The Future of Oil and Gas Exploration

26 February 2020

Overview

Access for Women in Energy (AccessWIE), in collaboration with IHS Markit, organised an evening seminar on the Future of Oil and Gas Exploration. The event was held at IHS office in London on 26 February 2020.

After **Paul Markwell**, VP, IHS Markit, made the opening remarks, **Dr Carole Nakhle**, CEO of Crystol Energy and Director of AccessWIE, moderated the discussion, which featured presentations from the following renowned speakers who provided a comprehensive overview of the outlook of oil and gas exploration particularly under the dual challenges of lower oil prices and energy transition.

- **Lord Howell**, Co-Chairman of AccessWIE and Former Secretary of State for Energy in the UK, brought in the policy maker's perspective.
- **Toril Bosoni**, Senior Oil Market Analyst at IEA, and **Ian Conway**, Executive Director, Upstream Research and Consulting, IHS Markit, provided an overview of past and future global trends in the industry.
- **Alana Finlayson**, Senior Exploration Geologist, Oil and Gas Authority (OGA), and **Michael Tholen**, Sustainability Director, Oil & Gas UK, discussed the important interaction between the government and the industry with a special focus on the UK and the North Sea.
- **Vera H. de Moraes Dantas Innes**, Leading Partner, Noronha Advogados, highlighted the factors shaping investment in exploration in Brazil; and
- **Mark Hume**, Director, the Natural Resources team, the Fundamental Active Equity, BlackRock, shared with the participants the key factors that the financial community considers when deciding on funding exploration activities.

The speakers

The following sections summarise the key highlights of the discussion.

Conflict ahead

- International Oil and Gas Companies (IOCs) are facing increasing political and public pressure to accelerate the energy transition to move faster towards a greener and cleaner future and deliver what has been promised.
- Politicians have made strong commitments and many countries signed the Paris Agreement to tackle climate change.
- There is, however, an enormous gap between politics and realities.
- Despite all the announcements, meetings and other efforts, hydrocarbons remain central to economics, prosperity of countries and their energy security meaning that the energy transition will unlikely to happen smoothly and quickly.
- The current trajectory of energy demand is far from what is needed to reach climate goals.
- Many countries even those committed to the Paris Agreement goals are high polluters: China continues to build coal plants around the world; Germany is still highly dependent on coal while developing renewables; the Saudi Arabia`s NOC plans to spend $110 billion on gas projects; and the UK has recently launched its energy transition programme but continues to incentivise exploration.
- In the last decades, the world has progressed largely thanks to oil and gas and it is hard to transform the energy sector having such dependence on fossil fuels.
- Even in the most optimistic scenario where climate targets are reached, there is still a future for oil and gas.

Lord Howell speaking

- Governments and industry are facing the same challenges and need to cooperate to answer such questions as:
- How can climate change policies and strategies fit in with further exploration and production of hydrocarbons?
- Who will finance oil and gas projects when traditional financiers put a veto on them?
- Is ‘Net Zero’ by 2050 still achievable? Do we have to accept, it is not? How will the public react to such news?

