

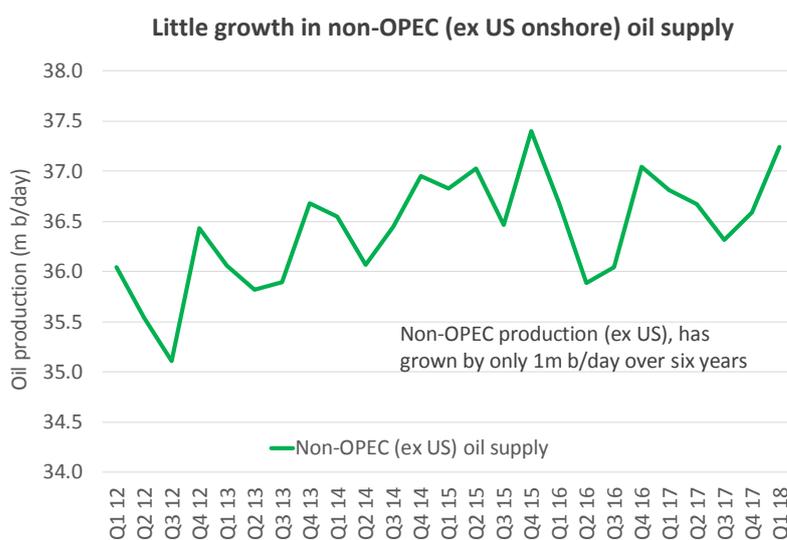
Mind the ‘non-OPEC oil supply’ gap

The largest slump in capex for over 20 years has caused a deterioration in the long term outlook for non-OPEC production outside the US. Existing fields have declined faster during the oil price fall and there is a shortfall of new projects coming online in this area, which represents over half of current world oil supply. Assuming that world oil demand continues to grow, we see an increasing ‘call’ on US unconventional oil and see the need for higher long term oil prices to incentivise the development of new large scale non-OPEC conventional oil fields.

Non-OPEC production (ex US) has been muted over the last five years

Oil production in the non-OPEC world (ex US onshore) comprises ‘conventional’ (e.g. deepwater offshore wells) and ‘unconventional’ supply (e.g. Canadian oil sands). The common strand tends to be that the oil comes from large, capital intensive projects, where the lead time between an investment decision being made and first production is normally at least three years.

Despite the oil price averaging over \$100/bl between 2010 and 2014, non-OPEC (ex US onshore) production has only grown by around 1m b/day over the last six years. Most of the growth can be attributed to Canada, where large oil sands projects have rolled into production, and Brazil, where sub-salt offshore developments have ramped up, albeit far more slowly than the Brazilian government planned. But beyond that, new projects have only been successful in plugging the gap of declines in existing production. There has been a very limited supply response from non-OPEC (ex US onshore) despite high oil prices.



Source: Bloomberg, PIW

Substantially lower reinvestment means the non-OPEC (ex US onshore) production outlook is worsening

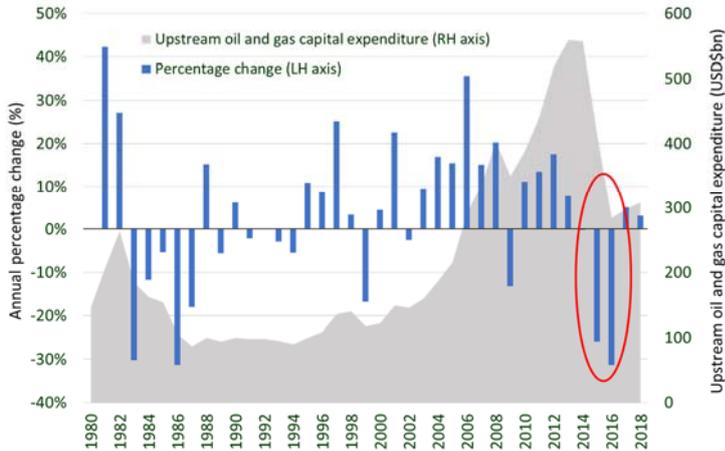
Significant capital spending reductions since 2014, as a result of the decline in oil prices, are likely to result in non-OPEC conventional oil production moderating and declining in the coming years. The reason is two-fold: existing fields producing less as a result of higher production decline rates, and new oil projects bringing less production as a result of many of those projects being delayed or cancelled.

