

2017 Outlook for Energy

The Guinness Atkinson Global Energy Team, January 2017

2016 was a year of rebalancing and recovery for energy markets. We'd like to share with you some big picture thoughts on 2016 events and our outlook for 2017 and beyond.

Highlights

2016 IN REVIEW

2016 was a year of rebalancing for the oil market, as a combination of demand growth and declining production from the US and the rest of non-OPEC¹ more than offset a rise in production from OPEC. **Nevertheless, OPEC chose in September 2016 to signal their first production cut since 2008**, in an attempt to accelerate the oil market's rebalance and to support the price.

The dominant themes for global oil markets last year were:

- i) **OPEC attempting to support the oil price, first contemplating a production freeze, then indicating that they would cut production by 1.2 million (m) barrels per day (b/day) from the start of 2017.** This marked a reversal of the shift to a market share strategy seen in late 2014. In 2016, OPEC grew their production by just over 1m b/day, the majority of which came from Iran post the lifting of sanctions relating to their nuclear programme.
- ii) **Declining non-OPEC supply, both for US onshore and the rest of non-OPEC.** Non-OPEC supply fell by around 0.8m b/day (per the International Energy Agency, or IEA), reflecting declines in the US as the drilling rig count fell to below 350 rigs (from 2014 peak of 1,600), and modest declines elsewhere. A group of non-OPEC countries announced a willingness to join OPEC's production cut, agreeing to reduce by 0.6m b/day from January 2017.
- iii) **Healthy global oil demand, expected to have grown by around 1.4m b/day (per the IEA).** This is made up of non-OECD oil demand growth of 1.2m b/day and OECD oil demand growth of around 0.2m b/day. Demand growth was slower than 2015 (+1.9m b/day), but still above average. In China, sales of SUVs dominated over smaller cars; Indian demand growth came to the fore, and total vehicle miles travelled in the US rose by around 3%.

For natural gas in the US, 2016 was also a year of rebalancing. The US gas market started the year with inventories close to record highs, but moderated closer to normal levels as supply was held back, allowing the price to recover to over \$3 per 1000 cubic feet (/mcf).

It was a year of recovery for energy equities, albeit volatile. The MSCI World Energy Index started the year negatively, declining as the oil price fell below \$30 per barrel (/bl). Initial news in February about a possible freeze from OPEC acted as a catalyst to lift the price back into the \$40s/bl through March, with energy equities responding positively. The energy sector then range traded until late September, when OPEC's announcement of a planned production cut lifted oil and energy equities again. The MSCI World Energy Index ended 2016 with a total return of 27.6% versus the MSCI World at 8.2%.

¹ OPEC= Organisation of Petroleum Exporting Countries

OUTLOOK FOR 2017

- **We expect OPEC to manage the oil price in a \$50-60/bl range** with compliance around planned OPEC production cuts and US oil production growth being the key variables for 2017.
- **OPEC has historically delivered good compliance on production cuts** and we are confident that they will deliver again this time. Saudi's fiscal balance has suffered significantly through 2015/2016 and the Kingdom will want a better oil price environment for the IPO of Saudi Aramco.
- **Animal spirits will return to the US onshore** as E&P companies repair their balance sheets and return to a growth agenda. We expect a moderation of efficiency gains and cost inflation to mute the scale and the timing of the US onshore oil production response, but we do expect it to come.
- **Non-OPEC (outside the US) is still under pressure** as upstream capex is likely to fall further in 2017 as oil companies defend dividends rather than invest for growth. A dearth of new project sanctions and increasing decline rates on existing fields means that non-OPEC (ex US) oil production will decline into the end of the decade, even if oil prices increase from here.
- **Global oil demand is likely to remain robust** as population growth, vehicle miles travelled and consumer demand habits mean that gasoline demand continues to grow. The non-OECD will deliver most of the growth in 2017, with attention turning to India now as well as China.
- **OECD oil inventories will likely normalise by the end of the year** as demand outstrips supply by something over 1m b/day on average in 2017. Historically, a decline in inventories has coincided with a strengthening oil price.
- **The inauguration of Donald Trump as US President on January 20 2017 is likely to lessen the regulatory and environmental burden on US oil and gas companies** (yielding stronger US oil supply) and improve the relative competitiveness of fossil fuels versus renewable energy sources (potentially yielding stronger US oil demand). An expansionary fiscal policy could yield to greater inflation in the near term; a potential positive for both energy commodities and energy equities.
- **Energy company profitability is at an unsustainably low ebb.** Energy sector return on capital employed (ROCE) fell to 2% in 2016 but is likely to recover because of efficiency gains, cost control and lower reinvestment. The valuation of energy equities is strongly correlated to ROCE and, if the relationship holds true, energy equity valuation should improve as ROCE improves.
- **On many metrics, energy equity valuation metrics are very low.** The weighting of energy in the S&P 500 at the end of 2016 was 7.6% (still below the 25 year average of 9.5%) and the relative price-to-book ratio of energy vs the S&P500 remain close to the trough levels seen around previous oil price declines. Energy sector sentiment has improved but is still low, in our opinion.
- **The valuation sensitivity work that we regularly perform tells us that energy equities are today discounting an oil price (into perpetuity) of around \$50-55/barrel.** This is in line with the current spot oil price but below the five year forward prices for both Brent and WTI.
- **Energy equities offer attractive upside if our scenario plays out.** If you believe, as we do, that a recovery in the oil price to \$70/bl is likely, or that return on capital will normalise (or both), our sensitivity work shows upside across the energy complex of around 40-50%.

Review of 2016

2016 was a year of rebalancing for the oil market, as a combination of demand growth and declining production from the US and the rest of the non-OPEC region more than offset a rise in production from OPEC. Nevertheless, OPEC chose in September to signal their first production cut since 2008, in an attempt to accelerate the oil market's rebalance and support the price.

It was another volatile year for the **oil price**, with Brent trading in a range from \$28-\$59/bl, the lows being visited in January and February as oversupply in the market peaked, and the highs in November and December as OPEC's decision to cut production was digested. The average Brent oil price in 2016 was \$45.1/bl, whilst WTI² averaged \$43.4/bl, tending to trade a little lower than Brent throughout the year.

The major components to oil supply/demand for 2016 were as follows:

- **OPEC oil supply (including natural gas liquids (NGLs))** is likely to have grown by around 1.2m b/day (totalling 39.3m b/day, versus 38.1m b/day in 2015). Iranian supply grew by 0.7m b/day, post the lifting of sanctions in January relating to Iran's nuclear programme, supported by growth of 0.4m b/day from Iraq and 0.3m b/day from Saudi. This was offset to an extent by lower Nigerian and Venezuelan production, both down by 0.2m b/day. On 30 November 2016, OPEC announced a six-month cut to production of 1.2m b/day, effective from 1 January 2017, to tighten the market, a reversal of the shift to a market share strategy seen in 2014;
- **Non-OPEC oil supply** is likely to have declined by around 0.8m b/day in 2016 (56.8m b/day, versus 57.6m b/day in 2015). Production from the US declined by 0.5m b/day, as shale oil declines accelerated through the middle of the year, whilst Chinese and Mexican production fell by 0.3m and 0.1m b/day. Small increases in production were reported from Russia (0.2m b/day) and Brazil (0.1m b/day), with Russia in particular benefitting from second year of lower local currency production costs as a result of the weaker Russian Ruble. A group of non-OPEC countries, notably Russia, Mexico, Oman and Kazakhstan, announced a willingness to join OPEC's production cut, agreeing to reduce by 0.6m b/day from January 2017;
- **Global oil demand** is likely to have grown by around 1.4 m b/day in 2016, according to the IEA (International Energy Agency). This is made up of **non-OECD oil demand** growth of 1.2m b/day (with China up 0.4m b/day) and **OECD³ oil demand** growth of 0.2m b/day. This represents a slower year for oil demand than 2015 (+1.8m b/day) but still a healthy level of growth. In the US, improving fuel efficiency across the vehicle fleet was offset by another year of growth in total vehicle miles travelled. In China, sales of SUVs continued to dominate over smaller vehicles, whilst India (+0.3m b/day), helped by rising auto sales and an improved highway system, featured for the first time in the league table for growth;
- **OECD oil inventories** at the end of October 2016 were estimated to be at 3,027 million barrels, down from a record high of 3,102 million barrels in July 2016, but still 11% above the 10-year average. The rise in inventories over the last 12 months implies that the market has been, on average, around 0.1m b/day oversupplied, versus an oversupply of 0.8m b/day for the prior 12 months, indicating better balance between supply and demand.

