How should the oil and gas industry respond to net zero?

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Overview

- Oil and gas industry production plans and investments are not consistent with limiting warming to below 2°C. As a result, fossil fuel companies are exposed to transition risks.
- Climate scenario analysis and stress testing are important to better understand companies' climate risks and opportunities and make better investment decisions under uncertainty.
- To ensure longevity in a net-zero world, oil and gas companies need to align their business, decarbonisation and investment strategies with below 2°C emission targets.
- Decarbonising operations, managing an orderly production decline and diversifying investments away from fossil fuels reduce exposure to transition risks.

The problem: There are far more fossil fuel reserves underground than can be burned if the emission targets of the Paris Agreement are to be met

The level of global warming is largely determined by the emissions of greenhouse gases (GHGs) accumulated over time. Global energy-related CO_2 emissions, the main GHG, reached 33 GtCO2 per year in 2019,[1] representing 66% of all GHG emissions, with oil and gas consumption representing 40% and coal accounting for 26%. In order to stabilise climate change, net emissions of CO_2 must be reduced to zero. The level of cumulative emissions that must not be exceeded to stay within temperature targets is referred to as a global carbon budget.[2] In the 2015 Paris Agreement, countries agreed to reduce their emissions to keep global warming to "well below 2°C" with respect to pre-industrial levels, and pursue 1.5°C. The carbon budget for a 66% probability of limiting global warming to 1.5°C has been estimated at 420 $GtCO_2$.[3] However, the carbon contained in global resources of fossil fuels is estimated at about 11,000 Gt of CO_2,[4] whilst the potential CO_2 emissions from reserves held by the 200 largest public fossil-fuel producing companies is at least 1,541 $GtCO_2$.[5] If the goals of the Paris Agreement are to be met, these companies and their shareholders will be left exposed to stranded assets[a] and unburnable carbon risks.[6] These unburnable fossil fuel reserves are unevenly distributed across companies and countries and entail considerable financial risks for the fossil fuel producers affected, insofar as their presently-assumed worth could be vastly reduced. However, most of these companies and countries have business and investment strategies incompatible with the Paris Agreement,[7] with consequent risks both for fossil fuel supply chain stakeholders and wider society in the form of health and climate risks. Furthermore, a key issue is that most companies that do attempt to reduce their emissions only focus on their *direct* emissions, but do not take responsibility for emissions related to the use of their products.

a A 'stranded asset' is something with a value in a company's balance sheet that suddenly loses its value because of an economic or political development

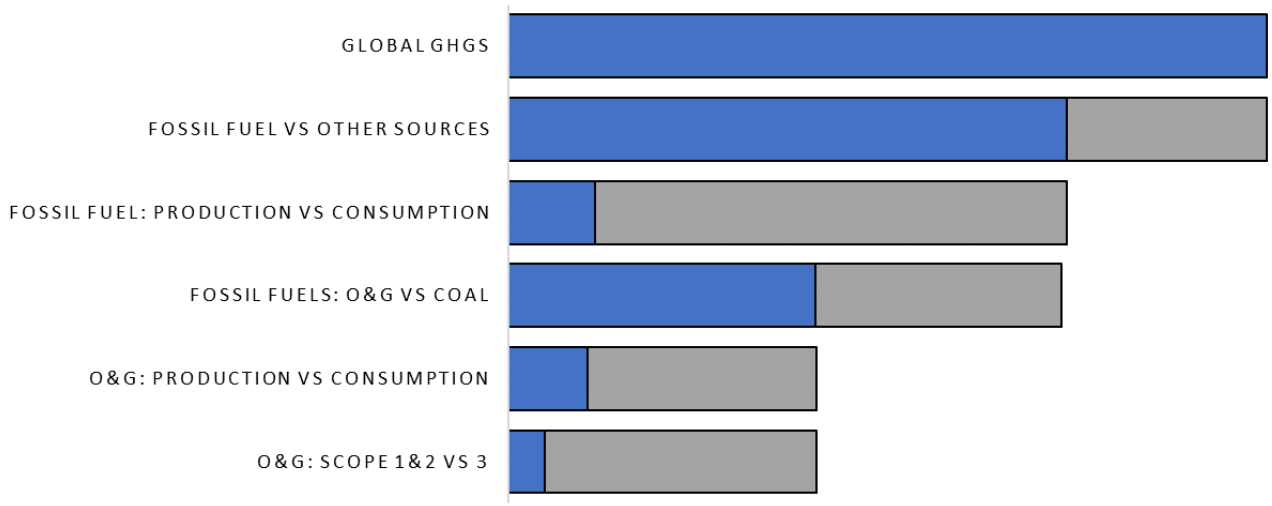

Figure 1. Illustrative estimates of oil and gas sector emissions, compared to total GHGs ~53 GtCO2e[9]