There is an old adage in the oil industry that ‘the best solution for low oil prices is low prices’ This appears to be relevant again as recent low oil prices have caused sharply lower reinvestment and are threatening future oil supply growth. The impact, ultimately, is likely to be a higher oil price.

Upstream investment has fallen at the fastest rate for over twenty years

The average oil price in 2015-2017 was over 50% lower than the average oil price in 2010-2014, so it is no surprise that oil industry reinvestment levels are down 40% on average over the period 2016-2018 compared to 2012-15. This reduction is the biggest correction in capex on oil and gas projects that we have seen in the industry since the slump of the early 1980s.

The largest decline in upstream oil and gas capex for over 20 years



Source: Bloomberg, JP Morgan, BP Statistical Review

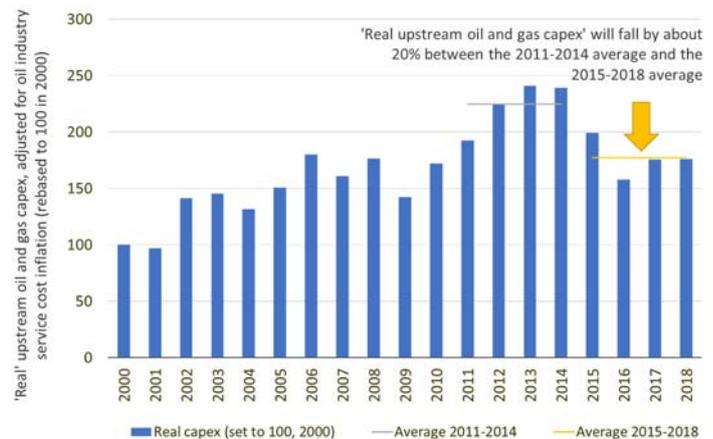
In a period of declining oil prices, the initial reaction from producing companies is typically to cut reinvestment, cut operating costs and (certainly for the larger companies) defend dividend commitments as strongly as possible. The time lag of the investment cycle means that capex can be cut with limited impact on existing production; however the cuts will ultimately impact future production. The question becomes; if capex in the conventional oil and gas world fell by over 40% in 2015-2017, and is showing only very limited signs of recovering at the moment, how much will future oil supply be affected?

There are two factors that we need to consider to properly adjust for these changes in capital expenditure levels; firstly, **adjusting for oil and gas industry inflation** and secondly adjusting for the **split between oil and gas** projects.

In terms of **industry inflation adjustment**, one key effect of the reduced investment is that the per unit pricing of oilfield services has fallen sharply, since there has been excess service capacity. This cost deflation has the effect of making every dollar spent by the upstream companies 'go further', and we can see this in development costs of the upstream companies falling appreciably. The peak of the oil service inflationary cycle was 2014, ending a 14 year period when oil service costs inflated at an average rate of 6% p.a. Since 2014, oil services prices have fallen by 10% p.a. and 2018 is likely to be the first year where we see a small increase in pricing. The deflationary pricing cycle appears to have been swift and is now just about over.

Combining actual capex changes and adjusting for inflationary metrics, we find that real oil and gas upstream activity (industry inflation adjusted upstream spending) will fall by about 20% on average in the 2015-2018 period compared to the 2011-2014 period. This takes real upstream spending back to what we saw in the 2006-2010 period.

Industry inflation adjusted upstream oil & gas capex down about 20%



Source: Bloomberg, JP Morgan, Guinness Asset Management

Secondly, when we allow for the allocation of upstream **capital expenditure between oil and gas projects**, we find that industry inflation-adjusted capex on oil-oriented projects is likely to be down by around 25% on average in the 2015-2018 period vs the 2010-2014 period. Over the last few years, there has been increasing focus from the

larger oil and gas companies to developing gas projects, especially large scale LNG projects, in preference to larger oil projects. Whilst it is difficult to be precise about the split between oil and gas capex, we estimate that about 50% of capex is currently being spent on gas projects and according to the 'Top Projects' analysis carried out by Goldman Sachs, around 60% of new project capex being sanctioned between 2018-2020 will be on gas projects. The larger energy companies have an increasing preference towards gas projects and the resulting reduction in oil capital expenditure will put even more pressure on oil production in the coming years.