For **natural gas**, 2016 was also a year of rebalancing. The US gas market started the year with inventories close to record highs, but moderated closer to normal levels as supply was held back by a) a shallow decline in 'associated' gas as shale oil declined, b) a decline in Marcellus/Utica gas, as local differentials in

² WTI = West Texas Intermediate

³ OECD = Organisation of Economic Co-operation and Development

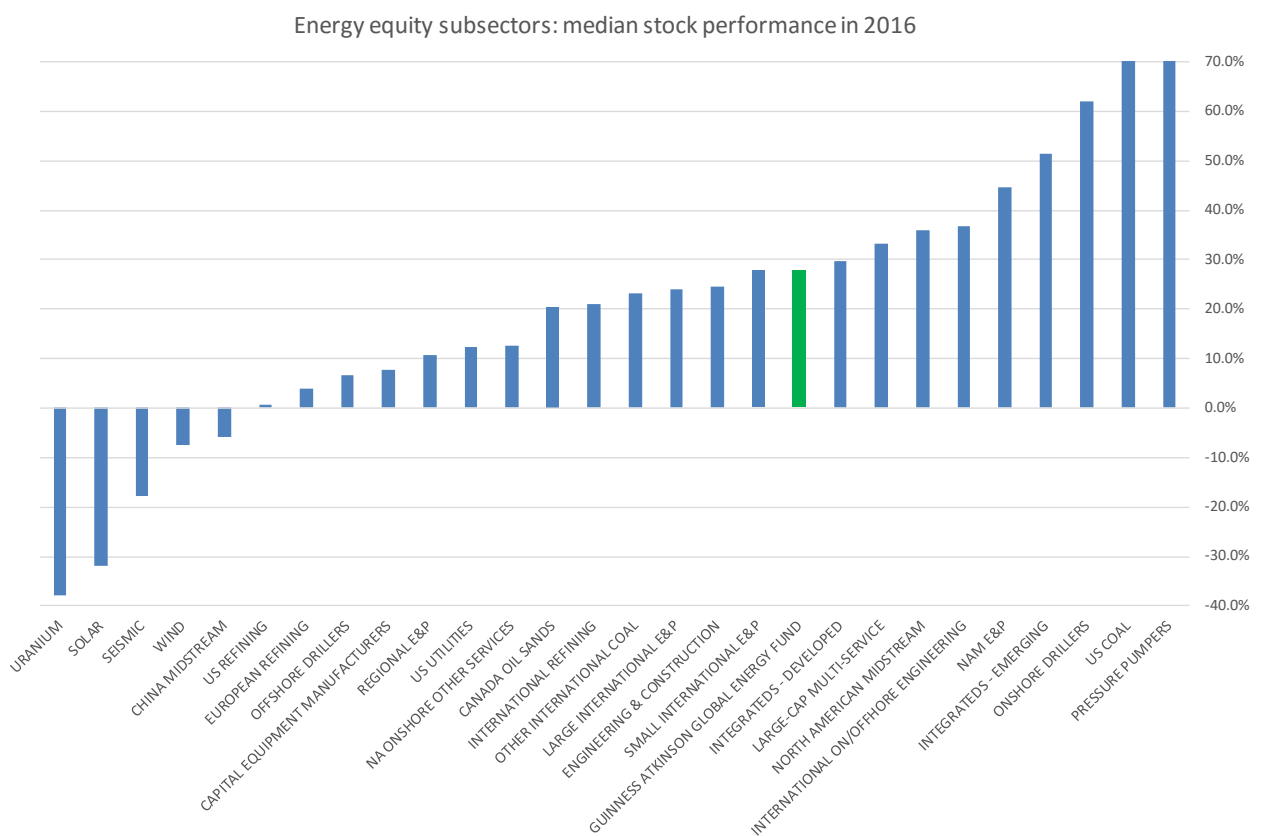
pricing blew out, and c) a continued decline in ‘base’ gas production elsewhere in the US, as the very low gas drilling rig count took effect. The Henry Hub gas price dipped below \$2/mcf in February 2016, as excess supply in inventory peaked, but then recovered to above \$3/mcf in the second half of the year. Overall, Henry Hub averaged \$2.55/mcf, versus \$2.63 in 2015.

Outside the US, gas prices also started the year at weak levels, as a warm El Nino winter translated into low demand for heating and high inventories of gas in several regions across Europe and Asia. Prices then picked up towards the end of 2016, as inventories were worked off. European natural gas averaged \$4.7/mcf (vs \$6.5/mcf in 2015) and Asian natural gas (as measured by the ‘JKL’ LNG contract) averaged \$5.5/mcf (vs \$7.5/mcf in 2015).

It was a year of recovery for **energy equities**, albeit a volatile one. The MSCI World Energy Index started the year negatively, declining in January and February as the oil price fell below \$30/bl. Initial news in mid-February about a possible freeze to OPEC production acted as a catalyst to pick the oil price off the floor and back into the \$40s/bl through March and April, with energy equities responding positively. We then saw the energy sector range trading until late September, when OPEC’s announcement of a planned production cut lifted oil and energy equities through the fourth quarter. The MSCI World Energy Index ended 2016 with a total return of 27.63% versus the MSCI World at 8.18%.

As ever, the performance of the MSCI World Energy Index was only part of the story, with a number of energy equity subsectors finishing the year up by around 30% to 50%, particularly those more levered to oil. Other sectors, including renewables, utilities and refining, struggled.

Global energy equity subsectors: median total return in 2016 (%)



Source: Bloomberg; Guinness Atkinson Asset Management

A quick tour of some of the main energy sub-sectors paints a picture for the energy equity sector’s performance in 2016:

- **Coal.** Generally the best performing sub-sector of 2016. In the US, the recovery in thermal coal prices brought on by higher gas prices, helped some coal equities up off the floor (having been down 90%+ plus from their peak). Donald Trump's support of the sector also boosted sentiment post the US election. Internationally, a decision by local Chinese regulators to curtail production, to help restructure the industry, caused Chinese thermal and metallurgical coal prices to rise, supporting domestic coal companies and producers across Indonesia and Australia.
- **Exploration and production (E&P).** E&Ps in most regions benefitted from the rebalancing of the oil and gas markets, in particular those exposed to North American operations. In the first half of the year, better performing producers tended to be those exposed to the faster growing shale oil basins (Permian and STACK), whilst the recovery in the oil price in the second half saw stronger recovery from companies with lower growth but greater operational and financial leverage to oil. Not all companies survived: according to US law firm Haynes and Boone, 105 North American oil and gas producers filed for bankruptcy between the beginning of 2015 and October 2016.
- **Integrated oil and gas companies.** Another year of relatively strong performance, with the broad market's continued search for equity income resulting in a renewed focus on the high dividend yield offered by the sector. With oil back in the \$50s/bl, the sustainability of those dividends looks significantly stronger than in a sub \$50/bl world, a reality not lost on investors. Generally, emerging market integrations performed better than developed market integrations, as they tend to have greater earnings leverage to the oil price.
- **Energy services.** A mixed bag. Onshore US services (pressure pumping, other completion services and land drilling) fared well, coincident with the bottoming in US onshore activity in March. The largest, best-diversified energy service companies fared relatively well, a function of their ability to outperform smaller peers operationally in the downturn and take market share, coupled with stronger balance sheets. Offshore services (offshore drillers, seismic, offshore-oriented capital equipment manufacturers) continued to struggle, as capital spending continued to be diverted to shorter-cycle onshore activity.
- **Oil refining.** One of the weakest performing sub-sectors, particularly in the US and Europe, with refining equities flat to slightly down over the year. The bounce in the oil price and a (relatively) weaker year for oil demand in 2016 than 2015 helped to put a lid on refining margins and earnings, causing valuation multiples in the sector to moderate.
- **Renewables.** Another weak year, as falling electricity prices and the lowering of subsidies have made for a challenging market environment, despite strong underlying growth in demand for wind and solar. Sentiment in the sector was also hit hard by Trump's election, as he threatens to repeal various pieces of supportive legislation for the sector (e.g. federal tax credits), in an effort to accelerate the competitiveness of renewable technologies on an unsubsidised basis.

The **Guinness Atkinson Global Energy Fund** in 2016 produced a total return of 27.0%. This compares to the total return of the MSCI World Energy Index of 27.6%. The slight underperformance of the Fund versus the Index can be explained in broad terms by the Fund's higher weighting to US E&P companies, which was a positive, balanced out by the negative of its holdings in renewables which declined in 2016. It was another comparatively strong year for the largest five oil and gas majors (Exxon, Chevron, Total, Shell and BP, which comprise around 45% of the Index), up on average by 27% over the year. Within the Fund, the best performing investments were generally those exposed to oil production, spread across oil services (Unit, Helix and Halliburton), international E&P (Tullow, Bankers and Canadian Natural Resources), US E&P (Devon and Apache) and integrations (Chevron, Statoil and Royal Dutch Shell). The weakest investments were renewables (JA Solar and Sunpower) affected by falling sale prices for solar, and US refining (Valero), held back as refining margins declined from their peak.

Performance as of 12/31/16

	2016	1 Year	3 Years	5 Years*	10 Years*	Since Inception (June 30, 2004)*
Global Energy Fund	27.04%	27.04%	-9.32%	-0.79%	1.16%	7.48%
MSCI World Energy Index	27.63%	27.63%	-3.97%	1.54%	2.42%	6.82%

Gross expense ratio: 1.41%

*Periods over 1 year are annualized returns

Performance data quoted represents past performance; past performance 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. Performance data current to the most recent month end may be obtained by calling 800-915-6566 and/or visiting www.gafunds.com

The outlook for 2017

Oil supply

The outlook for world oil supply in 2017 starts with consideration of planned OPEC production cuts, designed to accelerate the rebalancing of the oil market that started in 2016. Non-OPEC (ex-US) supply will essentially stagnate, held back by another year of low capital spending, but supported by the fact that new production (that was sanctioned pre-2015 when oil was above \$100/bl) is still coming on-line. We then have to watch US onshore supply closely, understanding that oil above \$50/bl is likely to produce a return to modest growth.

OPEC supply

The start of 2017 marks the start of a significant change of strategy for OPEC. The 'market share strategy' of November 2014 proved to be a necessary but expensive strategy for OPEC, and Saudi in particular whose fiscal reserve have fallen from \$750bn at the end of 2014 to an estimated \$520bn at the end of 2016.

The new OPEC production quota of 32.5m b/day comes into effect for six months from 1 January 2017 and it represents the first action from the group since November 2014 and the first quota cut since 2008/09. The 'referenced' OPEC production, for October 2016, and used as a starting point for the cuts, was a record level of around 33.7m b/day, so the announcement represented a cut of 1.2m b/day (all numbers for OPEC-14 including Gabon) and is allocated as broadly a 5% cut for each member.

The action is also notable in that it is the first time in 15 years that non-OPEC producers are joining with OPEC in co-ordinated production cuts. The non-OPEC cuts total just under 600,000 b/day, led by 300k b/day of cuts from Russia and then several smaller cuts from other non-OPEC countries (including Azerbaijan, Bahrain, Brunei, Equatorial Guinea, Kazakhstan, Malaysia, Mexico, Oman, Sudan and South Sudan).

We believe that Deputy Crown Prince bin Salman (the architect of Saudi's oil policy) has come under sustained pressure to put a firmer floor under the oil price, for the sake of Saudi's fiscal budget.

In September 2016, Saudi announced 20% cuts

to ministers' salaries and curbs to state allowances, as part of their response to running the highest budget deficit within the G20. With this in mind, Saudi's actions at the head of OPEC appear designed to achieve an oil price that to some extent closes their fiscal deficit (though \$80/bl is needed to close the gap fully), whilst not spiking the oil price too high and over-stimulating non-OPEC supply. In addition, the planned IPO of Saudi Aramco provides a very clear reason for Saudi Arabia to seek a higher oil price to maximise the valuation of the company (estimated by bin Salman to be more than \$2 trillion, with a float of around 5% being mooted) and to ensure the process is completed successfully.

The question now becomes; will OPEC members comply with the cuts? On this occasion, we have good confidence because the quota cut is being championed by Saudi Arabia (the de facto leader of OPEC who is able to force higher levels of compliance among smaller members) and because OPEC has taken the

OPEC production cut – Jan 2017 vs Oct 2016

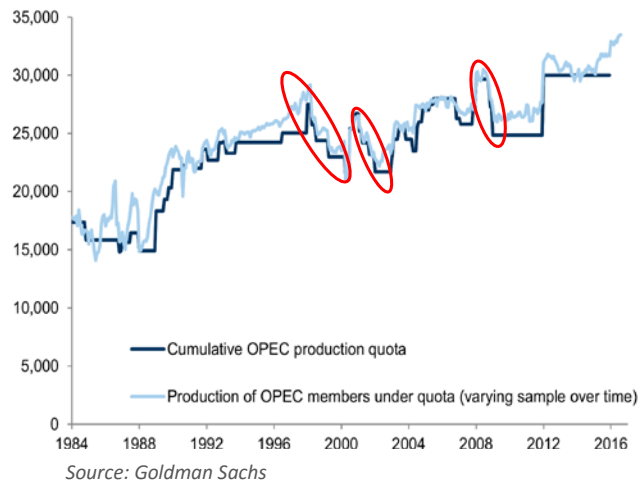
(m b/day)	Oct 2016*	adjustment	Jan 2017	% adjustment
Saudi	10.54	-0.49	10.05	-5%
Iran	3.70	0.09	3.79	2%
Iraq	4.56	-0.21	4.35	-5%
UAE	3.01	-0.14	2.87	-5%
Kuwait	2.84	-0.13	2.71	-5%
Nigeria	1.60	exempt	1.60	n/a
Venezuela	2.07	-0.10	1.97	-5%
Angola	1.75	-0.09	1.66	-5%
Libya	0.42	exempt	0.42	n/a
Algeria	1.09	-0.05	1.04	-5%
Qatar	0.65	-0.03	0.62	-5%
Indonesia	0.74	suspended	0.74	n/a
Gabon	0.20	-0.01	0.19	-5%
Ecuador	0.55	-0.03	0.52	-5%
OPEC-14	33.72	-1.19	32.53	-4%

Source: OPEC; Guinness Funds. Oct 2016 production or OPEC 'reference' production

unusual step of establishing a “Ministerial Monitoring Committee”, including OPEC and non-OPEC members, to monitor implementation and compliance with the agreement.