The challenge for the oil and gas industry: operations and business strategies are currently incompatible with the Paris Agreement targets

GHG emissions from the oil and gas (O&G) industry come from three sources: their own operations (Scope 1, e.g. consumption of fuel, flaring, and venting or fugitive releases of methane); other energy companies from whom they buy heat or electricity (Scope 2); and emissions associated with the production of goods and services they buy from other companies, and from the use of their products (Scope 3). National Oil Companies (NOCs) tend to have higher shares of Scope 1&2 emissions than International Oil Companies (IOCs) , as well as a larger proportion of the global oil reserves (nearly 60% belong to NOCs).[8] Although some of these companies have set targets to reduce Scope 1&2 emissions, the majority of emissions fall under Scope 3 (see Figure 1), when these commodities are used (i.e. the oil and gas is burned, for example in vehicles, homes or power stations).

Some companies now aspire to net-zero targets covering the full life cycle of production and consumption. This requires a structural shift in their activities away from oil and gas. However, most O&G producers focus only on those emissions from their own operations under Scope 1. The International Energy Agency (IEA)[10] estimates that over 75% of oil and gas companies have not announced pledges to achieve net-zero emissions, and fewer than 5% have net-zero targets that cover Scope 1, 2 and 3 emissions.

There are diverging O&G company responses to the challenge

There are stark differences in climate ambition amongst O&G companies. Three different groups of strategy appear to be emerging amongst the main IOCs, also called the 'oil and gas majors', as shown in Table 1: "Last Man Standing", "In Transition" and "Transformation". The "Last Man Standing" group prioritises maximising financial returns in the short term, even if that may increase their medium- to long-term risk of stranded assets. Those companies in the "In Transition" group have expressed ambitions to reduce both operational emissions and emissions in their supply chains, including from the use of sold products, to align with Paris goals. The "Transformation" group is aiming for a major strategic shift, diversifying their businesses away from oil and gas to low-carbon energy.

b IOCs include companies like Exxon Mobil, Shell, Chevron, BP and Total; NOCs are largely owned by or answerable to particular country governments, e.g. Saudi Aramco (Saudi Arabia), Rosneft (Russia), Petrobras (Brazil), Petronas (Malaysia) and PEMEX

Group		Description
1	"Last man standing"	• Most US majors' approach • Strategy based on companies' core and heritage, low cost approach • Focus includes 1) unconventional resources' short-term projects, and 2) conventional resources' high return projects
2	"In Transition"	• Responding to investor pressure for decarbonisation • Streamlining oil & gas portfolio, exiting high cost / high carbon intensity activities • Increasing investment in new energy
3	"Transformation"	• Major strategic shift, from 'oil & gas' to 'energy' • High and strategic investment towards low-carbon energy • More natural gas focus in upstream portfolio • Long term focus on energy transition (ET) related R&D (e.g. hydrogen, CCS)

Table 1. Strategies adopted by oil majors[9]

National Oil Companies (NOCs) tend to be behind the IOCs in the adoption of climate-related targets, since they have fewer incentives to decarbonise operations and make investments to shift the strategy of the company away from oil and gas. A survey from IHS Markit[11] found that 89% of IOCs use and disclose scenario-based climate strategies, but only 6% of NOCs do.

All O&G companies are diversifying investments at a very slow pace

O&G companies are moving away from oil and gas at a slow pace. Their investment of around USD2 billion in 2019 in non-fossil energy activities represented less than 1% of the capital expenditure of the O&G majors (Figure 2).

Oil and gas companies are pursuing different strategies to diversify their investments. Some companies are focusing on clean energy and the electricity value chain, whilst others are spending more on midstream and downstream assets. In doing so, they are only partially reducing their exposure to transition risks, as they continue investing in the fossil fuel supply chain.