Impact #1 of lower investment: increasing declines on existing oil production

The simple fact is that without investing capital consistently, every oil field will decline as the pressure within the reservoir depletes. The annual level of depletion is measured as the 'decline rate' and is presented on a %p.a. basis. Typically speaking, a conventional oilfield will increase production to a plateau level and then sustain this for three or four years before declines start. Once it starts, production decline is difficult to overcome, but this does not stop producers from seeking economic ways to drill infill wells or pursue reservoir injection in order to fight the laws of physics. Companies can offset the decline (and bring forward in time the ultimate recoverability of oil) but cannot overcome the decline.

Different types of oil fields have varying decline profiles. Heavy oil upgrader projects have very low decline rates, deepwater offshore fields have high decline rates and unconventional (shale oil) wells have exceptionally high decline rates. A 'typical' oil field might have a decline rate in the 2-7% p.a. range (after maintenance and extending capex) and a natural decline rates (before maintenance capex) of around 15% p.a. These are generalisations but useful rules of thumb.

The level of reinvestment has an impact on the decline rate of any individual field and industry research indicates that decline rates across countries and regions typically increase during an oil price fall. There is a time lag to this effect but it appears that non-OPEC (ex US onshore) decline rates have increased again as a result of recent years of underinvestment as discussed above.

Mexican oil production is maturing



Source: Bloomberg

The 'poster child' for the impact of natural declines (combined with a lack of new investment) in the past few years has been Mexico. Mexico's largest oilfield, Cantarell, has been in decline since the mid 2000s, and a failure to find replacement production has seen overall oil production declines in the country accelerate, particularly since 2014. The average annual (net) decline rate since the end of 2014 has been 7%. In response, Mexico has opened up its offshore oilfields to foreign investment, a process that started in 2015, but it will be some time before this translates into meaningful development.

We have analysed historic non-OPEC (ex US onshore) oil production and new project start-ups over the last twenty five years to measure an underlying decline rate and have found it to be in a range of 1% to 8% p.a. since 2000 with an average level of around 5% p.a. We believe that a long term estimate of around 6% p.a. is a sensible assumption after considering reinvestment levels and the increasing share of production coming from higher decline

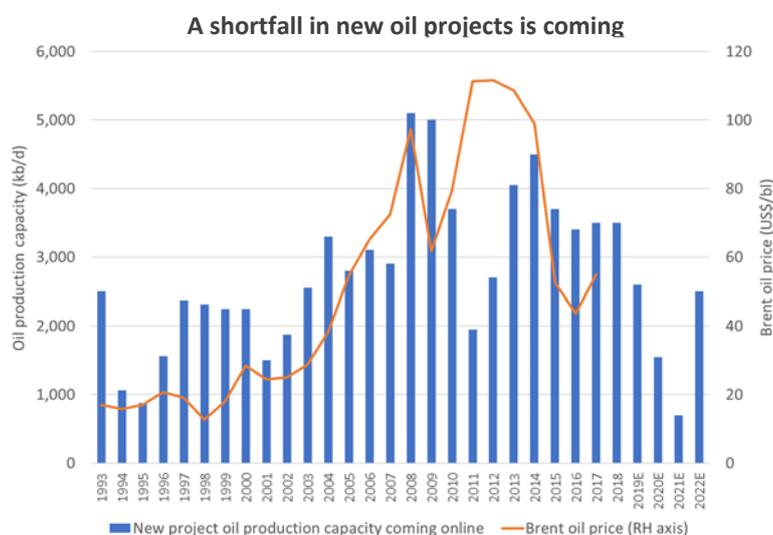
deepwater offshore oil fields. This gives us an assumed starting point that the non-OPEC (ex US onshore) region currently needs to replace around 3 million barrels per day of production each year to keep overall oil production flat.