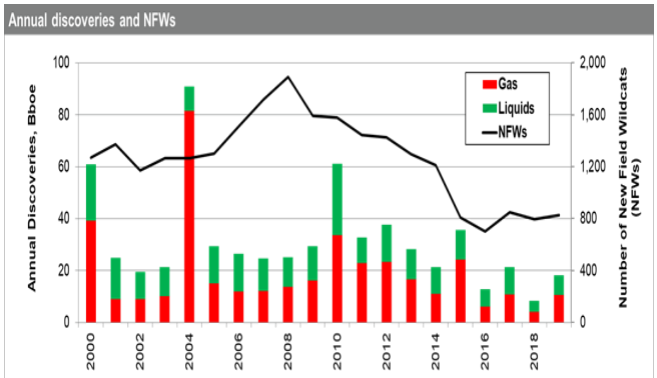
Scenarios

- The future of oil and gas is very uncertain. Leading organisations such as the IEA and IHS Markit are developing global scenarios taking into account various factors, e.g. oil price outlook, demand by country, governmental policies, Paris Agreement targets.
- The difference between the scenarios is considerable:
- The IEA’s Stated Policies Scenario (STEPS), reflecting the impact of existing policy frameworks, suggests that by 2040 the world would need 50 mboe/d of energy more than in the Sustainable Development Scenario (SDS), aligned with the Paris Agreement.
- IHS Markit estimates a ca. 25 mbbl/d gap in 2040 conventional liquids demand between its Base Case and Low Case (Autonomy), assuming a more accelerated energy transition away from fossil fuels. That is equivalent to Russian and US production summed together. The difference between the Autonomy and the SDS (2018) is ca. 17 mbbl/d, that is greater than daily liquid production in Saudi Arabia.
- Scenarios and their assumptions raise critical questions which will define how much risks investors will be willing to take: do we actually need to continue exploring oil and gas and how much?
- The answer is positive even if all Paris Agreement climate targets are achieved. Proven oil reserves at the end of 2018 totalled nearly 1.5 trillion barrels, equivalent to ca. 50 years of production at current rates. However, oil production in non-OPEC countries is assessed to have ca. 16 years of reserve life.
- Around 80% of reserves are concentrated in OPEC countries, a large portion of which is unavailable due to geopolitical problems in certain locations such as Libya, Iran, etc. Hence, one of the key reasons is uneven allocation of supply and demand and, consequently, energy security issues across the world.

- Demand is expected to fall, especially in more "sustainable" scenarios, however, production without exploration will fall more rapidly. Exploration activities of individual companies and countries will be defined by the scenario they believe in most. IHS Markit expects that 140 Bn bbl of liquids will need to be found and developed by 2050 in the Base Case compared to just 40 Bn bbl in the Low Case.
- Some factors are expected to play a major role in decision making:
    - the geography of exploration as existing discoveries are allocated unequally and often not in the main spots of demand;
    - time of monetisation as shorter-cycle projects (e.g., unconventionals, subsea tie-backs, mature basins) will be prioritised;
    - low cost of development as budgets have shrunk substantially; and
    - low greenhouse gas emissions as the energy transition is accelerating.

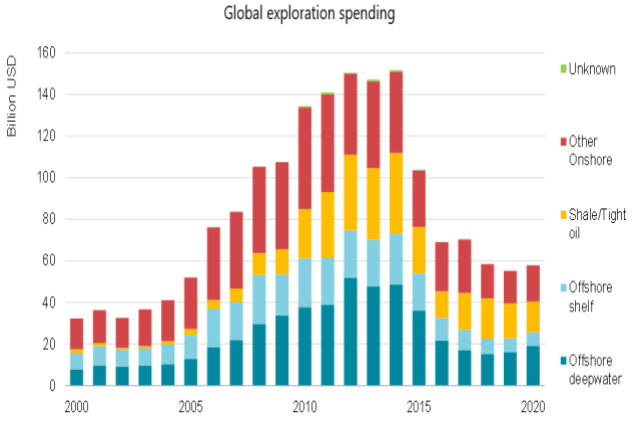
Oil and Gas Exploration Trends

- Exploration and development of new resources will be needed even though proven oil reserves are abundant.
- We are destroying supply much faster than destroying demand.
- Between 2009 and 2018, the mean for conventional exploration discovered volumes was 1,511 mboe.
- Following the oil price collapse in 2014, global exploration expenditure fell sharply and has not yet fully recovered: 2019 spending is estimated to be 60% lower than the 2014 level of US$150 billion - the lowest in the last fifty years, partly because of cost deflation, improved efficiencies and squeezed prices provided by service contractors and equipment providers.
- In 2018, the number of wells drilled and resources discovered were the smallest since 1952.



(Source: IHS, 2020)

- In 2019, the world discovered more gas than oil. Also, in the same year, out of the $55 billion invested on exploration activities, half was spent in the Americas, and nearly a third in the US alone. Significant amounts also spent in Brazil, Mexico and Guyana (Colombia, Argentina also featured). However, if shale is excluded, Asia dominates capital spending – and this is the region where majority of demand is expected to come from.
- Production in Asia is maturing and declining, the population is continuously growing, and the region is highly dependent on imports. The Chinese government acknowledged these problems as nationwide and pushed for domestic exploration, both for oil and gas.

