 2019)

We estimate that the US oil-directed horizontal rig count is down by around 120 rigs since the December 2018 peak, back at the level last seen in late 2016. The rate of growth in the US onshore system is also being affected by sharp natural decline rates in recently drilled wells. We believe that, all other things being equal, the US system needs to produce an additional 0.3m b/day in 2019 vs 2018 to overcome those declines. In other words, if the average rig count were flat (let alone falling), US supply would decline by that amount.
Looking ahead, we expect independent producers to remain more disciplined with their capital, with the market rewarding an appropriate balance of growth and free cashflow. An offsetting negative is the behavior of the oil majors, who are focusing a greater proportion of their global capex budgets on US onshore production, in particular the Permian Basin. Exxon now plans to grow their Permian oil production to around 600,000 b/day by 2024, up from around 180,000 b/day in 2018, while Chevron is eyeing something similar.

However, the falling rig count and higher natural declines set up slower growth in 2020. Assuming WTI averages around $55 next year, we expect US onshore oil and other liquids to grow by around 1.2m b/day, with the majority of that growth coming from the Permian.

Rest of non-OPEC (2019: +0.3m b/day; 2020: +0.8m b/day)

We regard non-OPEC (ex-US) supply as the part of the oil market that has surprised us most, with greater downside resilience thanks to a period of unusually low decline rates for existing production.



Source: IEA; Guinness Atkinson (Sept 2019)

Also, projects that were sanctioned in 2013/14/15 are also still having an impact on this picture. In Q4 2019, for example, we expect the start-up of the first phase of the Johann Sverdrup project in the Norwegian North Sea, which will add around 0.4m b/day in 2020. Elsewhere, it looks like Brazil will finally manage a year of supply growth next year (+0.3m b/day), as a series of FPSO vessels are brought into production in the Santos offshore basin.

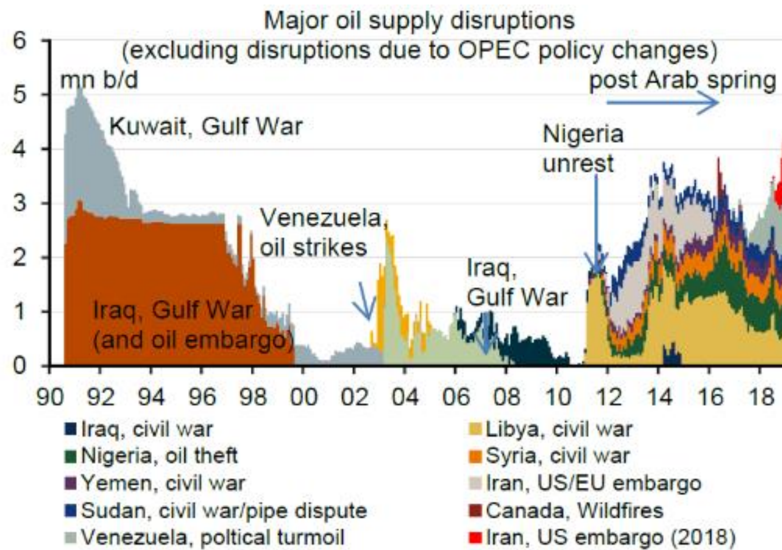
Beyond 2020, we continue to believe that non-OPEC (ex US) supply will be challenged by the slowdown in investment that has come since 2014 (for example, Rystad Energy see an average decline in 2020/21 of 0.3m b/day), but for now, production growth remains a headache for OPEC.

OPEC (2019: -1.8m b/day; 2020: depends on strategy)

OPEC cut production quotas at the start of 2019 by 0.8m b/day. Compliance from 'core' Gulf state OPEC members has been good, particularly from Saudi, who have cut their production by around 0.5m b/day beyond their country quota. This has offset laxer behavior from Iraq and Nigeria, currently producing around 0.4m b/day more than quotas imply.