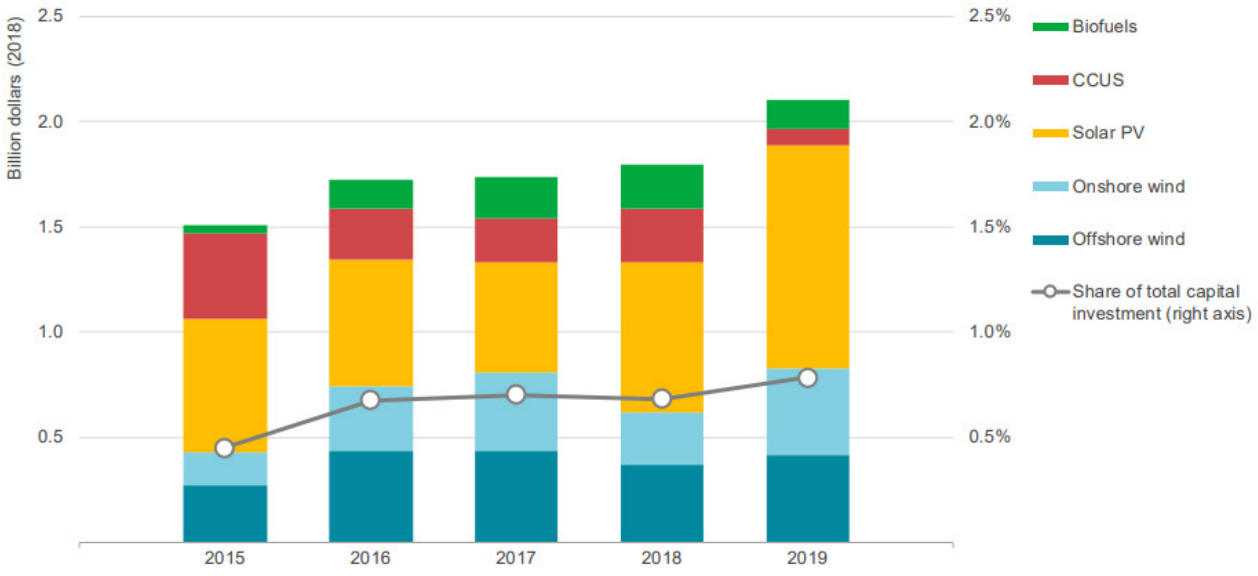

Figure 2. Capital investment by Majors and selected other companies in new projects outside oil and gas supply, and as a share of total investment[8]

Solutions for the O&G industry: Climate scenario analysis, decarbonisation, managed production decline and diversification

The challenge -and opportunity- for oil and gas companies is to survive through the ongoing shift to low-carbon energy, while making decisions with a long-term view in order to position themselves in a decarbonised world as energy companies of the future. Companies that include analysis of climate scenarios in their decision-making processes, decarbonise their operations and develop business strategies that align adequately with well below 2°C targets are more likely to attract investors and become more resilient, as pressure to move towards net-zero emissions from the public, investors and governments increases.

Climate scenario analysis and stress testing to inform strategic decisions

In order to understand the transition risks of a company it is important to explore a wide range of scenarios, considering how important but uncertain variables might impact on its oil and gas production, asset values and revenues. For instance, a recent study at UCL Energy Institute[12] of the oil prospects of national producers in Latin America and the Caribbean found that 66-81% of the region's reserves may not be exploitable if the Paris Agreement temperature targets are to be met, and that this could reduce tax revenues from oil to $1.3-2.6 trillion, compared with $2.7-6.8 trillion if oil reserves were fully exploited.

Stress tests involve analysing the impact on companies from a range of scenarios, usually testing the impact of extreme or adverse shocks on variables such as liquidity, capital adequacy ratios or valuations. Besides enabling companies to estimate the impact of an adverse shock on their assets' value and profitability, stress testing may also help companies to align their portfolios with climate targets, as companies compete for capital and investors seek opportunities with lower climate risk.

