A look into the future: Beyond “peak oil”?

Note: the views expressed by the author in this article are not necessarily those of WTW.

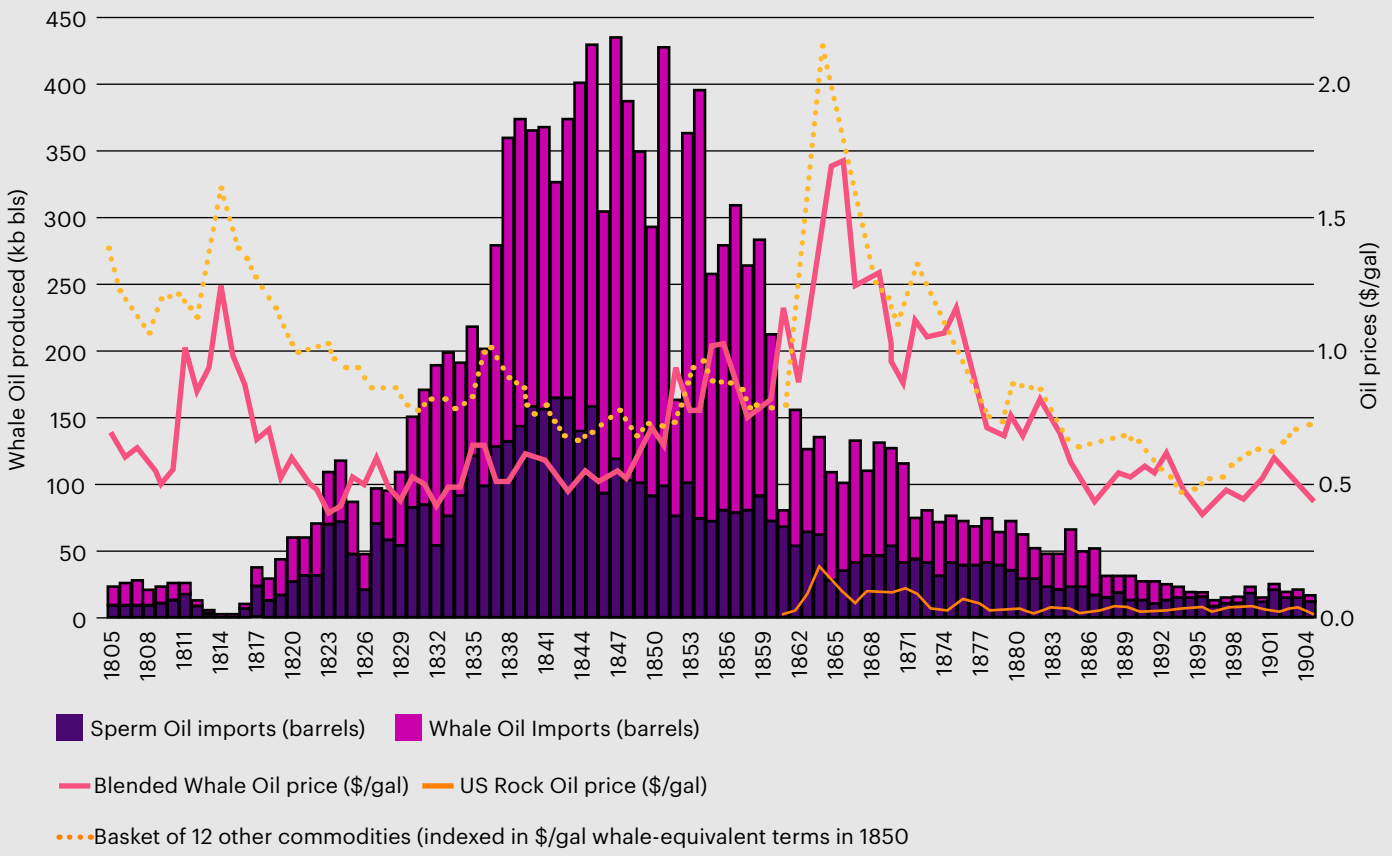
Introduction: “saving the whale”

The prevailing sentiment across the energy industry today, that we are finally approaching ‘peak oil’ and that the journey to Net Zero is inevitable, may put readers in mind of previous energy transitions. After all, we have been living through a dramatic energy transition in recent decades, away from coal to cleaner energy, led by natural gas, particularly in North America, the United Kingdom and Europe.

But it may be worth looking further back in history to glean some insights on the likely behaviour of commodity markets during such a transition. Before gas began to displace coal, coal displaced wood for heating and cooking, potentially saving many forests from complete destruction and driving the industrial revolution in these regions.

