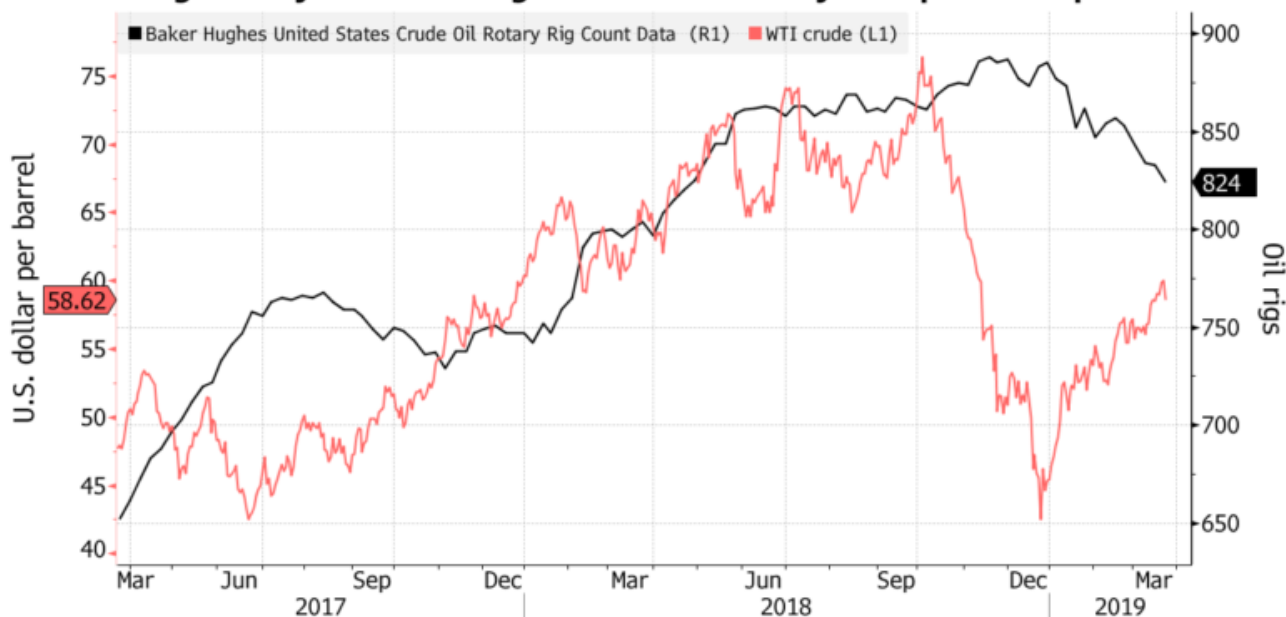


Shale Suffers Growing Pains That Could Slow U.S. Oil Production

Rig Reversal

U.S. drilling activity is still feeling the effects of last year's price collapse



Source: Baker Hughes

The dramatic ramp-up in U.S. shale production is running into a combination of issues – technical and financial – that threaten to slow the pace of expansion, according to some of the industry's biggest companies.

Schlumberger Ltd. and Halliburton Co., two of the largest providers of oil services, said Monday there will be a double-digit drop in spending from customers in the U.S. and Canada this year, a gloomier outlook than they had previously given.

American frackers are tightening their belts following a plunge in crude prices in late 2018 and as investors urge drillers to do more with less. An explosive surge in output from shale formations has pushed U.S. oil production past Russia and Saudi Arabia to become the world's largest. There are warning signs that growth cannot continue indefinitely.

That's leading one of those producers, Devon Energy

Corp., to slash its workforce by about a third amid pressure on spending, Chief Executive Officer Dave Hager said Monday at the Scotia Howard Weil energy conference in New Orleans. The Oklahoma-based driller has already whittled down its headcount by 200 people this year, he said, and is planning to get its total down to 1,700, from about 2,500 now.

In addition to financial limits, technical difficulties are sparking concern that some oil production forecasts won't materialize. Schlumberger Chief Executive Officer Paal Kibsgaard became the latest voice in the U.S. energy industry to warn of the problems caused by "interference" between newer oil prospects – called child wells – and their so-called parent.