Also, our observation is that when OPEC agree to reduce production to tighten the oil market, adherence to that agreement is good. In the three episodes of OPEC quota cuts over the last 20 years (1998, 2002 and 2008), the production of OPEC members under quota was cut close to new quota levels. The cut in 2008 was only 75% of what had been announced, though still 3m b/day in absolute terms. While compliance is generally high, we note that it does sometimes require a second round of quota cuts to achieve the desired compliance and positive movement in oil prices. In this instance, we would expect that OPEC will adhere to the targets set, since failure to do so would ultimately show up in elevated inventories and a lower price, which is what OPEC cannot afford.

OPEC production vs quota since 1984

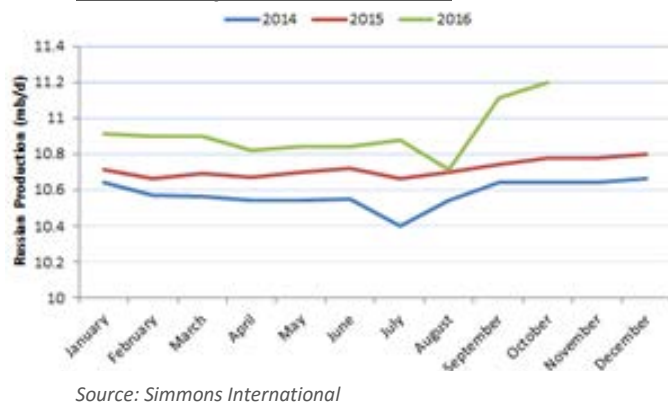


While market focus is on compliance with production quotas, we must not forget the risk of escalated political instability within OPEC. 2016 witnessed further Shia-Sunni tensions in the region and we remind ourselves that almost all of Saudi’s oil output passes through the Shia heartland of the country, and it is not inconceivable that this supply could be disrupted through terrorist activity (despite Saudi’s concerted efforts to maintain security around its oil infrastructure), given the heightened state of relations between Sunni and Shia in the country.

Non-OPEC supply (excluding US onshore)

The agreed OPEC/non-OPEC cuts will have a smaller bearing on the production outlook for non-OPEC (ex-US) in 2017. There is less historical precedent to assess whether non-OPEC cuts will be adhered to, and we note that historic promises by Russia (e.g. in 1998) to cut production were not followed through. Moreover, we observe that Russia’s production spiked by around 400k b/day in the run-up to the agreement, so a cut of 300k b/day effectively sanctions July 2016 production levels. More broadly, we expect that a large proportion of the non-OPEC ‘cuts’ will actually be natural oil field production declines, resulting from sharply lower levels of capital investment, rather than actual production ‘cuts’. Accordingly, non-OPEC supply cuts are unlikely to have a material effect on global oil supply/demand in 2017.

Russian oil production 2014-16

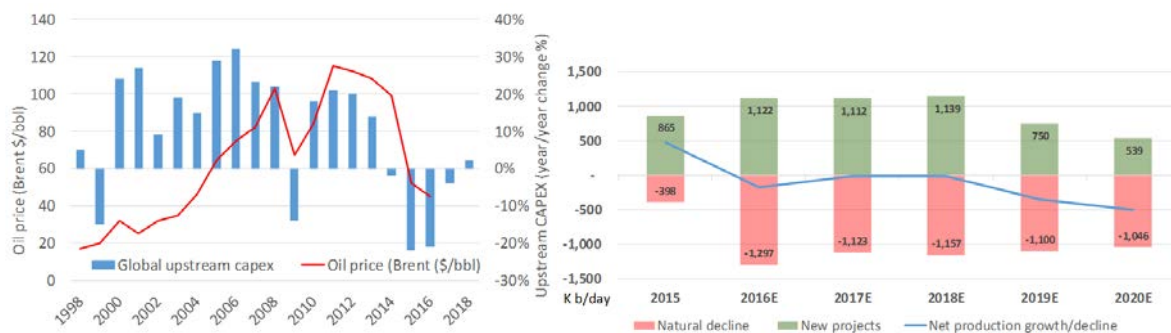


However, we do expect non-OPEC (ex-US) production to face increasing headwinds from higher natural decline rates in 2017 and for this trend to accelerate into the end of the decade. Upstream oil and gas capital expenditure fell by around 20% in 2015 and is likely to have fallen by around the same level again in 2016. This compound cut in expenditure in this downcycle is significantly larger than the cuts which followed the oil price declines in 1998 and 2008. We think that the expenditure cuts continue in 2017, as the super-majors have already signalled, illustrative of a sector that is choosing to defend dividends (and achieve cash flow neutrality at \$60/bl oil prices) rather than maintain growth. Deflationary pressures

have reduced the unit cost of developing new oil and gas fields (for example drilling rigs that were costing \$600k/day in 2012 are now available for \$200k/day) but it doesn't change the reality that activity levels are still sharply lower.

Typically, there is three or four-year time lag between investment and first production and we note that the heavy investment period of 2011-2014 has allowed non-OPEC (ex-US) oil production to remain remarkably robust through 2015 and 2016. We believe that this could be sustained through 2017 but that then the natural decline of existing production will start to outweigh the production contribution from new project developments, causing non-OPEC (ex-US) supply to decline into the end of the decade. The important factor here is that this production trajectory is now fixed in place. Even if oil prices rallied hard and investment picked up in 2017, it would be too late to boost production before the end of the decade.

Year to year change in global upstream capex Top 10 non-OPEC producers (ex-US): forecast to 2020



Source: Simmons International; Guinness Atkinson

Source: Tudor Pickering Holt; Guinness Atkinson

Overall, we expect non-OPEC (ex-US) oil production to decline slightly in 2017 vs 2016 and we expect this rate of decline to increase over time, broadly irrelevant of whether oil prices rise further.

US onshore supply

The dynamics of the US onshore oil industry, developing unconventional/shale oil, are different to those of the rest of non-OPEC. The weak oil price in 2015 and 2016 caused the number of oil-directed rigs in the US to fall from 1,609 to 316 and US onshore oil production subsequently fell from 7.6m b/day in April 2015 to 6.7m b/day in October 2016 (most recent data from the Energy Information Administration or EIA).

The short-cycle nature of this type of development means that activity can be rapidly cut or ramped up and it only took a matter of months of oil price decline to see that the US system could not sustain flat production at a \$50/bl oil price. However, US oil and gas producers are nimble and the low price environment has forced them to become more selective in where they drill wells and to become more efficient in their approach to drilling and fracturing. As a result, if oil prices are sustained in a \$50-60/bl range (as we believe OPEC will target near term) we expect to see a return of animal spirits in US onshore oil activity as several well positioned shale plays will benefit from greater investment levels resulting in steady month-on-month oil production increases by the end of 2017.

We expect the US oil patch to receive the most immediate and significant capital expenditure increases because the short-cycle investment opportunities offer an attractive combination of resource access together with low technical, political and fiscal risk. Already, the oil-directed rig count has increased from a low of 316 in March 2016 to 525 (30 December 2016) and we are seeing signs that US onshore oil production declines are starting to abate, with average month-on-month declines in 3Q 2016 of 26,000 b/day versus 67,000 b/day in 1H 2016. However, we are also seeing signs of service cost inflation and labour shortages returning to the areas that were hardest hit in the oil price slump. As activity picks up, we fully expect to see the return of cost inflation and the moderation or reversal of efficiency gains.