The birth of the oil industry in the 1850s began a perhaps less-well-known transition - and may have even saved the whales. Whale oil was a dominant lighting fuel in the 19th century, but what happened to pricing as the industry was disrupted, firstly by kerosene and ultimately by electric lighting? In recent research, Thunder Said Energy Research noted that whale oil pricing maintained a 25x premium to rock oil and outperformed other commodities, even as the whale oil market collapsed. As whaling declined, the prices of other by-products, including whale bone, also rallied very sharply as supply declined.

Figure 1: **2022 market performance, by sector**



Source: https://thundersaidenergy.com/2020/09/03/great-white-whales-the-end-of-oil-and-gas/

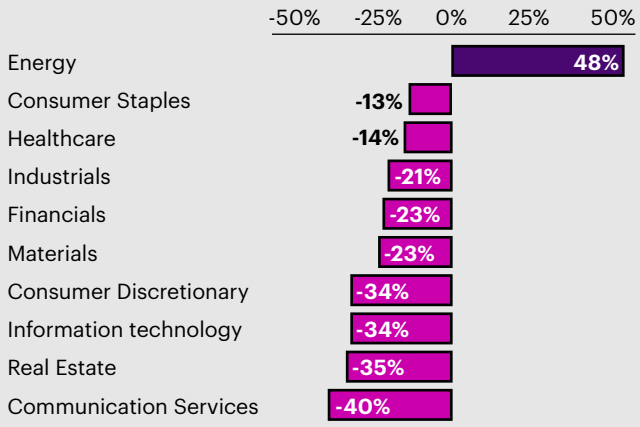
The parallel to today's oil market, the impact on its participants and on activity across all sectors, is worth some consideration, because this time it is the oil industry that is being disrupted.

In 2022 the energy sector rallied, as other industries suffered from the impact of the post COVID-19 hangover, supply chain disruptions, higher interests and global recessions. Energy companies received a significant boost as the conflict in Ukraine revealed the fragility of the global oil and gas supply situation.

Following the oil price crash in 2015 and eight years of underinvestment, it seems that the supply overhang that has weighed so heavily on markets has gone. In the intervening time, major oil companies have refocused their efforts, away from maintaining declining oilfields and growing new production, and towards energy transition initiatives. The events of 2022 have reminded investors and operators that their core oil and gas business is still the engine of medium-term profitability.

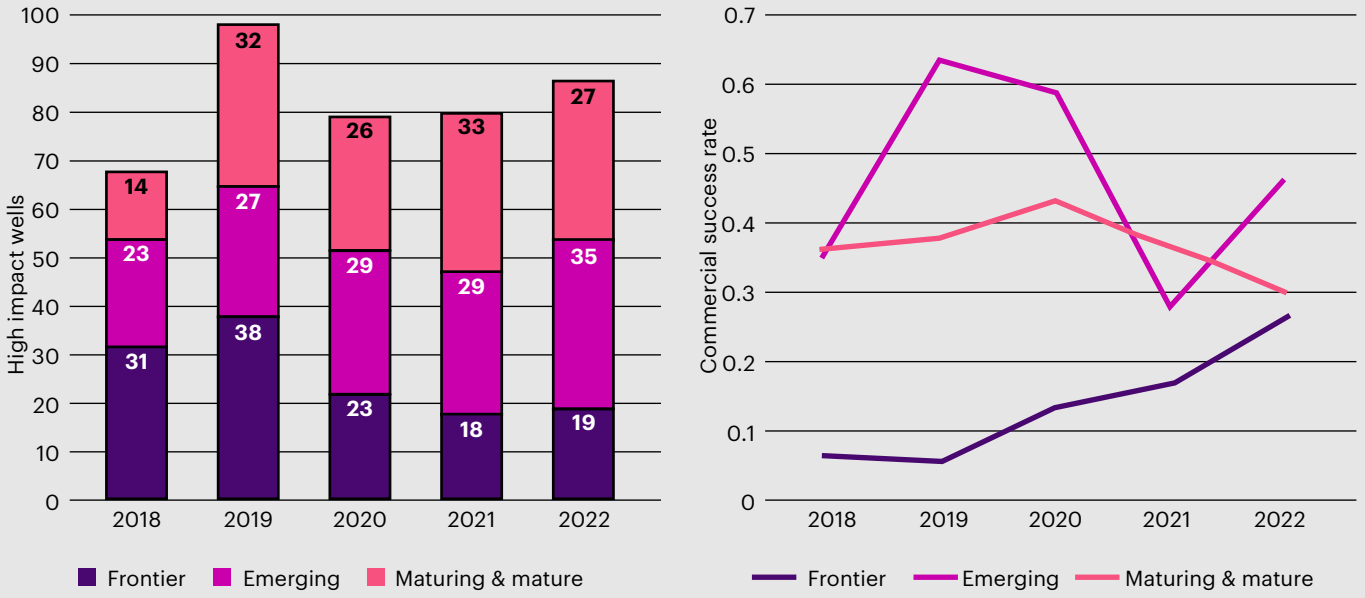
And while demand for their core products is not yet in full retreat, until recently all the indications were that peak oil was on its way. But will a supply-side decline be accompanied by an extended period of high and volatile prices? If so, will oil companies be positioned to benefit? Perhaps the energy transition can 'save the whale' after all.