Too close, and the child wells can turn out to be less prolific than their parent. But too far apart, and drillers can end up leaving oil in the ground.

"Is there a parent-child relationship? Absolutely. Has it been there since time immemorial? Absolutely," Diamondback Energy Inc. CEO Travis Stice said at the conference. "It's our responsibility to account for the economics of the degradation between a parent and child well, and it's our responsibility to dial that into our forecast."

Stice said Diamondback hasn't had to cut back its activity in response to those issues, like some of its peers who have had to widen spacing after production failed to live up to expectations.

"I think what you're seeing is reserve reports coming out at the end of last year with a lot of negative performance revisions in there," he said. "That's really the first tell as an industry that you've overcapitalized your assets."

It's not just budget constraints or technological challenges that may slow growth. Concho Resources Inc. President Jack Harper said the industry will have to throw more money at the Permian Basin's stretched schools and roads for the hot shale

play to handle the level of activity expected over the next several years.

In another sign that the shale boom might be slowing down, explorers have reduced the number of oil rigs operating in the U.S. to the lowest in about a year, a report by Baker Hughes showed on Friday. There's also a backlog of thousands of wells that have already been drilled but haven't yet been fracked, the most costly part of the process of bringing a well into producing.

So far, U.S. oil output is holding at a record 12.1 million barrels a day after jumping about 30 percent in just two years. But shale wells have a short life span, with yields sometimes declining in just a few months. More have to be drilled and fracked frequently just to keep up the pace of production.

N-KOM successfully completes its first FSRU project



Nakilat-Keppel Offshore & Marine (N-KOM) has successfully completed its first floating storage regasification unit (FSRU) project for the 138,000cbm FSRU Excelsior owned by the US-based Excelsior Energy.

During its period at the Erhama Bin Jaber Al Jalahma Shipyard, the FSRU underwent routine drydocking and repairs, in addition to modifications and retrofitting of several new systems, including the installation of a ballast water treatment system (BWTS).

To date, N-KOM has completed some seven BWTS installations for various types of vessels, such as LNG and LPG carriers as well as very large crude carriers (VLCCs).

The vessel is now ready to sail to Bangladesh to join Excelsior's 'FSRU Excellence' in the Bay of Bengal and serve as the country's second LNG import terminal.

N-KOM's expertise in handling gas carriers has attracted many LNG vessels for routine docking, membrane repairs, and other repair and maintenance works at its facility. Located within the world-class Erhama Bin Jaber Al Jalahma Shipyard, N-KOM has completed more than 190 LNG carrier drydocking and repairs

to date, with around 30 projects undertaken in 2018 alone.

The shipyard's comprehensive facilities include three Q-Max sized docks (two graving docks and one floating dock), berthing capacity of 3,150 metres, specialised workshops and cryogenic cleanrooms, enabling it to handle repairs and maintenance for all types of marine vessels and offshore structures.

To date, N-KOM has delivered in excess of 900 marine and offshore projects in a safe, reliable and timely manner to clients from around the world.

Established in 2007, N-KOM is a joint venture between Qatar's premier gas shipper Nakilat and leading offshore rig constructor and ship repairer Keppel Offshore & Marine.

From its strategic location within the Erhama Bin Jaber Al Jalahma Shipyard in Ras Laffan Industrial City, N-KOM offers a comprehensive range of repair, conversion, maintenance and fabrication services for marine vessels, offshore and onshore structures.

Excelerate Energy is an LNG company based in Woodlands, Texas.

IEA: Carbon emissions hit record high in 2018



Global energy-related carbon emissions rose to a record high last year as energy demand and coal use increased, mainly in Asia, the International Energy Agency (IEA) said on Tuesday.

Energy-related CO₂ emissions rose by 1.7 percent to 33.1 billion tonnes from the previous year, the highest rate of growth since 2013, with the power sector accounting for almost two-thirds of this growth, according to IEA estimates.

The United States' CO₂ emissions grew by 3.1 percent in 2018, reversing a decline a year earlier, while China's emissions rose by 2.5 percent and India's by 4.5 percent.

Global energy demand grew by 2.3 percent in 2018, nearly twice the average rate of growth since 2010, driven by a strong global economy and higher heating and cooling demand in some parts of the world, the IEA said.