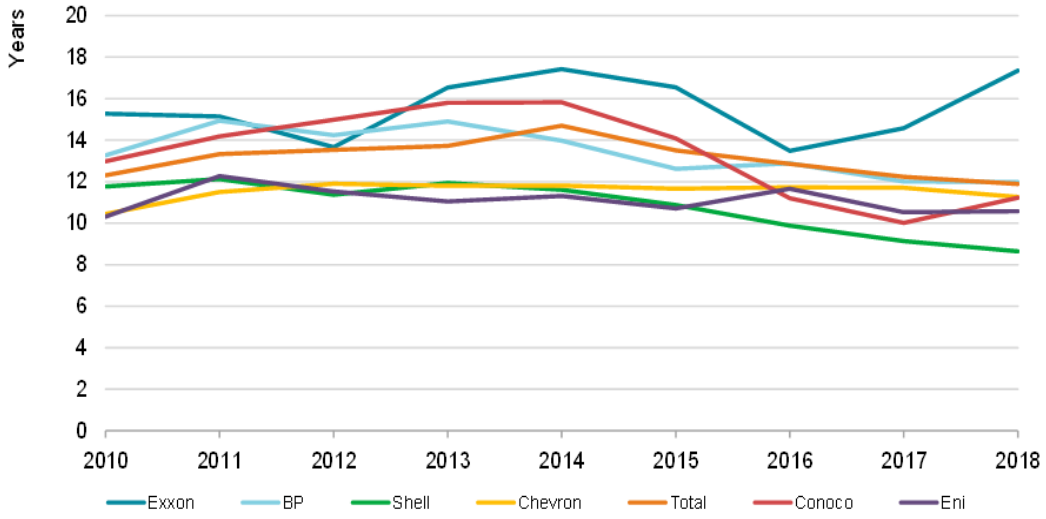


(Source: IEA, 2020)

Oil Majors

- Looking at company level, we continue to see decline in the majors' exploration expenditure, which has fallen for the last six years.
- While the Majors reject the notion that they might be left with stranded assets, the heightened uncertainty means that there is less incentive to increase their resource base.
- The majors' average reserve life (1P reserves divided by annual production) fell to below 12 years in 2019, having been on the decline since the 2014-16 price crash.
    - ExxonMobil bucked the trend as its discoveries in Guyana and increased US shale acreage gave a sizeable boost to proved reserves.
    - Shell saw the biggest decline, with 3.1 years reduction from 2010 to 2018 – divestments to pay for BG acquisition.

Oil Majors Reserves Life

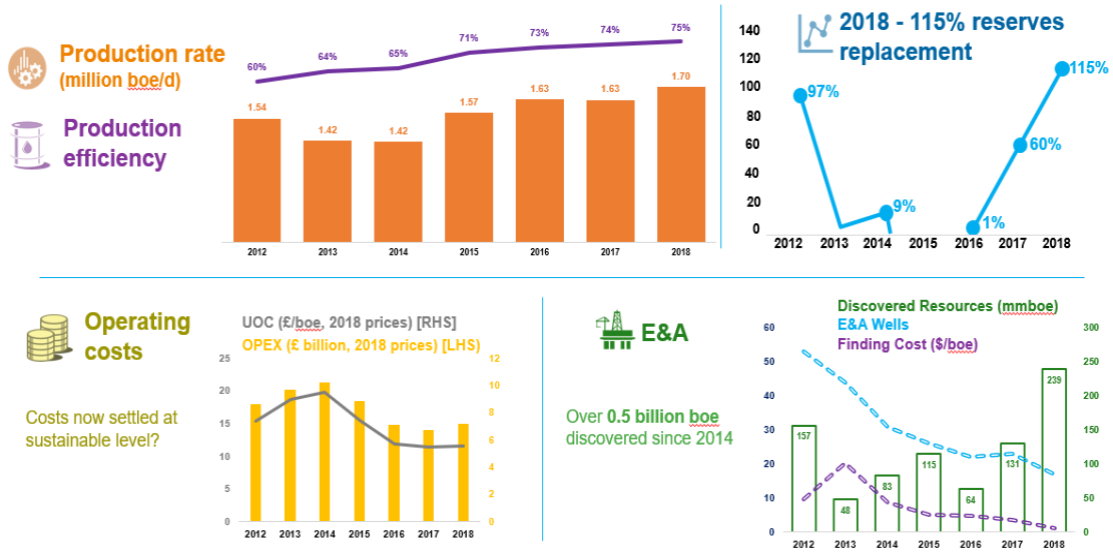


(Source: IEA, 2020)