Figure 2: **2022 market performance, by sector**



Source: https://www.reuters.com/markets/europe/wall-st-week-ahead-us-markets-churn-some-stick-with-rare-2022-winner-energy-2022-10-14/

Figure 3: **High-impact wells and success rates by play maturity (Westwood Global Energy Group)**



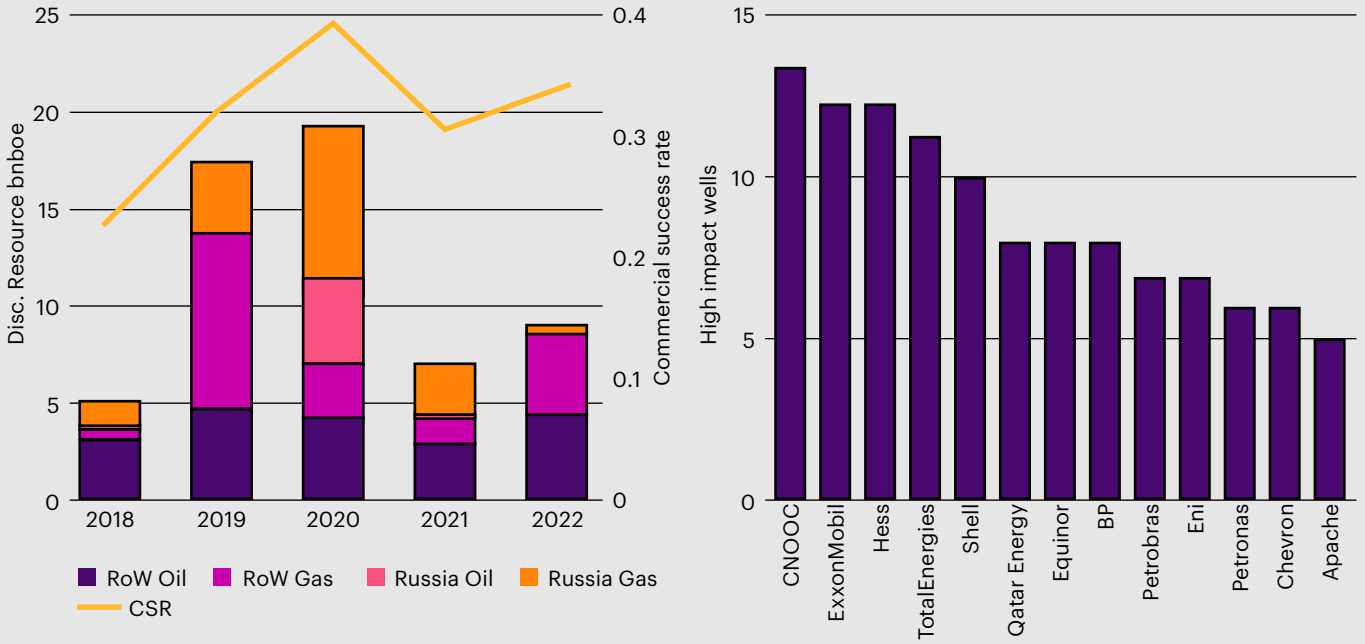
Source: https://www.westwoodenergy.com/news/westwood-insight/westwood-insight-2022-high-impact-exploration-drilling-stable-with-improved-performance-despite-a-turbulent-year

Exploration: "new frontiers"

Amid the turbulence of recent years, the oil exploration business has been remarkably resilient. Even though the overall industry spend and the number of active exploration companies may have decreased, 'high impact' exploration drilling has been steady. And while frontier drilling activity may have moderated a little, from the high point of activity in 2019, commercial success rates (CSRs) in frontier areas have almost tripled.