Global gas demand increased at its fastest rate since 2010, up 4.6 percent from a year earlier, driven by higher demand as switching from gas to coal increased.

"Coal-to-gas switching avoided almost 60 million tonnes of coal demand, with the transition to less carbon-intensive natural gas helping to avert 95 million tonnes of CO₂

emissions,” the IEA said. “Without this coal-to-gas switch, the increase in emissions would have been more than 15 percent greater,” it added.

BP’s focuses \$100 million on reducing emissions



HOUSTON – BP has announced that it has established a \$100 million fund for projects that will deliver new greenhouse gas (GHG) emissions reductions in its upstream oil and gas operations. The new Upstream Carbon Fund will provide significant further support to BP’s work generating sustainable greenhouse gas emissions reductions in its operations.

In April 2018, BP set clear, near-term and specific targets

aimed at reducing its emissions and advancing the energy transition, including achieving 3.5 million tons of sustainable GHG emissions reductions across the BP Group from 2016 to 2025 and targeting a methane intensity of 0.2%.

In the year since, BP's total direct GHG emissions fell by 1.7 MMt CO₂ equivalent, despite a 3% growth in upstream oil and gas production on the same basis. By the end of 2018, BP had generated 2.5 MMt of sustainable GHG emissions reductions throughout its businesses since 2016. BP's methane intensity for 2018 was 0.2% – in line with the target.

Upstream chief executive Bernard Looney said, "A year ago we challenged everyone at BP to reduce emissions in our operations and they have responded overwhelmingly. This \$100 million investment is designed to build on that momentum. It will fund ideas both big and small because everything counts in our transition to a lower carbon future and everyone at BP has a role to play."

Under the new initiative, funding totaling up to \$100 million will be made available over the next three years to support new projects in the upstream that will generate additional GHG emission reductions. Businesses and employees throughout BP's Upstream operating businesses are being invited to come up with ideas and propose projects for this funding.

The Upstream Carbon Fund will be in addition to the \$500 million that BP invests in low carbon activities each year, including investment in venturing activities and into its significant alternative energy business. BP is also a founding member of the Oil and Gas Climate Initiative, which brings together 13 of the world's largest energy companies and has set up a \$1 billion investment fund to address methane emissions and other issues.

BP's targets for reductions in operational emissions are part of its 'reduce-improve-create,' or RIC, approach to the energy

transition, which also aims to improve its products to allow customers to reduce their emissions and to create and grow new low carbon businesses. The projects that are awarded funding will help to deliver the further emissions reductions necessary to achieve the RIC targets.

The announcement of the new fund is a further step in BP's work to meet its targets and advance the energy transition. In January, BP announced that progress towards the sustainable emissions reductions target has now been incorporated as a factor in the remuneration of 36,000 employees across the Group.

The 'new reality' of the oil and gas sector



The "new reality" that Oil & Gas UK has identified in its new Business Outlook highlights the significant pressures that

those operating on the UKCS continue to grapple with, as the industry strives to remain competitive and sustainable.

Certainly, the current environment has challenges. Continued market uncertainty is reinforcing investor caution, indicating a conservative outlook for prices. This has meant that the laser focus on costs, budgets and efficiencies, which has been so crucial to the industry in recent years, must continue to be the norm across the sector.

However, it is important to stress that the latest Business Outlook also draws out some of the many positive outcomes that have resulted from better collaboration, new ways of working and greater focus on technology and innovation that have been adopted over the last 5 years. The industry is working better, smarter and more efficiently, and capable of maintaining global competitiveness.

The improvements in production, production efficiency and new field approvals which feature in this year's Outlook help to demonstrate the industry's ongoing resilience and optimism. Following 14 years of decline, production has increased by 20 percent over the past five years, while momentum around exploration activity has increased, with up to 15 exploration wells expected to be drilled this year, including some potentially high-impact prospects.

Additionally, the on-going levels of M&A activity indicate that the appetite to invest in the basin continues to be positive. That much of this activity in 2018 related to the transfer of assets, helping to ensure that investment opportunities are in the most appropriate hands, and creating a more diverse landscape, is hugely encouraging given the importance of this in achieving MERUK.