We then ask ourselves: “what oil prices are required to incentivise various levels of production response?”. We believe this is complex to answer as efficiency gains, cost inflation, resource quality and asset focus affect the overall responsiveness of the US onshore oil production system. Weighing the various factors up, our US oil supply model implies that US onshore oil production is likely to remain flat at an underlying oil price of around \$50/bl and that oil prices of \$60/bl and \$70/bl will be required to incentivise production growth of 0.3-0.5m b/day and 0.6-1.0m b/day respectively. As world oil demand grows and non-OPEC (ex-US) production decline, we potentially could see a happy equilibrium where US oil production growth and OPEC oil production growth maintain the world oil supply/demand balance.

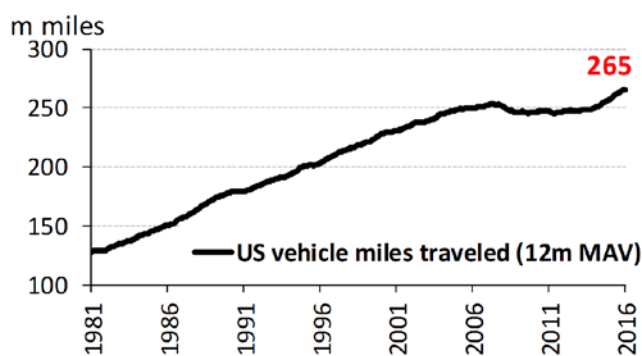
Brent oil price	Production change
\$40/bl	Declining around 0.3-0.5m b/day
\$50/bl	Broadly flat
\$60/bl	Increasing around 0.3-0.5m b/day
\$70/bl	Increasing around 0.6-1.0m b/day

Oil demand

The International Energy Agency (IEA) are forecasting growth in oil demand in 2016 of around 1.4m b/day, lower than 2015 but still above the 10-year average, then 2017 demand growth of 1.3m b/day. The 2017 forecast ties in with the current IMF⁴ forecast for global gross domestic product (GDP) growth of 3.4%.

What can we see ‘on the ground’ in terms of oil demand? For the transportation sector, whilst total car sales grew only modestly (+2.0% to 72.6m) in 2015, there was a step-up in the rate of car sales globally in 2016, which look to have grown by 5.6% to 76.7m units (according to Scotiabank). This creates a favourable backdrop for demand in 2017. Keep in mind that the number of vehicles being sold in 2016 (and forecast for 2017) is almost 50% higher than the annual average sales rate in the 2000s (c.52m units), and nearly double the annual average sales rate of the 1990s (c.39m units). This maintains upward pressure on gasoline demand, despite improvements in the overall fuel efficiency of the global fleet. We also note that the trend of rising vehicle miles travelled in the US has continued for a second year, up 3.0% in 2016 versus 2015 (per the EIA).

US vehicle miles travelled (millions)



Source: DoE; Guinness Funds

The growth in global car sales was underpinned for another year by China, with total car sales estimated at around 23m units in 2016, up by 15% versus 2015. SUVs continue to gain market share, with September 2016 sales, for example, running 54% higher than September 2015. Car sales in China have been boosted in recent months by government tax breaks which expired at the end of 2016; some tax incentives for smaller cars have been extended into 2017, but overall we expect the sales growth rate to moderate this year.

Across the rest of Asia, we watch Indian oil demand with particular interest. Indian oil demand is estimated to have expanded by around 0.3m b/day in 2016 (+7.5%), with domestic refined product demand surging to 4.8m b/day (+20% vs Nov 2015), as demand for gasoline, diesel and LPG were all strong. India consumes about 40% of the amount of oil used by China (despite having a similar population), but we expect the gap to close over the next few years as Indian GDP growth drives Indian car sales and an expanding manufacturing base.

⁴ IMF = International Monetary Fund

World oil demand 2004-17

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
OECD demand													IEA	IEA
North America	25.7	25.8	24.5	25.8	24.5	23.7	24.1	24.0	23.6	24.2	24.2	24.6	24.6	24.6
Europe	15.6	15.7	15.7	15.6	15.5	14.7	14.7	14.3	13.8	13.6	13.5	13.7	13.9	13.9
Pacific	8.8	8.9	8.7	8.7	8.3	8.0	8.2	8.2	8.5	8.3	8.1	8.0	8.1	8.0
Total OECD	50.1	50.4	48.9	50.1	48.3	46.4	47.0	46.5	45.9	46.1	45.8	46.4	46.6	46.6
<i>Change in OECD demand</i>		0.3	-1.5	1.2	-1.8	-1.9	0.6	-0.5	-0.6	0.2	-0.3	0.6	0.2	0.0
NON-OECD demand														
FSU	3.8	3.9	4.0	4.0	4.2	4.0	4.1	4.4	4.6	4.5	4.7	4.6	4.8	4.9
Europe	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7
China	6.4	6.7	7.2	7.6	7.7	7.9	8.9	9.3	9.9	10.4	10.8	11.5	11.9	12.2
India	2.6	2.6	2.7	2.9	3.1	3.2	3.3	3.5	3.7	3.7	3.8	4.0	4.3	4.5
Other Asia	6.4	6.4	6.6	6.9	6.8	7.1	7.5	7.6	7.6	7.9	8.2	8.5	8.8	9.2
Latin America	4.9	5.0	5.2	5.3	5.6	5.7	6.1	6.2	6.5	6.6	6.8	6.8	6.7	6.7
Middle East	5.5	5.9	6.1	6.4	6.7	7.1	7.3	7.5	7.9	8.0	8.4	8.4	8.4	8.6
Africa	2.8	2.9	2.9	3.3	3.3	3.4	3.5	3.5	3.8	3.8	3.8	4.1	4.2	4.3
Total Non-OECD	33.1	34.1	35.4	37.1	38.1	39.1	41.4	42.7	44.8	45.6	47.2	48.5	49.7	51.0
<i>Change in non-OECD demand</i>		1.0	1.3	1.7	1.0	1.0	2.3	1.3	2.1	0.8	1.6	1.3	1.2	1.3
Total Demand	82.5	83.8	85.1	87.2	86.4	85.5	88.4	89.2	90.7	91.7	93.0	94.9	96.3	97.6
<i>Change in demand</i>		1.3	1.3	2.1	-0.8	-0.9	2.9	0.8	1.5	1.0	1.3	1.9	1.4	1.3

Source: IEA; Guinness Atkinson

Global demand growth in 2017 of 1.3m b/day is expected to come entirely from the non-OECD world which has settled down into a steady pattern of growth since 2004. In 2016 and 2017, the lion's share of growth comes from Asia, with the rest of non-OECD demand supported by growth from the Middle East. OECD demand in 2017 is forecast to be essentially flat, with little change in North America and Europe and the Pacific region down slightly.

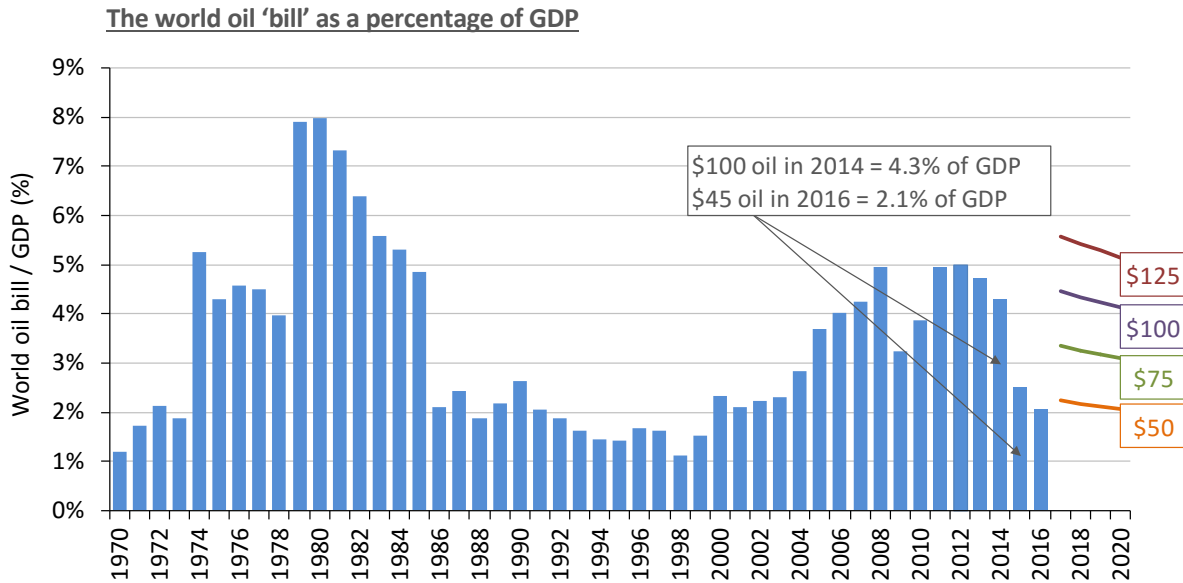
The continued strength of the US dollar against almost all emerging market currencies means consumers in those countries aren't enjoying the full commodity price decline since 2014, and the removal of refined product subsidies (e.g. as seen recently in India and Indonesia) also limit the decline in prices at the pumps. That said, the same headwinds were faced in 2016 and served only dampen but not derail non-OECD demand growth.