These increased success rates are supported by two trends. The first is that compared to 10 years ago, both frontier and emerging play exploration are now dominated once more by the majors. There is little appetite in financial markets today to back high-risk exploration-focussed small-cap companies. Secondly, explorers are making better decisions; they are spending less money, but being choosier and, as a result, are being more successful.

Figure 4: **High-impact wells and success rates by play maturity**



Source: https://www.westwoodenergy.com/news/westwood-insight/westwood-insight-2022-high-impact-exploration-drilling-stable-with-improved-performance-despite-a-turbulent-year

Discovered oil volumes have been steady at 3-4 billion barrels a year, along with some equally impressive gas volume. The ExxonMobil-led consortium (XOM, Hess, CNOOC) drilling out the prolific Stabroek block in Guyana is leading international exploration activity, measured by both success rates and volumes discovered. But other discoveries in Brazil (Alta de Cabi Frio and Puduculo), the eastern Mediterranean (Zeus and Cronos-1), Namibia (Venus, Graff and La Rona), Colombia (Uchuva-1) and the UAE (XF-002), have seen likes of Petrobras BP, Total, ENI and Shell cash in as well.

So, despite the energy transition the Exploration & Production (E&P) sector has so far maintained the high impact well count and increased its frontier success rate; whether this will continue beyond 2022 is the question. The 2022 exploration programme was dominated by commitment wells on licences acquired prior to 2020, some of which were delayed by the COVID-19 pandemic. However, continued success in these new and emerging areas could see robust activity maintained beyond 2023.

Project developments: "how to become a millionaire"

As Richard Branson is quoted as saying, "If you want to be a millionaire, start with a billion dollars and launch a new airline"[1]. The same might be said for the Engineering, Procurement & Construction (EPC) sector, where formerly great companies have been humbled over the past eight years since the oil price crash in 2015.

In recent years, several EPC companies have found themselves in financial difficulties, or mired in political and legal scandals, born of their efforts to stay competitive. EPC companies are also experiencing delays in project awards, for two reasons:

- **Inflation:** materials and labour price inflation has resulted in many 2022 bids coming in much higher than project developers expected. Furthermore, feedstock price inflation for some projects, particularly higher gas prices caused by the Ukraine conflict, has impacted project economics. Developers have in turn paused tendering for many projects to reassess commerciality or to extend negotiations with suppliers.
- **The US Inflation Reduction Act:** the relative generosity of the Act, when compared to support from other international governments, has made many developers wonder why they would bother to develop their energy transition-related projects anywhere else but the US. The impact on many international projects has been more delays.

So the EPC sector seems to be in for a turbulent year. Recent news of Apollo's offer to take over Wood Group[2] (US$1.92 billion at a 48% premium to the previously undisturbed share price) will likely not be the last this year, as a mismatch between cash-rich funds and cash-strapped EPC companies plays out.

Oilfield Services: "tightrope walk"

Oilfield Service (OFS) companies have been performing a balancing act, trying to maintain activity while avoiding competing in low-margin, commoditised markets. Overcommitting in the US shale market has hurt the top players, so focussing on margin versus volume has become a top priority.

In recent years the leading OFS companies have used their scale to secure large integrated service contracts, particularly in Norway, UK and Brazil, where the top three companies, Schlumberger (recently renamed SLB)[3], Halliburton and Baker Hughes have carved up the market between them. In the onshore space, large integrated contracts have been a feature in the Middle East. SLB has dominated in KSA, UAE, Bahrain, Qatar and Oman, while in the fastest growing market, Iraq, Halliburton and Weatherford have been more successful.