However, fresh and forward-thinking approaches to collaboration and business models that take into consideration trust, technology and transformation in the oil and gas

industry remain crucial to ensuring the UKCS's competitiveness and longevity as well as supporting that of its critical supply chain mass. While there have been positive changes towards this, there is much more that can still be done.

The industry needs to move forward together to unlock the £200bn that OGUK has reported to be required to achieve Vision 2035 – adding another generation of productive life to the basin. By building on the momentum now established, and with a continuing focus on our “new reality”, this definitely looks to be achievable.

European Parliament approves Clean Energy for All Europeans package



The European Parliament has adopted the new Electricity

Regulation and Electricity Directive, concluding the political negotiations on the Clean Energy for All Europeans package. The regulation now requires to be formally approved by the Council. It will then enter into force immediately (with a date of application of 1 January 2020 for the Electricity Regulation) and has to be transposed into national law within 18 months.

The revised Electricity Regulation opens up electricity markets to renewables, energy storage and demand response. It also introduces stricter and harmonised rules for capacity mechanisms and enhances regional coordination in order to improve market functioning and competitiveness. Under the new rules, new thermal power plants emitting more than 550 gCO₂/kWh will not be allowed to benefit from the capacity mechanism, while existing power plants emitting more than the 550 gCO₂/kWh threshold will be allowed to participate in capacity mechanisms until July 2025 only.

The Clean Energy for All Europeans package is expected to enable the European Union to realise the energy transition, follow up on the 2030 climate legislation and meet the Paris Agreement commitments.

America emerges third-biggest holder of LNG export capacity



Bloomberg/New York

Just three years after it began sending liquefied natural gas overseas, America now trails only Australia and Qatar in the volume of the fuel it's capable of exporting.

The US jumped ahead of Malaysia with the startup of Cheniere Energy Inc's LNG terminal in Corpus Christi, Texas, data from BloombergNEF show. And the race is just getting started: US export capacity, currently accounting for 8% of the world total, will more than double as projects under construction are completed.

More than a dozen projects are vying to be part of the so-called second wave of US LNG development, seeking to capitalise on the surge of production from shale basins. Though global gas demand is climbing as nations switch to the cleaner-burning fuel from coal, American shipments will compete with supplies from Qatar and Russia.

Cheniere shipped the first cargo from Corpus Christi in December, and a fifth LNG production unit at its Sabine Pass terminal in Louisiana received US approval this month to start service.

Though the US is already in third place in terms of global export capacity, the Cheniere projects "will be what nudges

the US up to third place in terms of supply into market – overtaking Malaysia on export volumes, including on a monthly basis,” Fauziah Marzuki, an analyst with BNEF in Singapore, said in an e-mail. “Russia isn’t too far behind” as it exports from Siberia, but America should have the lead with the startup of three more terminals this year, she said.

Shell makes aggressive move into UK retail power market



Bloomberg/London

Royal Dutch Shell Plc took a step forward in its aim to become the world’s biggest power company with an aggressive move into the UK retail market by offering one of the cheapest tariffs available.

Shell Energy, formerly known as First Utility Ltd, said yesterday it has a fixed rate power-supply tariff for UK customers of about £970 (\$1,278) a year, or about 81 pounds a

month until July 2020. The move is part of its rebranding of its UK utility business.

This undercuts former cheapest UK power supplier Bulb Energy Ltd, which has a deal available for £981 a year, and is around 18% cheaper than power supplied by Centrica Plc-owned British Gas, according to data from UK power regulator Ofgem.

Shell plans to become the world's biggest power company within 15 years and is spending as much as \$2bn a year on its new-energies division, a move that suggests it sees climate change as a significant threat to the fossil fuel business.

"Shell has been increasingly vociferous about its ambitions in electricity markets, and we see it as a significant competitive/disruptive force over the coming years for traditional utility energy suppliers/retailers," RBC Capital Markets LLC said in a note yesterday.

The bank said Shell's plan to invest about \$1bn-\$2bn a year on its new energies division is only 5% of the company's annual capex and "hence has significant room to grow." It added that it's "difficult to rule out" Shell buying other UK-based utilities such as the retail unit of SSE Plc or Npower Ltd, which are both up for sale.