Impact #2 of lower real oil investment: new projects are delayed or cancelled

The more apparent effect of reduced real oil industry investment is the lower level of new projects being sanctioned, developed and ultimately starting production. Combining various industry research papers, we have created a time series of historic oil field developments and the production associated with them. Years of high oil price (and associated high levels of free cash flow generation) are generally associated with higher levels of project sanction and production start-ups (and vice versa). Since 1993, we estimate that new non-OPEC (ex-US onshore) oil projects added at peak in excess of 5m b/day of new production capacity, with an average level of new additions over the period of just under 3m b/day per annum.

As a result of lower industry inflation adjusted oil investment levels, we expect that the oil production capacity added in 2019, 2020 and 2021 will be **well** below the average level added since 1993.

If oil prices sustain over \$60/bl and confidence returns, we expect to see an increased level of 'final investment decisions' (FIDs) in non-OPEC (ex US onshore) projects. However, these FIDs would be unlikely to impact the low level of project start-ups expected in 2019-21 because the typical non-OPEC conventional oil project takes in excess of three years from FID to the start of production. We could see an improvement in 2022 (and we have modelled a significant one as you can see above) but the downdraft in 2019-2021 is coming.

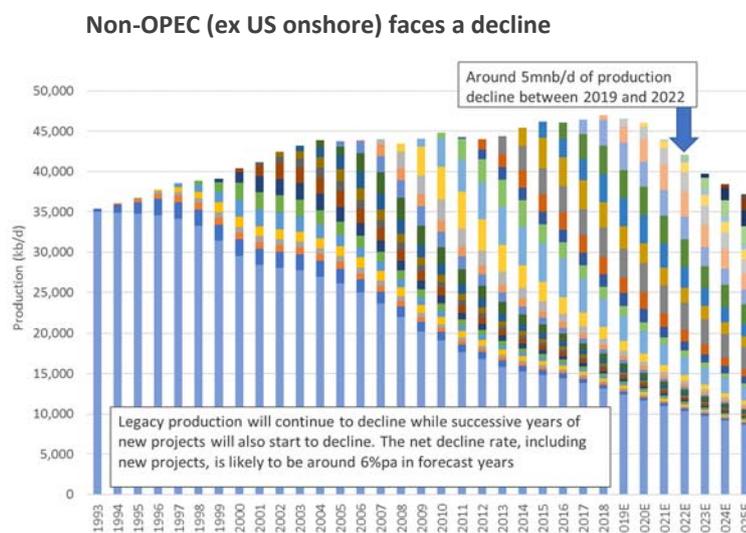


Source: Kessler Energy, Goldman Sachs, Credit Suisse, Piper Jaffray, Guinness Estimates

Higher declines and lower new project start ups will soon cause a problem

The 25% plus reduction in real oil-oriented capex is causing higher decline rates and a reduced level of new oil project sanctions and will result in the outlook for non-OPEC (ex US onshore) oil production to be increasingly under pressure.

We estimate that non-OPEC (ex-US onshore) oil production will reach a peak of around 47m b/day in 2018 (ex biofuels and processing gains) as a result of the higher level of new project start-ups associated with the higher oil price environment of 2010-2014. As these new projects roll over, and the base continues to decline at around 6% p.a., we expect to see a relatively sharp decline in non-OPEC (ex US onshore) oil production. It would be wrong to



Source: Kessler Energy, Goldman Sachs, Guinness Estimates

pretend that we can be precise about the outcome of these effects, but our modelling does suggest non-OPEC (ex-US onshore) production could fall by around five million barrels per day over the four year period from 2019 to 2022. Higher oil prices may result in higher 2018 FIDs but this is unlikely to have any impact on the production outlook before 2022.

Conclusion: higher long dated oil prices required to incentivise spending to offset the declining non-OPEC (ex US onshore) oil profile

As non-OPEC (ex US onshore) oil matures and declines, the global oil industry will have to find other ways to replace the supply shortfall and satisfy the likely growing global demand for crude oil. The requirement will predominantly fall on **OPEC** and the **US onshore** to satisfy this growing gap:

1. **OPEC** will taper 'missing' quota barrels back into the market, then gradually increasing production and exports again.