The bigger story within OPEC has been the significant decline in Iranian and Venezuelan production. Both countries have been affected by sanctions, and Venezuela also by chronic mismanagement and underinvestment. Average production from the two countries is down by 1.5m b/day so far in 2019 versus last year.

With events in Iran and Venezuela this year, the amount of global oil supply disruption has risen to a multi-decade high. Some of these disruptions can now be deemed structural (e.g. further recovery in Libyan production; Nigerian oil theft), but others (e.g. Iranian sanctions) could be easily reversed. Of the 4m b/day currently 'disrupted', we estimate that around 2m b/day could return if the political climate changed.



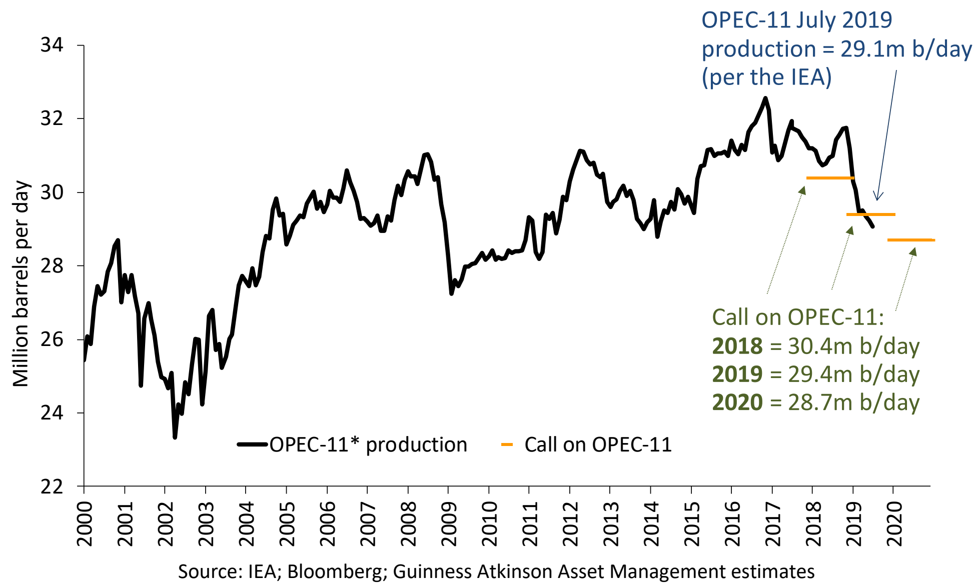
Source: BAML; Guinness Atkinson (Sept 2019)

Within the OPEC group, we continue to think that Saudi are managing the oil price in a rational fashion: trying to support the price as high as possible, while avoiding pushing it too far over-stimulate non-OPEC supply (in particular US onshore production).

At the most recent formal OPEC meeting in July, it was interesting to note Saudi's stance towards US shale oil. In 2014, OPEC took a specific 'market share' approach towards shale and other non-OPEC supply. In this meeting, however, there was effectively an acknowledgement that OPEC were trying to stabilize price at a reasonable level, making space for shale oil to grow until it peaked. Al Falih stated: "*until [US shale supply peaks], it is prudent for those of us who have a lot at stake ... to keep adjusting to it .... It increases the reasoning for us to stay vigilant, watchful and adjust slightly here - up and down as necessary to keep markets balanced".*

The message from OPEC, and in particular from Saudi over the last 12 months, has been a desire to normalize global oil inventories, and stabilize oil at a price which benefits producers without placing stress on consumers. We believe the price being sought is Brent at around $60-70/bl.