The move will bring yet more pressure to the UK power market which has seen swaths of customers abandon the traditional Big Six utilities for smaller, cheaper suppliers. Surging wholesale prices for power and gas have driven several companies out of business. Last year, more businesses folded than in the previous 16 years combined. Brilliant Energy, which has about 17,000 domestic customers, became the 10th firm to cease trading in the past 12 months on March 11.

British Gas, which lost 742,000 customers last year, held a 19% share of the UK's electricity market in the third quarter of 2018, according to Ofgem. Bulb, which has about 1mn customers, had a 3% stake in the market.

As well as announcing the rebranding, Shell also said it has switched its existing 700,000 UK customers to power supplied entirely by renewable sources of energy such as wind, solar and biomass.

“Shell recognises the world needs more energy with lower emissions and this will give customers more flexibility, greater control and cleaner energy,” said Mark Gainsborough, executive vice president of Shell New Energies US LLC.

Newly rebranded Shell Energy will also offer a range of smart home devices, such as thermostats, and discounts on home electric vehicle chargers for its customers.

“We are building on the disruptive nature of First Utility to give customers something better,” said Colin Crooks, chief executive officer of Shell Energy Retail Ltd. “We know that renewable electricity is important to them and we are delivering that, while ensuring good value and rewarding loyalty.”

Alongside First Utility, Shell has made other acquisitions in power including car-charging operator NewMotion and a stake in US solar company Silicon Ranch Corp. It has also announced it’s bidding for Dutch utility Eneco Group NV, which provides low-carbon power to industrial users and offers apps and other technology to manage electricity consumption. Shell also entered a bid to expand an offshore wind farm in the Netherlands.

Norway Deals a Blow to an Oil Industry That’s Quickly Losing Friends



The decision of the world's largest sovereign wealth fund to reduce holdings in oil stocks wasn't as far-reaching as the industry feared, but dealt a symbolic blow to fossil fuels that will reverberate for energy companies and their investors.

While the divestment by Norway's \$1 trillion fund doesn't include Big Oil, instead rooting out \$7.5 billion of companies that focus purely on exploration and extraction, the impact of the announcement rippled through the sector. Shares of all oil companies initially plunged on the news, suggesting the move sets the industry up for greater disruption.

It's a bitter taste of the new reality for oil producers, which increasingly have to fight for investor dollars rather than enjoying the perks of being indispensable to the global economy.

"The Norwegian sovereign wealth fund is seen as something of a poster-child amongst sovereign wealth funds," said Alejandro DeMichelis, director of oil and gas research at Hannam & Partners LLP. "This decision could also trigger other large investors to review their stance toward investing in the oil and gas sector."

Life is changing for oil companies. Ten years ago, they accounted for about 15 percent of the S&P 500 index. Today, they make up just 5 percent, having been mostly displaced by technology giants such as Facebook Inc. and Apple Inc.

Driving this shift is a smorgasbord of new energy sources that's bringing unprecedented competition for capital. Consumer choices are set to drift farther from the hydrocarbons of the 20th century, with renewables potentially meeting about a quarter of demand by 2040, according to oil major BP Plc.

It's no surprise, then, that investors are increasingly questioning the wisdom of betting on oil and gas. A divestment campaign started by activist group 350.org in 2012 has already persuaded funds holding \$8 trillion to back away from fossil fuels, according to its website.

Scrutiny could intensify as AGM season approaches. Catherine Howarth, chief executive officer of ShareAction – a group that has targeted Royal Dutch Shell Plc in the past – said she expects a “ramp-up” of pressure at annual general meetings that start in the spring.

‘Vulnerable’ Industry

“Institutional investors are withdrawing their capital from oil and gas companies on the grounds that quicker-than-expected growth in clean energy and associated regulation is making oil and gas business models highly vulnerable,” Howarth said in an email.

It's not only oil companies facing pressure. One of the world's biggest sellers of coal, Glencore Plc, yielded to investor demands earlier this year by promising to limit production of the fuel and align the business with Paris climate targets. In oil and gas, Shell and BP have made pledges around transparency and climate after facing the wrath

of shareholders.