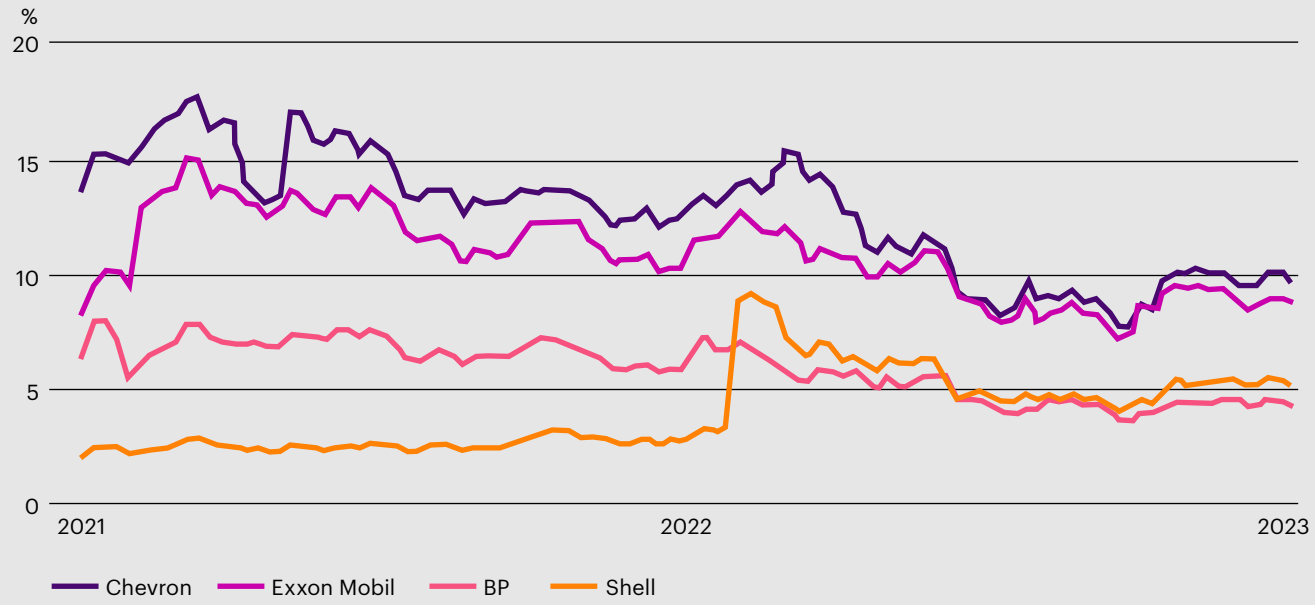
The leading companies have more recently sought to diversify into the energy transition space. SLB has created divisions specifically focussed on carbon capture and storage and has a tie-up with Linde for carbon capture. SLB and Baker Hughes have both made advances in Geothermal services, while Baker Hughes has made a number of acquisitions in carbon capture technology, acquiring two non-amine solvent systems, including a chilled ammonia process and a mixed salt process acquired form Compact Carbon Capture (3C).[4]

Whether services and products in both digital and energy transition can compete with the volumes and margin performance of their heritage oilfield portfolios is yet to be seen.

Despite the energy transition the Exploration & Production (E&P) sector has so far maintained the high impact well count and increased its frontier success rate; whether this will continue beyond 2022 is the question.

[1] https://www.brainyquote.com/quotes/richard_branson_452106
[2] https://www.reuters.com/business/energy/britains-wood-group-rallies-apollo-globals-buyout-proposal-2023-02-23/
[3] https://www.bloomberg.com/news/articles/2022-10-24/oilfield-giant-schlumberger-revamps-name-to-slb-as-energy-transition-gains-pace
[4] https://investors.bakerhughes.com/news-releases/news-release-details/baker-hughes-signs-agreement-acquire-compact-carbon-capture

Figure 5: **Price-to-earnings ratios for major oil companies**



Source: https://www.barrons.com/articles/bp-and-shell-vs-exxon-and-chevron-the-mystery-of-big-oils-p-e-gap-51673052237

Oil majors: "sustainable discount?"

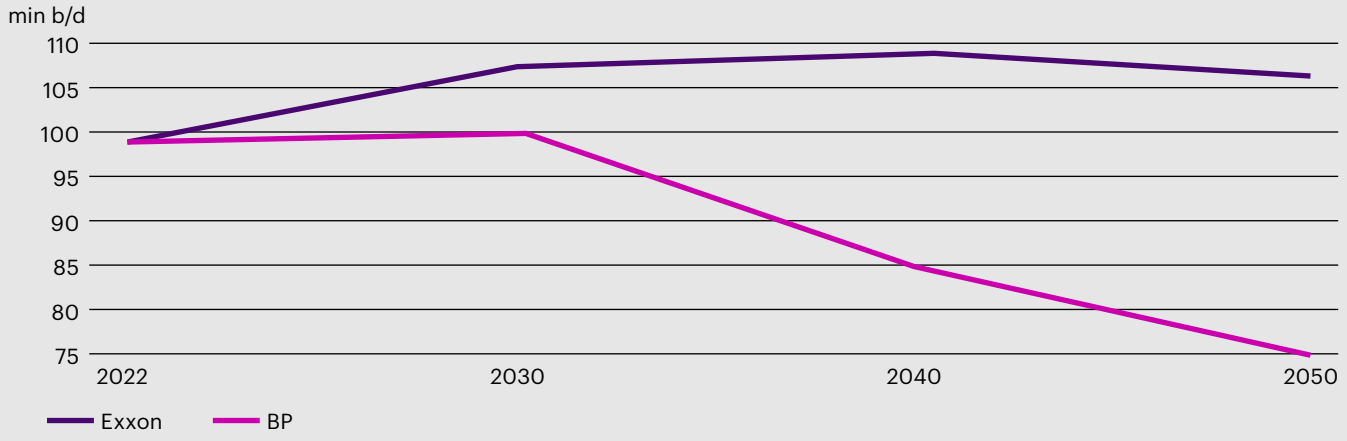
One feature of the market has been the poor rewards that the oil majors have reaped from moving away from their core oil and gas business to embrace the energy transition.