We keep a close eye on developments in the 'new energy' vehicle fleet (electric vehicles (EVs); hybrids etc), but see nothing that makes a significant dent on the consumption of gasoline and diesel in the next few years. Sales of electric vehicles (pure electric and plug-in hybrid electrics) globally were around 0.8m in 2016, up from 0.4m in 2015. Sales of 0.8m electric vehicles represents around 1% of total light vehicle sales, and increases EV's share of the world car fleet to around 0.2%. We expect to see EV sales accelerate in 2017 to around 1.2m, or 1.5% of total global sales. Even applying an aggressive growth rate to EV sales, we see EVs comprising only around 1% of the global car fleet in 2020.

Longer term, we see a plausible scenario of gasoline demand peaking at some point in the late 2020s, as a combination of improved fuel efficiency and substitution to electric/hybrid vehicles starts to outweigh the overall growth in the global vehicle population. However, keep in mind that gasoline demand comprises only around 25% of total oil demand globally, the balance being consumed by heavy transportation, industry, heating, power and petrochemicals. Much of this will continue to grow alongside the world economy, and suggests total oil demand peaking in the mid 2030s at the earliest.

How does the current burden of oil spending compare to history? With the oil price averaging around \$45/bl last year, it implies that the world spent 2.1% of GDP on oil in 2016. This is considerably lower than the average world 'oil bill' from 1970 to 2015 of 3.4% and keeps the spend on oil back into the 'cheap' 1986-2003 range (averaging 1.9% GDP) which stimulated a significant wave of new demand. If oil returned to the

45-year average level of 3% of GDP, this implies a recovery in price to \$70/bl, inflating to around \$80/bl by 2020 as inflation and improved efficiency in the use of oil take effect.



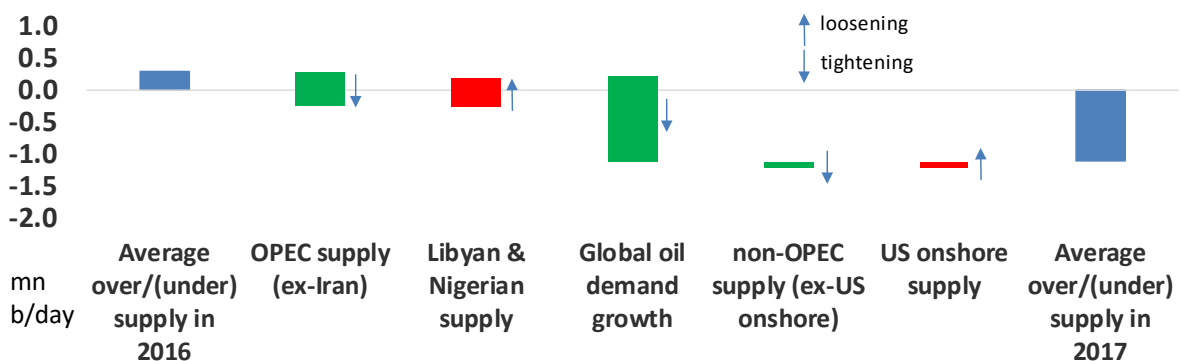
Source: IEA, Bloomberg, Guinness Funds

Oil inventories and conclusions

As ever, the picture of oil supply and demand in 2017 will be dynamic, depending on price and macro-economic factors. However, we conclude that it is still useful to present a 'base' case, or starting-point for the oil demand/supply balance, as we see it today.

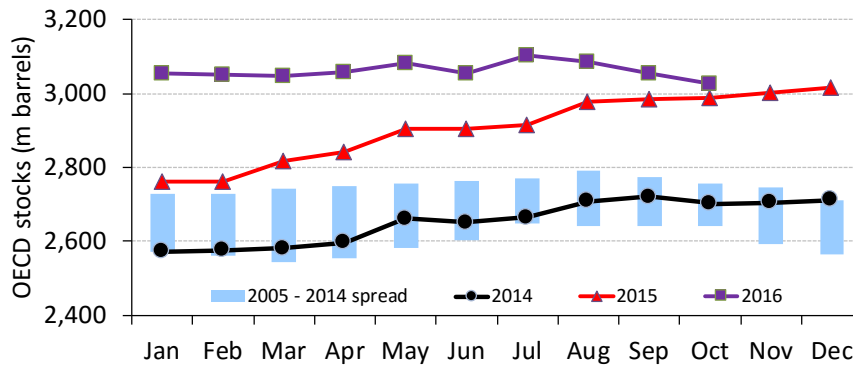
If we pull together our supply and demand expectations for 2016, it shows that the oil market is likely to be undersupplied in 2017, by something over 1m b/day. We assume that the market averaged 2016 in slight oversupply (c.0.3m b/day), is tightened by 'core' OPEC cuts and growing global oil demand, offset to an extent by recovering production in Libya and Nigeria, plus a small rise in US onshore production.

2017 global oil market balance



Source: Guinness Atkinson Asset Management estimates

Reconciling our base case view on supply and demand with the current state of OECD inventories, we expect inventories to decline through the first half of 2017, returning towards the 10-year seasonal norms. Historically, a decline in inventories has coincided with a strengthening oil price. The state of inventories in the middle of the year, together with oil prices will be key factors for Saudi/other participating producers in deciding whether to continue with the adopted quota cuts, deepen them, or relax them.

OECD oil inventories

Source: IEA; Guinness Atkinson Asset Management

Through 2017 and beyond, we expect oil prices to find a happy medium where OPEC economics are better satisfied, the world economy is stable and US oil production grows in a controlled manner. We think that the oil price which achieves this is around \$70 per barrel.

We believe that Saudi's long-term objective remains to maintain a 'good' oil price, significantly higher than current levels.