However, the challenge OPEC faces comes in the form of non-OPEC supply, which is expected to grow in 2020 by a further 2m b/day, versus demand growth of 1.3m b/day. This decreases the call on OPEC by 0.7m b/day:



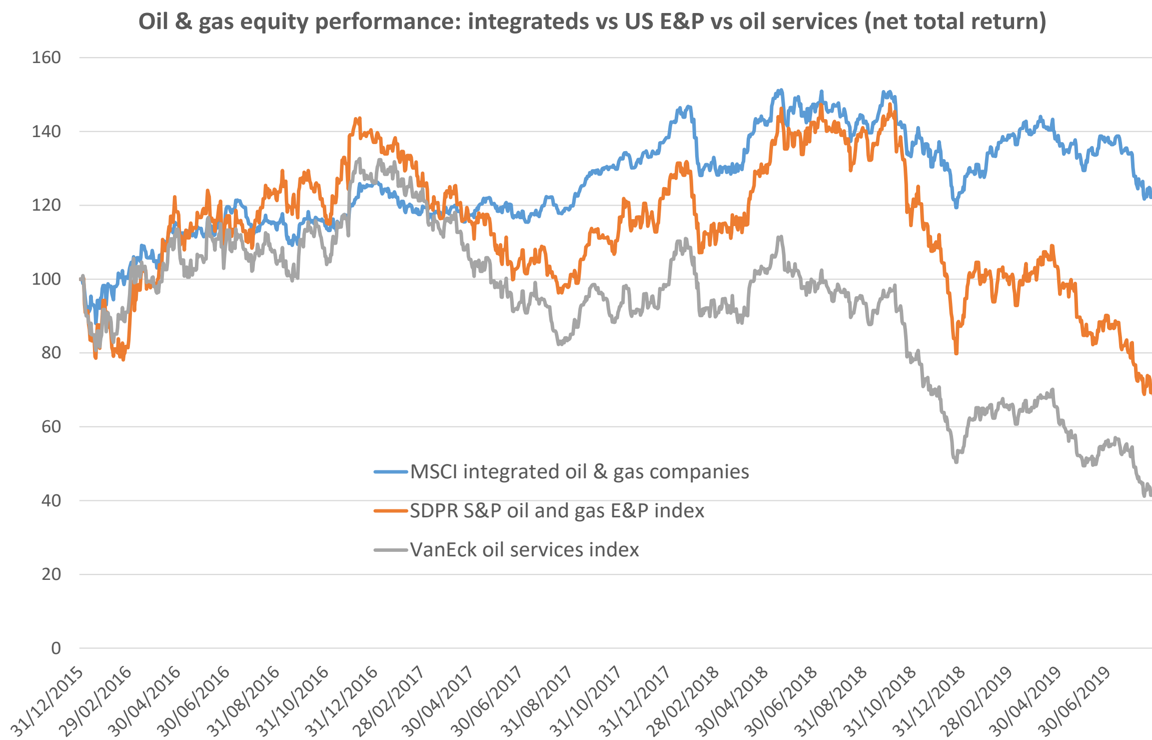
Source: IEA; Bloomberg; Guinness Atkinson Asset Management estimates

We believe OPEC has an expectation that the underinvestment in non-OPEC (ex US) regions since 2014, coupled with the 'decline curve challenges' of US shale, create significant challenges for non-OPEC supply to continue to grow in this fashion. But until that supply slowdown comes, tensions within the OPEC+ group will remain.

Energy equity valuations

Energy equities recovered well at the start of the year, reflecting the improvement in front month oil prices. Weakness over the summer, however, leaves the MSCI World Energy Index lagging broader equities (MSCI World) by 14%, year-to-date.