BP and Shell have trailed ExxonMobil and Chevron in terms of price-to-earnings ratios in recent years. This has mirrored the general discount of UK markets when compared to the US, but this trend has been more persistent than in the past and did not recover during 2022 when the equity UK market was one of the bright spots and closed the gap in its international rivals.

BP[5] and Shell[6] are each intending to invest about US$2-5 billion a year each in low-carbon energy and say their oil-and-gas production has peaked. However, ESG investors still appear to be avoiding BP and Shell, perhaps because they are still fossil-fuel producers.

Meanwhile, ExxonMobil and Chevron are spending less on green projects, and expect fossil-fuel output to rise. ExxonMobil in particular has doubled down on current and future oil production and has refocussed its capital investment asset with the best short-term growth potential, such as the Permian Basin and offshore Guyana. In contrast to BP, ExxonMobil sees oil production as being almost flat through 2030-2040, with a much gentler decline than predicted by BP.

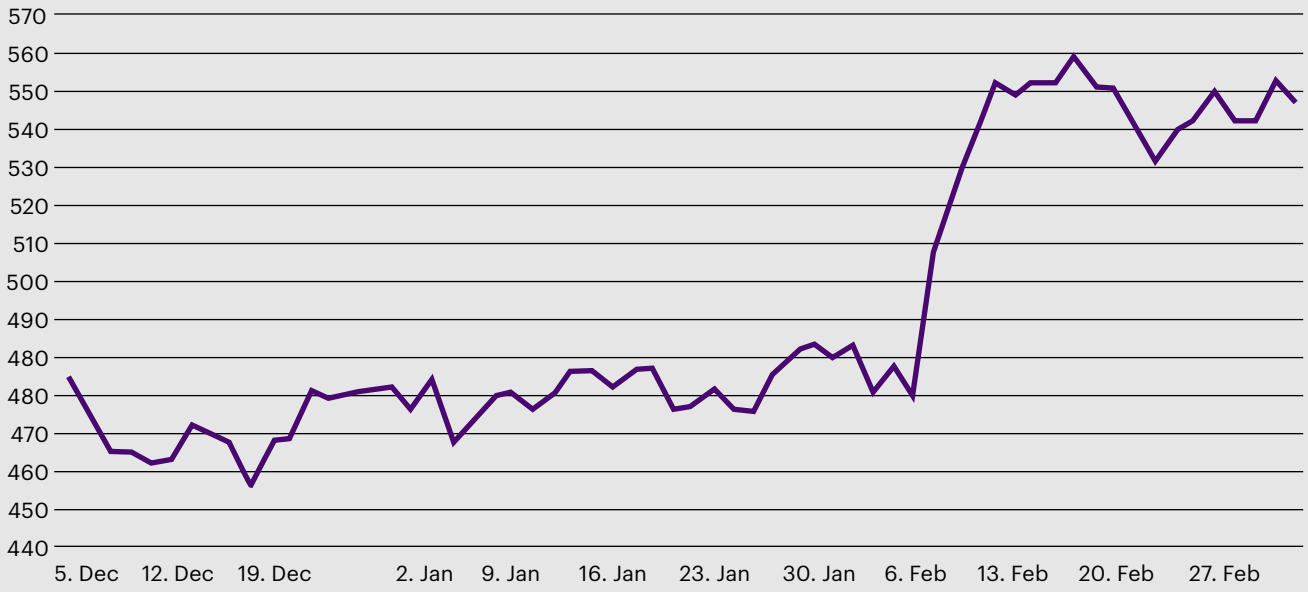
Figure 6: **BP vs. ExxonMobil oil demand projections**



Source: https://www.ft.com/content/fd1e65ab-0b8e-415f-b92b-271d0c209a73

[5] https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/investors/bp-fourth-quarter-2022-results-presentation-slides-and-script.pdf
[6] https://www.shell.com/investors/results-and-reporting/quarterly-results/2022/q4-2022.html

Figure 7: **BP share price response to Bernard Looney's 12th February speech**



Source: https://www.londonstockexchange.com/stock/BP./bp-plc/company-page

ExxonMobil and Chevron's investments in the energy transition have focussed on the decarbonisation of their core businesses. In contrast to BP and Shell, they have avoided straying into power and utilities markets.