OPEC currently has 1.2m b/day of oil on the sidelines – production that was removed from the market at the start of 2017 as quotas were lowered. OPEC representatives have talked of 'tapering' this oil supply back into the market once global oil inventories have fully corrected lower, potentially later in 2018 or 2019. We expect this process to be managed carefully by Saudi, to avoid a return to oversupply. Beyond the next year or two, with the non-OPEC (ex US onshore) declines that we are forecasting, we see OPEC attempting to maintain a broadly flat market share, as a result of International Oil Company investment in new projects. However, limited spare capacity means that the group is poorly placed versus history to maintain a balanced market should we see an external supply shock.

2. **US onshore supply** will increase as higher oil prices incentivise a greater level of activity.

The US onshore industry has proved itself to be dynamic in recent years with activity, investment and production adjusting rapidly to changes in oil prices. We believe that the US onshore will be required to be a flexible supply source in the coming years as well, in order to maintain a balanced global oil market. We also believe that the US system can continue to grow successfully, but it becomes a question of the oil price needed to incentivise that growth. Over the past twelve months, with WTI averaging in the high \$50s, the US onshore oil system has been growing by around 1m b/day. This may be sufficient production currently, but if the 'call' on the US rises to, say, annual growth of 1.5m b/day or 2m b/day at points, then a higher price will be required and one that is certainly higher than the level seen in the current forward curve for oil.

History shows that global oil supply and demand factors will adjust to achieve balance and that price is a key factor in creating that balance. Our conclusion from this piece is that non-OPEC (ex US) production, which comprises over half of world oil supply, faces significant growth challenges over the next few years. This issue will become more acute from 2020 onwards. We believe, therefore, that the next oil upcycle, supporting investment in the industry and price, will be required to incentivise supply. Spot oil prices have risen this year, reflecting a tighter market in the short-term, but it is longer dated oil prices that will need to rise to incentivise investment in long-term non-OPEC and OPEC production, as well as shorter cycle US shale oil.

Why the Guinness Global Energy Fund?

Best in class energy strategy since inception (19 years): annualised returns of 9.8% p.a. (to 31/03/2018 in USD)*

The Guinness Global Energy strategy started in November 1998 and has been consistently run and managed by Tim Guinness and the wider team ever since. The portfolio is constructed on a “best ideas” basis in a concentrated manner comprising 30 equally weighted positions of 3.3% each. Our equal weighted approach is a ‘Guinness House style’ and it provides us with a structural sell discipline, a regular ‘top slicing’ premium and it keeps life simple so that we can focus our efforts on picking the best energy stocks. Our investment process is based on regular, detailed and disciplined macro analysis (to achieve the best possible understanding of the drivers of energy markets) and intelligent regular screening of all energy equities.

We initially screen for good quality companies that display attractive valuation with positive earnings momentum and then perform detailed due diligence on this group to select our preferred portfolio holdings. Our bias is towards value with cash returns as a preferred valuation methodology. We believe that our approach has been a key factor behind the long term outperformance of the Guinness energy strategy versus the MSCI World Energy Index and our strong performance relative to our peer group of competitor energy funds. We think our competitive edge lies in the following attributes:

■ Consistency of investment philosophy & process	Strategy developed in 1998, applied by the team for 19 years
■ Equally-weighted portfolio	Limits risk, gives concentration and keeps life simple
■ Top-down analysis	Shaping the portfolio towards different energy sectors
■ Value bias	Picking good quality stocks when valuation is attractive and allowing each idea to work
■ Team	Three managers with varied backgrounds and skills
■ Length of track record	According to Towers Watson, “To be statistically significant, a performance record should be intact for nearly 15 years.”