Within the global energy sector, significant divergence in performance between subsectors has continued, with exploration & production (E&P) companies and energy service companies materially underperforming the integrated oil & gas sector:

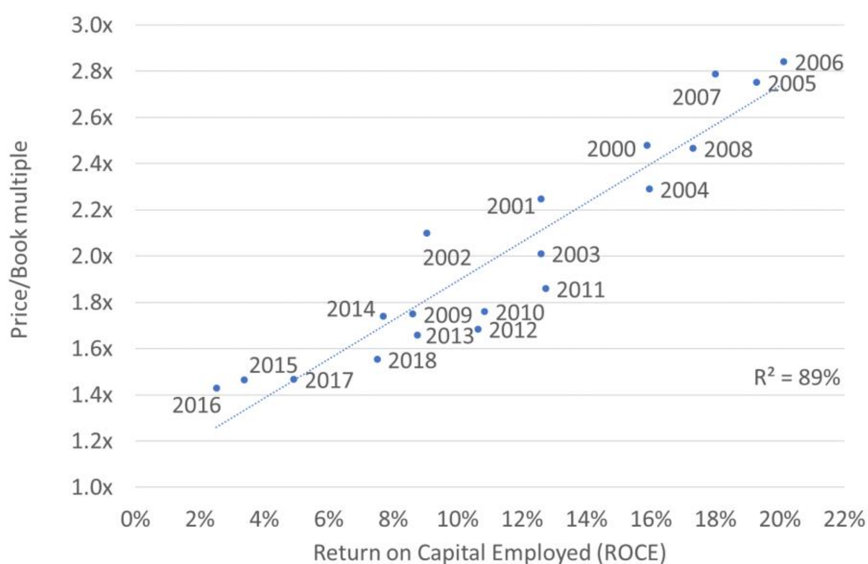


Since the start of 2019, integrateds have produced a positive return of around 1-2%, while E&Ps and services are both down by around 18% (total return in USD).

The current valuation of our portfolio of energy equities implies a Brent/WTI oil price of $49/$45/bl into perpetuity, which we think of as a 'blended' implied oil price of $47/bl. This is the lowest implied oil price in the portfolio since we launched the Fund in 2008, so lower than the previous troughs of early 2009 and early 2016. By comparison, the five year forward Brent oil price is around $57/bl, so the equity market already looks to be pricing in a significantly more pessimistic about forward oil prices than the futures curve would suggest.

If the market were to price in a long-term Brent oil price of $60/bl (which is our base case), it would imply 35-40% upside in our portfolio, while there would be 65-70% upside at a long term oil price of $70/bl Brent.

The stock market has historically valued energy companies based on their sustainable levels of return on capital (ROCE). The ROCE for our portfolio has recovered from a low of 2% in 2016 to 7% in 2018.



Source: Bloomberg, Guinness Atkinson Asset Management estimates

The long run average ROCE for our portfolio and the sector is around 11%, which we consider to be a 'cost of capital' return, and must be the minimum that companies aim to recover to. If ROCE improved to 11%, it would imply around 65% upside in the portfolio.

2. Performance – Guinness Atkinson Global Energy Fund

The third quarter of 2019 was slightly positive for global equities. The MSCI World Energy Index (Net Return) was down by 5.8%, underperforming the MSCI World Index which was up by 0.7% and the S&P 500 which was up by 1.7%. The Guinness Atkinson Global Energy Fund fell by 6.3%, underperforming the energy index by 0.5% and underperforming the broad market (MSCI World Index) by 7.0%.

Within the portfolio, the strongest contributors were Anadarko and Gazprom.

- Anadarko was subject to acquisition from Occidental at a substantial premium, following a bidding war with Chevron. We sold our position just prior to the deal closing allowing the position to contribute 2.43% to the fund's performance ytd.
- Gazprom announced changes to its senior management team, and a larger increase in dividend than the market was anticipating. Both events were very well received and led to our position contributing 2.44% to the fund's performance ytd.
- Other individual strong contributors were OMV, Noble Energy, Enbridge and two of our Canadian Oil Sands companies (Suncor Energy and Canadian Natural Resources)

Within the portfolio, the weakest contributors were predominantly North American focused E&Ps and service companies

- Halliburton was particularly weak (providing a negative contribution of 1.07%) as a result of the sharp slowdown in North American onshore oil well drilling and completion activities. Halliburton is a very high-quality service company and we expect the shares to recover when activity starts to rebound in the UNS onshore.
- Occidental was weak, delivering a negative 1.02% contribution, as a result of its successful cash and share bid for Anadarko.
- Other weak contributors included Newfield Exploration, which was bid for in an all share deal by EnCana. The combined contribution of the position was -0.95%.