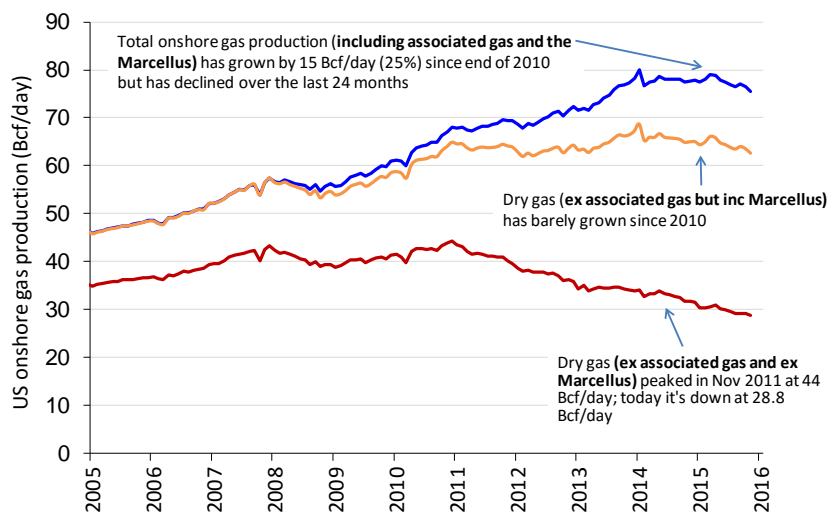
Natural gas markets

The US natural gas market moved into under-supply in 2016, the key features being:

- Year-on-year decline in associated (by-product) gas from shale oil production;
- Flattening of production in the low-cost Marcellus and neighbouring Utica fields in the north-east of the country, as price differentials remained wide;
- Moderate demand growth (+1.3%), led by utility use of gas for electricity production, which was boosted by coal-to-gas switching and the mothballing of various coal-powered competitor plants; offset by a mild 2016 winter, dampening heating demand for gas

We think The outlook for natural gas in 2017 is likely to be defined by various factors:

- Prices over \$3/mcf stimulating additional drilling; **return to shallow growth of supply in the Marcellus/Utica fields**, though only if local price differentials improve from current extreme levels;
- Shallow **associated (by-product) natural gas** production growth as a result shale oil production growing moderately;

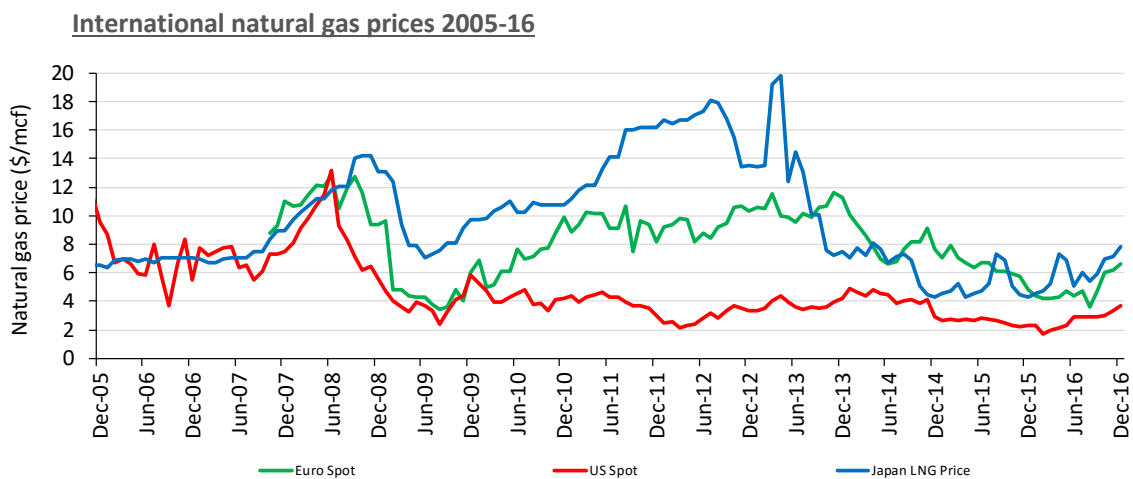


Source: EIA; Guinness Atkinson Funds (as at Oct 31 2016)

- **LNG net exports.** Exports of LNG started from Sabine Pass (capacity of 2.2 Bcf/day) in early 2016 but averaged only around 0.5 Bcf/day. Net LNG exports are expected to rise to 1.0-1.5 Bcf/day in 2017. The amount of gas exported will ultimately be a function of the differential between US and international gas prices;
- A positive response from **industrial natural gas demand** as new petrochemicals and fertiliser plants are completed; and
- Steady replacement of the coal utility fleet by new gas-fired electricity generation plants.

The US natural gas price bottomed in 2012 and a tepid recovery since then has been muted by continued strength in gas supply, particularly from the Marcellus and from gas produced as a by-product of shale oil. Average 2016 natural gas prices (at \$2.55) are well below the marginal cost of supply (which is over \$3.50). Today the gas market sits in reasonably good balance, which has helped the price to stabilise in the \$2.75-\$3.50 range. It may be held at this level for a period (excepting weather-induced spikes and troughs) until demand grows further, and longer term we expect the price to normalise to \$3.50+.

International gas prices (Europe and Asia) fell sharply at the start of 2016, pulled lower by El Nino and declining oil prices. By the end of 2016, they had recovered to around the \$6-8/range, which we expect to persist in 2017.



Source: Bloomberg; Guinness Atkinson Funds

Energy equities

2016 was a year of recovery for energy equities, but only after another volatile year. The MSCI World Energy Index ended the year with a total return of 27.63% versus the MSCI World at 8.18%.

Despite the rally, energy equities are still near depressed levels

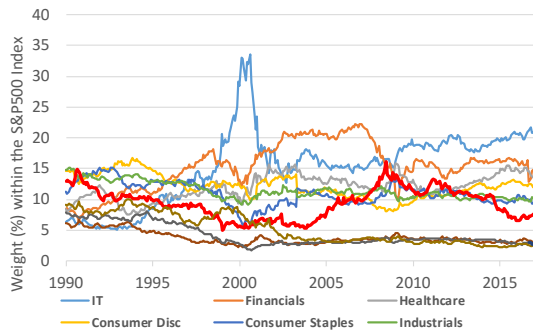
The rally in 2016 has brought an end to the energy equity 'bear market' which lasted from June 2008 to December 2015. This was the longest and most significant period of energy equity underperformance versus broad equities at least since 1980. The recovery seen in 2016 recoups some of the underperformance witnessed during the period but still leaves energy equities at a depressed level relative to broader markets.

On a relative price-to-book (P/B) basis (versus the S&P500), the valuation of energy equities is still close to the lowest level that we have witnessed since 1965. At 0.6x, the relative price-to-book for energy equities has rebounded from its trough (that was also seen in 1998 when the oil price fell from \$38 to \$12 per barrel, in current USD) and is still below the level witnessed in 1986 when the oil price fell from the mid \$60s to around \$20 per barrel (also in current USD). We expect this relative P/B metric to mean-

revert over time as the profitability of the energy sector recovers and sentiment improves towards the sector – a return to the long-term average suggests c.50% (relative) upside.

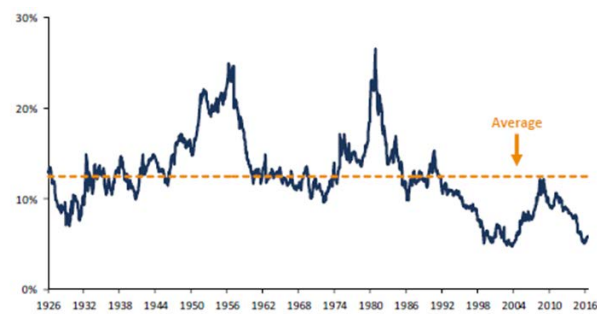
Sentiment towards the energy sector remains low. We observe that the capitalisation weighting of energy in the S&P500 at the end of 2016 was only 7.6% (up from 6.5% at the end of 2015), a level that is low relative to history. Since 1990, energy as a proportion of the S&P 500 has ranged between 5.1% and 16.2%, with an average weighting of 9.5%. Moreover, the weighting of energy within the S&P500 appears to still be at very low levels when looking back as far as 1926.