Guinness Global Energy portfolio

Single sector	Companies producing or distributing energy
High conviction	Equally-weighted, concentrated portfolio (30 positions)
Low turnover	Buy and hold rather than trading philosophy
Unconstrained	No reference to index
Global	Diversified globally
Investment type	Listed equities (long-only)

**The value of an investment and the income from it can fall as well as rise as a result of market and currency movement; you may not get back the amount originally invested. Past performance is not a guide to future performance.*

Note: Simulated (composite) past performance prior to 31 March 2008, the launch date of this Fund. The Guinness Global Energy investment team has been running global energy funds in accordance with the same methodology continuously since 1998. These returns are calculated using a composite of the Investec GSF Global Energy Fund class A from 31 December 1998 to 29 February 2008 (managed by the Guinness team until this date); the Guinness Atkinson Global Energy Fund (sister US mutual fund) from 1 March 2008 to 31 March 2008 (launch date of this Fund), the Guinness Global Energy Fund class A (1% AMC) from launch to 02.09.08, and the Fund’s E class (0.75% AMC) thereafter. *Source: Financial Express, bid to bid basis, total return.*

Guinness Asset Management

Guinness Asset Management provides a range of long-only actively managed funds to individual and institutional investors. Founded in 2003, Guinness is independent and is wholly owned by its employees. We have a variety of specialisms in global sector funds, Asian regional and country funds and global growth and global dividend funds. The Guinness equity funds are in a Dublin OEIC and sit alongside a range of similar SEC-registered funds offered to US investors by our US sister company, Guinness Atkinson Asset Management Inc. Having raised around \$1bn in these vehicles, primarily from Family Offices, Private Banks and Wealth Managers, Guinness is now pursuing a new era of growth by presenting its capabilities to Pension Funds and other Institutional Investors.

We believe in: in-house research; intelligent screening for prioritisation of research; well-designed investment processes; concentrated, high conviction portfolios; low turnover; and the avoidance of benchmark constraints. Our in-house global economic and industry research allows us to take an independent view and not be led by the market. Our size and specialist nature also means we have the ability to act quickly and efficiently to any market movements. At heart Guinness Asset Management is a value, or growth at reasonable value, investor. We combine strategic sector-selection with a fundamental screening process to identify specific value-driven stock opportunities.

Please find further details at www.guinnessfunds.com

Guinness Global Energy team



Tim Guinness

Tim founded Guinness Asset Management in 2003 when he left Investec, who then appointed his new company as the outsource manager of the Investec Global Energy Fund. Tim has over 35 years' investment experience. He founded Guinness Flight Global Asset Management Ltd in 1987 and was joint CEO from 1987 to 1999 and a portfolio manager of the Global Equity Fund. After Investec acquired Guinness Flight in 1998, he was Chairman of the company during the transition into Investec, as well as lead manager of the Investec Global Energy Fund. Tim read engineering at Cambridge University and, upon graduation in 1968, completed a Master's Degree in Management Science at the Sloan School M.I.T. in the US.



Will Riley, CA

Will joined Guinness Asset Management in May 2007. Previously Will worked for six years for PricewaterhouseCoopers, first in the London Middle Market Assurance Team, then as a valuation specialist in the Valuation & Strategy division. Will qualified as a Chartered Accountant in 2003 and graduated from the University of Cambridge with a Master's Degree in Geography.



Jonathan Waghorn

Jonathan Waghorn has 21' years' experience in the energy sector. He was a Shell drilling engineer in the Dutch North Sea and worked as an energy consultant with Wood Mackenzie before becoming co-head of Goldman Sachs energy equity research in 2000. He joined Investec Global Energy in 2008 where he helped grow the energy franchise at Investec to a peak of nearly \$3.5bn in 2011. Jonathan joined Guinness Asset Management in 2013

Guinness Global Energy Fund is an equity fund. Investors should be willing and able to assume the risks of equity investing. The Fund invests only in companies involved in the energy sector; it is therefore susceptible to the performance of that one sector, and can be volatile. Details on the risk factors are included in the Fund's documentation, available on our website.

The value of an investment and the income from it can fall as well as rise as a result of market and currency movement; you may not get back the amount originally invested. Past performance is not a guide to future performance.

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- the Manager: Link Fund Administrators (Ireland) Ltd, 2 Grand Canal Square, Grand Canal Harbour, Dublin 2, Ireland; or,
- the Promoter and Investment Manager: Guinness Asset Management Ltd, 14 Queen Anne's Gate, London SW1H 9AA.

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

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