Our Super Major positions (BP, RD/Shell, Chevron and TOTAL) performed well over the period, delivering an average return of 6.1%. We did not hold a position in ExxonMobil, which was up 7.2% over the period. The Guinness Atkinson Energy fund underperformed as a result of greater than index weightings to the E&P companies and Service companies. The US E&P index (XOP Index) and US oil services index (OIH Index) were down by 14.9% and 16.3% respectively over the period.

Performance as of September 30, 2019 (inception date is June 30, 2004)

Inception date 6/30/04	Full Year 2016	Full Year 2017	Full Year 2018	YTD 2019	1 year (annualized)	Last 3 years (annualized)	Last 5 years (annualized)	Last 10 years (annualized)	Since inception (annualized)
Global Energy Fund	**27.04%**	**-1.06%**	**-18.92%**	**5.79%**	**-23.46%**	**-2.55%**	**-9.70%**	**-1.36%**	**4.96%**
MSCI World Energy NR Index	**26.56%**	**4.97%**	**-15.84%**	**6.15%**	**-16.86%**	**0.23%**	**-4.71%**	**1.46%**	**4.54%**
S&P 500 Index	**11.76%**	**21.82%**	**-4.37%**	**20.55%**	**4.25%**	**13.39%**	**10.82%**	**13.22%**	**8.71%**

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 https://www.gafunds.com/our-funds/#fund_performance or call (800) 915-6566.

The Advisor has contractually agreed to reimburse expenses (excluding Acquired Fund Fees and Expenses, interest, taxes, dividends on short positions and extraordinary expenses) in order to limit the Fund's Total Annual Operating Expenses to 1.45% through June 30, 2020. To the extent that the Advisor absorbs expenses to satisfy this cap, it may recoup a portion or all of such amounts absorbed at any time within three fiscal years after the fiscal year in which such amounts were absorbed, subject to the expense cap in place at the time recoupment is sought, which cannot exceed the expense cap at the time of the waiver.

4. Portfolio – Guinness Atkinson Global Energy Fund

In August, we sold our position in Anadarko and switched to a position in Repsol. Anadarko was the strongest performer in the portfolio this year thanks to the proposed acquisition by Occidental. We sold our stake in the company just prior to the deal completing. We purchased a stake in Repsol, the Spanish integrated oil & gas company, owing to its improving free cashflow and profitability, and positive refining leverage to the IMO 2020 regulations. At a 2019 P/E of 7.5x, Repsol is also trading as one of the cheapest integrated oil & gas companies, versus a European peer median of 10.4x.

Sector Breakdown

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

(%)	31 Dec 2010	31 Dec 2011	31 Dec 2012	31 Dec 2013	31 Dec 2014	31 Dec 2015	31 Dec 2016	31 Dec 2017	31 Dec 2018	30 Sept 2019
Oil & Gas	**93.2**	**98.5**	**98.6**	**95.6**	**95.3**	**94.4**	**97.9**	**97.7**	**98.6**	**97.1**
Integrated	41.2	39.6	39.1	39.6	37.5	40.5	45.8	41.8	45.3	49.5
Exploration and production	36.9	41.5	41.6	36.8	38.1	37.0	37.3	38.0	35.9	31.1
Drilling	6.3	6.0	7.4	6.8	3.1	1.7	2.3	1.8	1.5	0.4
Equipment and services	5.3	6.6	7.1	9.0	13.1	11.1	8.9	9.2	8.3	7.8
Storage & transportation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.7	4.3
Refining and marketing	3.5	4.8	3.4	3.4	3.5	4.1	3.6	3.5	3.9	4.0
Coal and consumables	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Solar	**3.2**	**1.2**	**1.2**	**2.8**	**3.5**	**4.9**	**1.0**	**2.1**	**0.6**	**1.6**
Construction and engineering	**0.4**	**0.4**	**0.6**	**0.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Cash	**3.2**	**-0.1**	**-0.4**	**0.7**	**1.2**	**0.7**	**1.1**	**0.2**	**0.8**	**1.2**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Guinness Atkinson Asset Management
Basis: Global Industry Classification Standard (GICS)
Holdings are subject to change at any time