S&P500 sector weights (1990-2016)



Source: Bloomberg; Guinness Atkinson Funds

Weight of energy in the S&P500 (1926-2016)

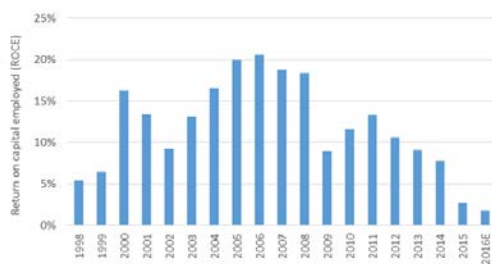


Source: GMO; Guinness Atkinson Funds

Return on capital employed likely to recover, even at lower oil prices

We believe that sentiment towards the energy sector and energy equity valuation remain at a low ebb because energy company profitability is at historically low levels. It is worth remembering that energy equities started to underperform markets a few years before the oil price collapsed in late 2014 and we believe that this underperformance was catalysed by declining levels of energy company return on capital employed (ROCE). In 2016, at \$45/bl oil prices, the Guinness Atkinson Global Energy Fund holdings had an average ROCE of 2%. Higher oil prices and various self-help measures (like capitalising on cost deflation, use of technology, M&A strategies and lower reinvestment) will help to increase ROCE and we expect it to recover to the middle of the long run range (around 10-12%). There is a very tight correlation between ROCE and price/book valuation (A correlation (or R^2) of 79% for the Guinness Atkinson Global Energy fund) and, if the relationship holds true, we would expect valuation to improve as the industry recovers its return on capital employed.

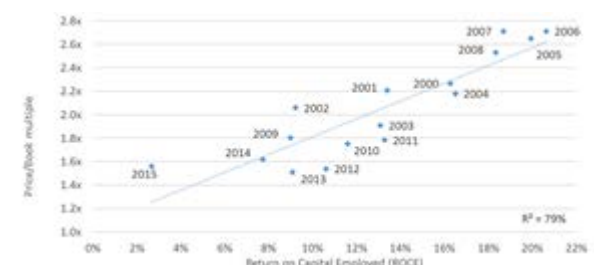
ROCE history - current Guinness portfolio



Source: Bloomberg; Guinness Atkinson Funds

Note: past performance is not a guarantee of future results

ROCE vs P/B ratio – current Guinness portfolio



Source: Bloomberg; Guinness Atkinson Funds;

Note: past performance is not a guarantee of future results

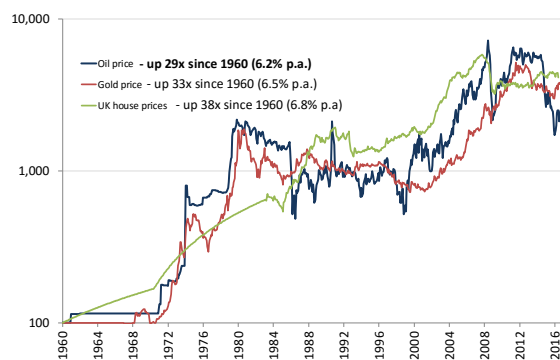
While higher oil prices will speed up the ROCE recovery, we believe that the energy industry will adjust organically to lower oil prices (as it has done in previous lower oil price environments) and that a normalisation of ROCE could occur even at current levels of oil price. The sector has experienced this before; as an example, RD/Shell, one of the Guinness Atkinson Global Energy portfolio holdings, targeted a 13-15% ROCE using a \$16/bl oil price assumption in late 2002 while in 2016 they target a 10% ROCE

with a \$60/bl oil price assumption.* This is an industry where costs adjust and ROCE (and ultimately valuation) tend to normalise.

Energy equities offer a potential hedge against inflation

With the arrival of President Trump in 2017, coupled with sustained quantitative easing in recent years, the prospect of inflation is an increasing issue for many investors and ‘hard assets’ such as crude oil, property and gold have historically hedged well against inflationary pressures. Our analysis back to 1987 indicates that energy equities have overall delivered a higher correlation with inflation metrics (than crude oil itself) and that the investment returns from energy equities have been very competitive with those achieved from gold, UK property or crude oil futures over a large number of investment periods. Energy equities have been the advantaged way of owning an inflation hedge and we believe that the current cyclical weakness in crude oil prices provides a compelling time to hold energy equities as part of a basket of assets that could hedge against future inflation.

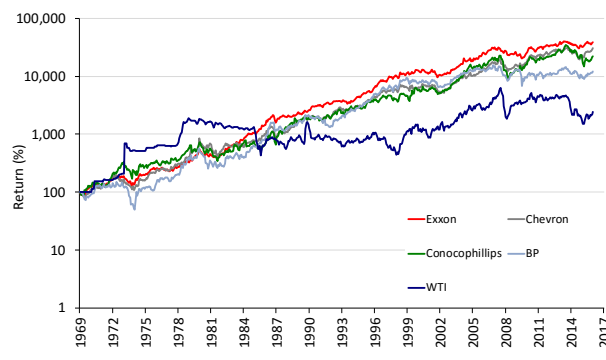
Oil price, gold and UK property since 1960



Source: Bloomberg; factset; UK government; Guinness Funds

Note: past performance is not a guarantee of future results

Oil price and oil majors: total return since 1969



Source: Bloomberg; Bernstein; Guinness Funds

Note: past performance is not a guarantee of future results

Energy equities appear to be pricing in around \$55/bl oil prices

The valuation sensitivity work that we regularly perform tells us that energy equities are today discounting an oil price (into perpetuity) of around \$55/barrel; broadly in line with the current spot oil price but below the five year forward prices for both the Brent and WTI benchmarks. If you believe, as we do, that a recovery in the oil price to \$70/bl is likely, or that return on capital will normalise (or both), our sensitivity work shows upside across the energy complex of around 40-50%.

Will Riley, Jonathan Waghorn & Tim Guinness

January 2017

*Past performance is not a guarantee of future results

Opinions expressed are those of Guinness Atkinson Funds, are subject to change, are not guaranteed and should not be considered investment advice.

The Fund's investment objectives, risks, charges and expenses must be considered carefully before investing. The statutory and summary prospectus contains this and other important information about the investment company, and it may be obtained by calling 800-915-6566 or visiting gafunds.com. Read 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.

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.

MSCI World Energy Index is a free-float weighted equity index based on the energy sector.

MSCI World Index is a capitalization weighted index that monitors the performance of stocks from around the world.

One cannot invest directly in an index.

Price to Book Ratio (P/B) is used to compare a stock's market value to its book value and is calculated by dividing the current closing price of the stock by the latest quarter's book value per share.

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.

Return on Capital is a return from an investment that is not considered income. The return of capital is when some or all of the money an investor has in an investment is paid back to him or her, thus decreasing the value of the investment.

Contango is a situation where the futures price of a commodity is above the expected future spot price.

The Compound Annual Growth Rate (CAGR) is the mean annual growth rate of an investment over a specified period of time longer than one year.

OPEC-12 are the 12 countries that make up OPEC (Organization of Petroleum Exporting Countries): Venezuela, Saudi Arabia, Iran, Iraq, Kuwait, United Arab Emirates (UAE), Libya, Nigeria, Qatar, Algeria, Angola, Ecuador

CAPEX or Capital Expenditure are funds used by a company to acquire or upgrade physical assets such as property, industrial buildings or equipment.

[Click here](#) for a complete list of holdings of the Guinness Atkinson Global Energy Fund

Top 10 holdings as of 12/31/2016: 1. OMV AV 3.94% 2. Statoil ASA 3.81% 3. Suncor Energy Inc 3.79% 4. Royal Dutch Shell PLC 3.76% 5. Hess Corporation 3.75% 6. Imperial Oil Ltd 3.65% 7. Devon Energy Corp 3.63% 8. Valero Energy Corp 3.62% 9. Apache Corp 3.61% 10. Petrochina Co Ltd 3.59%

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