Decarbonisation towards net-zero emissions

Oil and gas companies need to design a decarbonisation strategy that gets them in line with emission targets. For any particular company this strategy will depend on factors such as their asset portfolio, their countries of operation and the regulations that they are subject to. As a first step, minimising their Scope 1 emissions is key. This could be achieved through efficiency improvements, the use of low-carbon energy sources, reduced flaring and reduced methane emissions leakage. To align with the Paris Agreement goals, companies (in particular IOCs, who face increased pressure from investors and financial regulators) also need to consider indirect emissions along the supply chain, as well as the carbon intensity of their final products. Their emission targets need to be framed on an absolute basis that reflects the decreasing global production volumes permitted under net-zero commitments.

NOCs have greater potential to achieve emission reductions from their operations, since their upstream activities tend to be less efficient. Cutting emissions through process changes and minor adjustments is not necessarily expensive and may result in reduced energy consumption and health co-benefits for local communities. As climate policy stringency increases, these companies are likely to face increased local and international pressure to reduce emissions.

Managing an orderly production decline

The IEA's recent Net-Zero by 2050 report[10] suggests that oil and gas investment in the 2021-2030 period should only be for maintaining production at existing fields or projects that are already under construction or approved. In a below 2°C world oil prices will be lower, making resources with high carbon intensity unattractive due to their higher upstream emissions and extraction costs. The report also makes clear that the Paris Agreement targets leave no room for investment in new oil and gas fields post-2030.

Continuing on a business-as-usual trajectory and postponing decarbonisation would not only worsen the impacts of climate change, but potentially lead to stranded assets and damage for those communities and economies dependent on fossil fuel revenues. Whilst governments plan for a just transition for workers and communities, oil and gas companies need to

proactively manage the decline of their fossil fuel operations to reduce asset stranding risks.

Diversifying investments away from fossil fuels

To ensure the long-term viability of their businesses, oil and gas companies need to shift their capital investments away from increasingly risky fossil fuels and towards low-carbon activities such as renewables, carbon capture and storage, biofuels and hydrogen production.

NOCs are falling behind IOCs in their diversification efforts. With governments more reliant on their oil and gas revenues, NOCs have fewer incentives to invest in an energy transition as they face less scrutiny from government regulators. With NOCs exposed to larger stranding risks than IOCs, since they hold the largest share of reserves, they have most to lose from the low-carbon transition, and therefore the most to gain from political leadership that guides their investments, perhaps through state investment banks[13], into low-carbon assets and away from fossil fuels.

References

1. IEA. Global CO2 emissions in 2019. (2020).
2. Carbon Tracker Initiative. Carbon Budgets Explained. 1–8 (2018).
3. IPCC, 2018: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. (2018).
4. McGlade, C. & Ekins, P. The geographical distribution of fossil fuels unused when limiting global warming to 2°C. *Nature* **517**, 187–190 (2015).
5. Leaton, J. Unburnable Carbon 2013 : Wasted capital and stranded assets.Carbon Tracker Initiative (2013).
6. Leaton, J. Unburnable Carbon – Are the world's financial markets carrying a carbon bubble? *Carbon Tracker* (2011).
7. SEI, IISD, ODI, E3G & UNEP. The Production Gap Report: 2020 Special Report. (2020).
8. IEA. The Oil and Gas Industry in Energy Transitions. (2020) doi:10.1787/aef89fbd-en.
9. Al-Kuwari, O., Welsby, D., Solano-Rodriguez, B., Pye, S., Ekins, P. Carbon intensity of oil and gas production. (2020) doi:10.21203/rs.3.rs-637584/v1.
10. IEA. Net Zero by 2050: A Roadmap for the Global Energy Sector. (2021).
11. IHS Markit. Oil and Gas Company Climate Indicators Highlight Consensus on Risks, Divergence in Response, Climate and Carbon Insight. (2019)
12. Solano-Rodríguez, B., Pye, S., Li, P., Ekins, P., Manzano, O., Vogt-Schilb, A. Implications of climate targets on oil production and fiscal revenues in Latin America and the Caribbean. Energy Clim. Chang. 100037 (2021). doi:10.1016/j.egycc.2021.100037.
13. Steffen, B. & Schmidt, T. S. A quantitative analysis of 10 multilateral development banks' investment in conventional and renewable power-generation technologies from 2006 to 2015. *Nat. Energy* **4**, 75–82 (2019).