Guinness Atkinson Global Energy Fund Portfolio

Based on the information shown previously, the table below shows the fund valuation in terms of historical and forward (analyst consensus estimates from Bloomberg) price/earnings (P/E) ratios versus the S&P500 Index.

	2012	2013	2014	2015	2016	2017	2018	2019
Fund P/E	6.6	7.2	7.4	19.1	35.5	19.7	11.2	12.4
S&P 500 P/E	30.7	27.7	24.8	29.6	28.1	23.9	19.6	18.4
Premium (+) / Discount (-)	*-78%*	*-74%*	*-70%*	*-36%*	*26%*	*-18%*	*-43%*	*-33%*
Average oil price (WTI $/bbl)	94	98	93	49	43	51	66	

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

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

Portfolio Holdings

Our integrated and similar stock exposure (about 47%) 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. At September 30, 2019 the median P/E ratios of this group were 10.7x/11.8x 2018/2019 earnings. We also have two Canadian integrated holdings, Suncor and Imperial Oil. Both companies have significant exposure to oil sands in addition to downstream assets.

Our exploration and production holdings (about 29%) give us exposure most directly to rising oil and natural gas prices. We include in this category non-integrated oil sands companies, as this is the GICS approach. The stock here with oil sands exposure is Canadian Natural Resources. The pure E&P stocks have a bias towards the US (EnCana, Devon and Oasis), with four other names (Apache, Occidental, ConocoPhillips, Noble Energy) having a mix of US and international production and one (Tullow) which is African focused. One of the key metrics behind a number of the E&P stocks held is low enterprise value / proven reserves. Almost all of the US E&P stocks held also provide exposure to North American natural gas.

We have exposure to four (pure) emerging market stocks in the main portfolio, though one is a half-position, and in total represent 12% of the portfolio. Two are classified as integrateds (Gazprom and PetroChina) and two as E&P companies (CNOOC and SOCO International). Gazprom is the Russian national oil and gas company which produces approximately a quarter of the European Union gas demand and trades on 3.5x 2019 earnings. PetroChina is one of the world's largest integrated oil and gas companies and has significant growth potential and, alongside CNOOC, enjoys advantages as a Chinese national champion. SOCO International is an E&P company with production in Vietnam.

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

We have useful exposure to oil service stocks, which comprise around 9% of the portfolio. The stocks we own are split between those which focus their activities in North America (land driller Unit Corp) and those which operate in the US and internationally (Helix, Halliburton and Schlumberger).