The North Sea Example

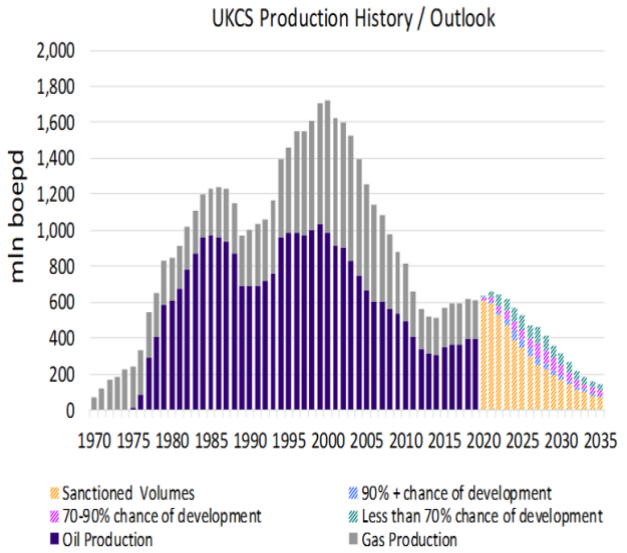
- Exploration remains one of the seven key themes of the UK Corporate Plan, despite the government placing a stronger emphasis on greener and cleaner energy.
- The annual licensing rounds that the OGA, the industry's regulator, has organised confirm continued interest in the UK exploration opportunities among both smaller E&Ps and multinational companies.
- 2018, however, witnessed historically low levels of exploration and appraisal (E&A) drilling activities. In 2019, the situation improved albeit slightly. Volumes of discovered resources have been healthy, and costs have stabilised, yet the scale of exploration has substantially decreased.
- The North Sea will continue to be an attractive spot for a range of investors for longer if the right incentives are in put place.
- The OGA has developed the Exploration Strategy, as part of its programme aimed at maximising economic recovery (MER) from the basin. It has initiated a range of measures and packages promoting both frontier and mature areas.
- In March 2019, the OGA launched the National Data Repository (NDR) that gives access to reported historical information on operations in the UKCS. The NDR was designed to promote collaboration and data sharing among the operators and, consequently, let them derive the maximum value from their assets.
- All the efforts, strong and robust regulation combined with stewardship, are believed to have paid off as the government accepted 71 applications in the most recent license round in November 2019.
- Oil and gas exploration and development clearly get enough attention from the government, as a major revenue generator: in 2018, oil and gas production contributed ca. £24 billion to the UK GDP and is projected to contribute ca. £8.5 billion in production tax payments over the next five years. The industry also supports 270,000 jobs across the UK.
- There is, however, no doubt the country is taking further steps to larger emissions reductions by 2035 and the 'Net Zero' future by 2050. The OGA and the Oil & Gas UK (OGUK) play a pivotal role in promoting and achieving the 'Net Zero' target.
    - In June 2019, the OGA published its energy transition policy position, reinforced by the launch of the "Roadmap to 2035: a blueprint for net zero" initiative in September 2019. The OGA highlighted several items including: maximising domestic gas position; increased operating efficiency; regulation of the offshore flaring and venting regime; carbon capture and storage (CCS) and re-use of existing facilities for storage; the use of CO2 for enhanced oil recovery (EOR); offshore energy integration (e.g., electrification, hydrogen production); and supporting diverse range of supply chain options.
- The UKCS is estimated to have a significant potential in carbon storage, equivalent to 78 GtCO2. The UK is expected to see 6-15 large scale CCS projects (12 MtCO2 per year) in 2050.

UKCS Performance Highlights



(Source: OGA, 2020)

- In December 2018, the OGA issued the first CO2 appraisal and storage license. The OGA is working on the action plan that should be announced in the near term. The authority, in collaboration with BEIS Crown Estate and Ofgem, is also working on the Energy Integration Project entering Phase 2. A £1 million funded project was created to boost energy integration in the UKCS primarily through platform electrification, CCS, and hydrogen production.
- The energy transition for the UK means not only cleaner and more efficient energy systems, it is expected to bring broader economic benefits, such as jobs, revenues, and reduce its reliance on hydrocarbon imports.



(Source: Oil &Gas UK, 2020)