ExxonMobil's renewable energy plans are mainly based on low-carbon solutions, carbon capture, and lower-emission fuels. ExxonMobil has said it is "advancing a broad portfolio of competitively advantaged hydrogen, CCS, and lower-emissions fuels projects" and say they have plans "to invest US$17 billion from 2022 to 2027, with portfolio returns in excess of 10%."[7] This contrasts with the low expected returns forecast by BP and Shell for their energy transition efforts.

BP: "a change of tack?"

BP CEO Bernard Looney recently reassured investors that BP was going to continue to invest in its oil and gas portfolio alongside more-sustainable investments. BP committed an extra US$1 billion (£830 million) a year until 2030 to its "transition growth engines", meaning biofuels, electric charging points, wind, solar and hydrogen, but also committed an equivalent extra sum to new oil and gas investments.

The ambition of reducing hydrocarbon output by 40% by 2030 has been moderated in favour of a 25% figure. With BP relying on returns on investment of 15% from prospective oil and gas investments but just 6%-8% for its transition investment portfolio, perhaps this is understandable.[8]

Some might suggest that BP and other major oil companies have no business investing in adjacent power and utilities sector, given that previous attempts have been unsuccessful and that if investors wanted exposure to offshore wind, they could invest in Orsted or any number of other sector specialists. Trying to please the many different shades of investors will therefore continue to be a challenge for BP and its peers.

Be that as it may, the head of BP's US business has recently insisted that the company is sticking with its promised transition away from fossil fuels era[9].

> **"Trying to please the many different shades of investors will continue to be a challenge for BP and its peers."**

[7] https://corporate.exxonmobil.com/news/newsroom/news-releases/2022/1208_exxonmobil-announces-corporate-plan-to-double-earnings-and-cashflow-potential-by-2027
[8] https://www.bp.com/en/global/corporate/news-and-insights/reimagining-energy/bp-sets-net-zero-ambition-outlining-reinvention.html
[9] https://www.ft.com/content/02facf98-e7c3-4973-beda-b1cc6e125d54

The energy transition: "flying the plane while building it"

And it's not just BP that is undergoing an existential crisis; all areas of the industry are impacted in a similar way by the energy transition. The most problematic issues for companies are the uncertainties around emerging technologies and the expected pace at which they will be implemented.

It's clear that many of the technologies expected to be the foundation of the energy transition are simply not ready. Many proposed technologies have not been demonstrated at commercial scale, and a large proportion do not yet resemble industrial technologies at all. The background to this is that many technologies have emerged in the past 5-10 years from academic laboratories and national institutes, where governments had channelled the larger part of their energy transition-related funding.

The result is that the job of scaling up and commercialising these technologies is, in many cases, in the hands of 'first timers'. ITM Power, the UK's leading electrolyser manufacturer, encountered some challenges last year and replaced its long-time chief executive Graham Cooley in December. Sir Roger Bone, the chair of ITM Power, said it had "underestimated the competencies and capabilities required to scale up and to transition from an R&D company to a volume manufacturer."[10]

This may be a theme we return to. It would be no surprise to see a slew of similar bankruptcies in technology companies who have spent too much money on prototypes and scale-up efforts and are not close enough to positive cashflow to keep investors happy.

Project Financing: "a game of chicken (and egg)"

Project economics is also an issue. From carbon capture to green hydrogen to synthetic fuels, the break-even price requirement of new projects is, in some cases, many times greater than that of similar, conventional projects. Governments must help bridge the gap to commerciality. However, governments have competing priorities and show every sign of foot dragging on funding decisions. Project developers are playing a game of 'chicken' with governments, coming to market with proposed developments and daring governments not to help fund them.

In the meantime, project financiers are seeking more certainty. A survey by Boston Consulting Group (BGC)[11] found that while commercial banks are keen to finance hydrogen and CCUS projects, they are holding back because of the perceived risks involved. And because most banks aren't prepared to be more flexible with their project-finance risk criteria, many projects are not going ahead. Some 80% of announced low-carbon hydrogen projects worldwide are still in the planning stage, while only about 7% of CCS projects have reached the final investment decision (FID) stage to date.

According to BCG, commercial banks are waiting for these projects to meet the same standards and provide the same levels of risk as more developed green projects, such as solar photovoltaic (PV) parks and wind farms.