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

Portfolio at September 30, 2019

Guinness Atkinson Global Energy Fund (30 September 2019)			Total return (USD)					P/E			EV/EBITDA		
Stock	% of NAV	Market Cap USD	3 months	6 months	1 year	3 years	5 years	2018	2019E	2020E	2018	2019E	2020E
Integrated Oil & Gas													
Chevron Corp	3.8%	220,236	-1.8%	0.9%	12.3%	30%	22%	14.7x	17.1x	15.0x	5.9x	6.6x	6.1x
Royal Dutch Shell PLC	3.7%	227,510	-3.6%	-9.2%	4.6%	42%	6%	11.4x	12.4x	10.3x	5.5x	5.5x	5.1x
BP PLC	3.8%	125,633	-9.8%	-12.3%	5.0%	31%	19%	10.7x	12.1x	10.9x	5.3x	4.9x	4.6x
Total SA	4.1%	135,125	-3.5%	-15.1%	2.7%	29%	5%	10.7x	10.8x	9.5x	5.4x	5.0x	4.7x
ENI SpA	4.1%	54,619	-8.3%	-14.3%	3.1%	25%	-14%	11.6x	12.9x	10.7x	3.4x	3.6x	3.4x
Equinor ASA	3.8%	62,388	-10.7%	-29.2%	-6.1%	30%	-11%	9.4x	11.8x	10.2x	2.9x	3.1x	2.7x
Repsol SA	3.4%	24,660	-5.3%	-16.3%	0.6%	37%	-11%	9.4x	9.0x	7.5x	4.7x	4.6x	4.2x
OMV AG	4.5%	17,587	2.8%	-0.7%	27.5%	105%	91%	10.3x	9.3x	8.6x	4.7x	4.3x	4.0x
	31.3%												
Integrated / Oil & Gas E&P - Canada													
Suncor Energy Inc	4.2%	47,636	-0.5%	-15.1%	16.2%	25%	3%	15.0x	12.2x	13.5x	6.2x	6.0x	6.1x
Canadian Natural Resources Ltd	4.2%	30,583	-0.9%	-15.0%	13.6%	-8%	-19%	12.6x	10.1x	13.6x	6.1x	5.9x	6.1x
Imperial Oil Ltd	3.8%	19,358	-3.3%	-17.5%	4.5%	-12%	-40%	12.6x	12.9x	14.6x	6.8x	7.5x	7.3x
	12.2%												
Integrated Oil & Gas - Emerging market													
PetroChina Co Ltd	3.4%	151,085	-17.2%	-33.8%	-13.9%	-14%	-54%	11.8x	11.9x	11.1x	4.7x	5.0x	4.9x
Gazprom PJSC	3.8%	80,537	64.1%	48.1%	67.2%	98%	31%	3.7x	3.5x	3.8x	3.1x	3.4x	3.4x
	7.2%												
Oil & Gas E&P													
Occidental Petroleum Corp	2.9%	39,151	-30.5%	-42.7%	-24.1%	-29%	-39%	9.0x	16.1x	18.4x	5.1x	5.1x	3.4x
ConocoPhillips	3.6%	61,224	-13.8%	-25.0%	-7.3%	39%	-14%	12.8x	13.9x	13.4x	4.6x	4.8x	4.9x
Apache Corp	3.3%	9,125	-24.9%	-44.6%	0.0%	-57%	-70%	15.3x	159.0x	40.8x	4.1x	5.1x	4.8x
Devon Energy Corp	3.1%	9,353	-23.2%	-39.0%	7.8%	-44%	-62%	15.9x	17.5x	13.1x	3.7x	4.1x	4.0x
Noble Energy Inc	3.7%	10,235	-8.2%	-26.6%	21.6%	-34%	-65%	23.3x	n/a	41.5x	6.3x	7.6x	5.6x
EnCana Corp	2.6%	5,783	-36.2%	-64.5%	-19.9%	-55%	-77%	6.8x	7.6x	7.3x	6.6x	4.1x	3.8x
Oasis Petroleum Inc	0.8%	1,085	-42.7%	-75.6%	-37.4%	-70%	-92%	12.3x	101.8x	n/a	4.3x	4.3x	4.3x
	20.0%												
International E&Ps													
CNOOC Ltd	3.7%	67,532	-13.6%	-18.3%	4.8%	43%	13%	8.9x	8.7x	8.6x	3.0x	3.4x	3.3x
Tullow Oil PLC	2.0%	3,603	-13.8%	-21.5%	18.0%	-4%	-70%	23.7x	15.6x	11.9x	5.4x	5.4x	5.3x
Soco International PLC	1.1%	311	-4.6%	-24.3%	-1.6%	-47%	-84%	23.8x	28.1x	21.8x	3.8x	2.9x	2.3x
	6.8%												
Midstream													
Enbridge Inc	4.3%	71,120	-0.1%	15.7%	18.3%	-6%	-7%	17.8x	17.5x	17.4x	13.5x	12.9x	12.4x
	4.3%												
Drilling													
Unit Corp	0.4%	173	-76.3%	-87.0%	-76.3%	-82%	-94%	3.4x	n/a	5.6x	3.2x	4.1x	3.3x