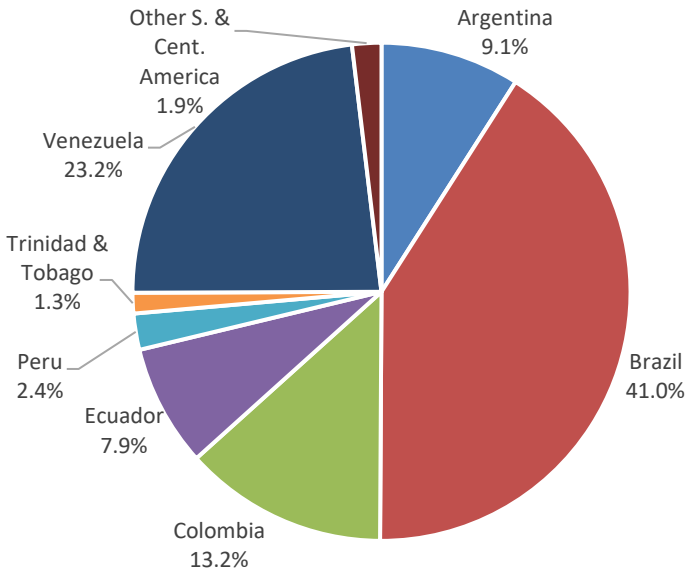
- According to the Roadmap 2035, the UK will see ca. £20 billion-worth exports from the diversified sector, ca. £10 billion in economic value through technology and innovation, 40,000 additional jobs, more than 100 new start-ups, a 50% increase in the number supply chain firms, and so on.
- There is a huge opportunity to build relevant capabilities in the country and make the UK one of the global energy transition leaders and not a follower. But, to begin with, this will require investments in people, young talents, companies and technology – what usually yield higher returns than anything else.

The Case of Brazil

- Brazil is one of the top oil reserve holders in the world and the largest in South America.
- The oil and gas sector is important for the country's economy, representing 13% of its GDP.
- Oil production is estimated to have grown by 15% up to ca. 3.0 mbbl/d between 2018 and 2019. It is expected to increase by another 10% by 2022 and by 70% by 2035 compared to current levels.
- Interestingly, the exploration potential of the country (particularly in the offshore pre-salt areas) is big and significantly bigger than in the North Sea, however, its success has been much more moderate.
- Brazil attracted a number of domestic and international companies since the end of state-owned Petrobras monopoly on oil and gas activities in 1995.
- In 2007, a massive pre-salt oil discovery, Lula, turned a new page in the history of the petroleum industry of Brazil.

- In 2010, Petrobras bought E&P rights under blocks in the pre-salt for ca. $43 billion (R$75 billion) and got a right to extract 5 Bbbl of oil.
- In 2013, the NOC reported that the pre-salt potential is significantly larger than it was expected, with billions of barrels trapped under the layers of salt. New opportunities seemed so attractive that the best operators in the world wanted to get their piece of the cake since then.
- It took six years to agree the complex contractual terms of the planned "Transfer of Rights" (TOR) for the pre-salt area between Petrobras and the government and the agreement was finally achieved in 2019.
- In late 2019, the government launched the TOR E&P pre-salt auction, one of the largest bidding rounds that ever happened, and the 6th pre-salt bid round. 14 leading oil and gas firms from all over the world were approved for participation in the TOR and 17 - in the 6th bid round. Government`s expectations were very high especially after the successful 16th licensing round when several IOCs were awarded blocks.
- However, this time the auction failed to get offers from any IOCs owing to onerous contract agreements (PSAs) and fiscal terms, including high signature bonuses and potentially high reimbursement costs. Companies planning to take an operatorship role were turned away by the NOC`s preferential right to a minimum 30% operated stake for some blocks in both TOR and 6th bid round.
- The only foreign majors who made the bids were Chinese NOCs, i.e. CNOOC and CNODC, and that helped make business relationships between two countries stronger.
- Brazil is a good example of how host governments can influence exploration activity. The oil and gas potential of Brazil is certainly high. Nevertheless, unattractive offers and requirements especially at the time of oil market downturn and market uncertainty can easily make oil and gas companies walk away, even well-funded experienced operators.
- This is the lesson that Brazil learnt that has encouraged the state to revise fiscal and contractual terms which will hopefully be able to revive the success of previous bids next time.

Oil Production Share in South and Central America



(Source: BP Statistical Review, 2019)

Money Matters

- From a financial perspective, exploration is a capital intensive high-risk high-reward activity.
- Global conventional exploration success rates have been good in the last decade: more than 1-in-3 wells drilled found hydrocarbons.
- However, making a suitable return has proven elusive for most (the median IRR is estimated to be just 7% - though it might take 10 years to get there).
- In the wake of low oil prices and climate change awareness, investors' requirements have toughened and the capital is available only for projects with strong clear balance sheets.
- The time lag for development can destroy value.
- It is important to take a long-term view and business has to show resilience to climate change.
- Need to build a resilient business at $40/bbl.
- Financiers developed energy sector investments frameworks which will be used to prioritise projects and make investment decisions.
- The most competitive barrels in the future will most likely be low cost, short cycle and low emissions.