The list of companies to be excluded from the Norwegian fund includes Anadarko Petroleum Corp., Cnooc Ltd. and Tullow Oil Plc. Shale producers like EOG Resources Inc., which extract fuel from the heartland of America's oil and gas boom, are also included.

Higher Costs

In the longer term, a dearth of capital will push up the cost of borrowing to explore for oil and gas, with those costs likely passed on to consumers, according to Georgi Slavov, head of research at energy broker Marex Spectron. That makes renewables comparatively cheaper, further pushing fossil fuels out of the market.

While Shell, BP and other oil majors were spared in Norway's decision on Friday, they may yet be earmarked for divestment in the future.

"The country may eventually revisit the issue and target such holdings," said Rob Barnett, an analyst at Bloomberg Intelligence. In particular, the fund could consider shedding "integrated companies not allocating a portion of their capital spending toward clean energy."

For those oil companies moving to diversify, there's light at the end of the tunnel. In its statement, Norway said some of the biggest investments in renewables now come from Big Oil. The fund "should be able to participate in this growth," the Finance Ministry said.

"While the fund was initially built on revenue from oil and gas, the Ministry of Finance understands that the future belongs to those who transition away from fossil fuels," said Mark Campanale, founding director of energy researcher Carbon Tracker. "Now is the time for smart investors around the world to follow their lead and make decisions driven by the reality

of the energy transition.”

CCUS is a stopgap to a big hydrogen world



As a proponent of hydrogen being key to the UK's atmospheric decarbonisation drive, I am concerned that hydrogen receives so little press when compared with carbon capture and storage (CCS).

CCS, to my mind, has some serious flaws; the major concern being that CCS has a large parasitic energy load.

To provide the energy required for CCS means that more hydrocarbons have to be combusted, which in turn means more

carbon dioxide (CO₂) is produced.

The parasitic load for the CCS compressors, dryers and CO₂ absorption plant typically requires 15-30% more fuel.

Of course around 90% of the CO₂ is captured by the CCS plant so what's the problem?

The additional 15-30% fuel has to be supplied by the oil and gas producers, the consequence being that the associated energy use in production will increase.

The upshot is the additional harmful emissions of CO₂, nitrous oxide, sulphur dioxide and particulates from the producing plant. Also CCS does not address the huge swathe of emissions from transport.

CCS could be combined with hydrogen production. The main industrial process for hydrogen production is steam methane reforming (SMR).

Here, methane (natural gas) is combined with water (steam) to produce hydrogen and CO₂. The two reaction products are separated with the CO₂ vented to the atmosphere and hydrogen used as a feedstock to multiple processes.

A CCS plant is bolted on to deal with the CO₂, thus a combined CCS and SMR plant would produce low carbon hydrogen; the hydrogen being used as carbon free fuel for power and transport.

This combined process is termed carbon capture utilisation and storage (CCUS). Hydrogen-based CCUS is an improvement over CCS but, like CCS, it requires more hydrocarbons to be produced to feed and fuel the process.

An alternative is to produce hydrogen by seawater electrolysis using renewable energy – a process that produces no CO₂ or other harmful emissions. A process that can also use surplus renewable energy and has an almost limitless, free feedstock.

Electrolysis though is viewed as too expensive when compared to SMR but that is changing.

Shell and others are investigating electrolysis as a competitive route to large scale hydrogen production. Are we in a similar position with hydrogen by electrolysis as wind power was a decade or so back?

Wind was viewed as commercially unattractive but that position has changed as offshore wind technology has driven the cost of electricity production down.

“CCS is a false climate solution that bolsters big oil” claim Greenpeace. I am not quite there but I do understand Greenpeace’s position – CCS requires the extraction of more fossil fuels hence could be viewed as a favourable option for oil and gas companies.

Whilst the government and other commentators believe CCS/CCUS is essential to meet the UK’s climate goals, I remain to be convinced. CCS/CCUS feels like a blunt, end of pipe, short term solution.

There is some excellent hydrogen research and development being undertaken through government and industry initiatives, but are we putting sufficient effort and funding into its development? CCS/CCUS is a stopgap to a big hydrogen world. We should bypass CCS/CCUS and deliver on hydrogen.

Finally, hydrogen will not solely deliver on decarbonisation – energy efficiency, land use, renewables and battery power all have their part to play.