To move forward, more certainty is needed in four key areas:

- Offtake risk
- Technology risk
- Policy risk
- Merchant risk

The commercial banks want projects to have long-term offtake agreements with good quality counterparties, to use mature technologies, to operate under clear regulations and industry standards and to be able to sell into established markets. We are currently a long way from this objective.

This lack of certainty in development funding and approvals is making it hard to 'time the market' and is a headache for companies looking to commercialise new technologies. Securing firm sales contracts with project developers, who themselves cannot secure financing, is proving difficult. One thing must come before the other, which means that, for the moment, many technology companies are stuck.

[10] https://www.ft.com/content/31c5fea6-8995-4242-87bf-2734909b1d87
[11] https://www.bcg.com/publications/2023/breaking-the-barriers-in-financing-hydrogen-and-carbon-capture

US Inflation Reduction Act: "mind your V's and Q's"

The US Government has done more than its international peers to help provide some certainty for the industry. In August 2022, the Biden Administration passed the Inflation Reduction Act[12] which contained a raft of legislation to support both renewable technologies and American business.

For renewable power, the legislation rolls-over and increases existing tax credits. For example, the investment tax credits for solar projects will increase from 26% to 30%, including projects started in 2022, dependent on meeting various commitments to apprenticeships. However, an additional 30% tax credit is now available for projects that meet various criteria around the domestic production of input materials, locations in 'former energy communities' and if the power is sold to low-income individuals.

The relevant legislation for hydrogen and carbon capture are the 45V and 45Q tax credits, respectively:

- **For hydrogen**, the 45V legislation provides support of up to US$3/kg for hydrogen production. This is likely to be enough to cover the requirements of both blue and turquoise hydrogen projects, depending on the particular energy intensity (T CO_2/T H2). For green hydrogen projects, which produce hydrogen form the electrolysis of water, the economics will depend mainly on the price of electrical power and the hope that the capital costs of electrolyser units will fall over time.
- **For carbon capture**, the \$85/TCO_2 price offered for carbon capture and storage will be enough to kick start the industry, a particularly where high-pressure streams of highly concentrated CO_2 can by captured, close to existing infrastructure.

The US Inflation Reduction Act democratises the energy transition sector by not discriminating against technology choice, developer or financing routes. Any qualifying project can receive tax credits. In contrast, government initiatives elsewhere focus more on carbon pricing and fiscal pressure, and direct subsidies for preferred development consortia. This results in a system of patronage, where chosen consortia that heavily favour national champions are more likely to secure government backing.

The outcome is likely to be stark. If we were to come back in 10 years' time, the difference will very likely be that, while both the US and other regions will have developed a handful of larger projects, the US will have encouraged a multiplicity of small to medium-sized projects, of varying technologies, developers and financing models, whereas in Europe and other regions, the numbers of small to medium sized projects will likely be much smaller.

Bernard Looney's apparent damascene conversion may prove to be a watershed. Shell may also be coming around to the point of view that its Net Zero ambitions are too aggressive, and that the energy transition will be realised over a much longer period of time.

Shell's incoming CEO Wael Sawan indicated that Shell will proceed with more caution from now on. In an interview with The Times, he noted that "I am of a firm view that the world will need oil and gas for a long time to come. As such, cutting oil and gas production is not healthy. We've seen, of course, through 2022 the fragility of the energy system. To see prices start to skyrocket, that's not healthy for anyone, particularly consumers."[13]

Echoing BP's intention to slow the planned decline in its oil and gas production in order to guarantee the reliability of energy supply brings the UK majors more in line with their American and European counterparts. Whether BP and Shell will change course to focus more on the decarbonisation of their own operations and the fuels value chain remains to be seen. Their adventures in the renewables and power markets seem to have been bruising experiences.

Oilfield services companies will be banking on the continuation of high development activity, supported by higher prices. The wider contracting sector must wait for major projects to move forward and to see whether anticipated energy transition projects materialise, or whether technology maturity and financing problems slow progress.

Technology companies and project developers will look to focus on low-hanging fruit in the US, and unless Europe and other regional governments can come up with an adequate response to Bidens' enticing tax credit system, progress in those regions will be more modest.

Security of supply will remain a top priority for governments. The US government is responding to higher prices and striding ahead in all areas of energy production - if international governments follow suit, then both operators and contractors are set to benefit.

Michael Blakemore is an independent business consultant with 25+ years of experience in the Energy, Resources, Chemicals and Infrastructure Sectors.

[12] https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/19/fact-sheet-the-inflation-reduction-act-supports-workers-and-families/
[13] https://www.bloomberg.com/news/articles/2023-03-03/shell-ceo-says-cutting-oil-and-gas-production-is-not-healthy