	0.4%												
Equipment & Services													
Halliburton Co	2.5%	16,275	-34.5%	-52.1%	-27.4%	-55%	-68%	10.2x	14.5x	11.7x	6.3x	7.1x	6.5x
Helix Energy Solutions Group Inc	1.8%	1,148	1.9%	-18.4%	49.0%	-1%	-63%	36.6x	27.0x	20.6x	10.1x	9.1x	7.4x
Schlumberger Ltd	3.3%	45,224	-19.2%	-40.9%	-1.3%	-52%	-61%	21.0x	23.0x	17.9x	9.2x	9.3x	8.5x
	7.6%												
Solar													
Sunpower Corp	1.6%	1,481	68.5%	50.3%	121%	23%	-68%	n/a	n/a	51x	28.7x	22.7x	12.9x
	1.6%												
Oil & Gas Refining & Marketing													
Valero Energy Corp	4.0%	35,315	2.8%	-21.7%	17.6%	80%	121%	13.9x	17.1x	8.9x	7.6x	8.4x	5.8x
	4.0%												
Research Portfolio													
Cluff Natural Resources PLC	0.4%	27	-39.3%	-33.2%	-36.8%	-70%	-70%	n/a	n/a	n/a	n/a	n/a	n/a
EnQuest PLC	0.9%	392	-4.9%	-49.0%	-16.0%	-13%	-83%	4.7x	2.7x	2.3x	3.9x	3.1x	3.2x
JKX Oil & Gas PLC	0.5%	62	-48.1%	-22.7%	-26.3%	61%	-53%	18.6x	n/a	n/a	2.7x	n/a	n/a
Reabold Resources PLC	0.8%	54	76.8%	15.8%	41.0%	36%	-78%	n/a	n/a	n/a	n/a	n/a	n/a
Shandong Molong Petroleum Machinery Co Ltd	0.1%	341	0.0%	0.0%	0.0%	0%	0%	0.0x	0.0x	0.0x	0.0x	0.0x	0.0x
Diversified Gas & Oil Company	0.4%	861	-16.2%	-8.1%	-2.8%	n/a	n/a	8.8x	6.8x	8.0x	10.8x	5.5x	5.6x
	3.3%												
Cash	**1.2%**												
Portfolio	**100.0%**							**11.5x**	**11.0x**	**11.4x**	**5.1x**	**5.2x**	**4.8x**

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 will involve greater volatility, political, economic and currency risks and differences in accounting methods. The Fund is non-diversified meaning it concentrates its assets in fewer individual holdings than a diversified fund. Therefore, the Fund is more exposed to individual stock volatility than a diversified fund. The Fund also invests in smaller companies, which involve additional risks such as limited liquidity and greater volatility. 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. The decline in the prices of energy (oil, gas, electricity) or alternative energy supplies would likely have a negative effect on the fund's holdings.

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.

West Texas Intermediate (WTI) crude oil is produced, refined, and consumed in North America and it is an oil benchmark. WTI crude oil is the underlying commodity of the New York Mercantile Exchange's oil futures contracts and is considered a "sweet" crude because it is about 0.24% sulfur, which is a lower concentration than North Sea Brent crude.

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

The Organization of Petroleum Exporting Countries and its new crude-producing allies make up OPEC+, with the "+" consisting of ten additional oil-producing nations, the largest three being Russia, Mexico and Kazakhstan.

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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