



Why fossil fuels still have a future

November 2017

A growing number of investors are responding to climate concerns by selling shares in fossil fuel producers. At \$5.4 trillion, the value of portfolios that exclude fossil fuels has doubled in two years¹, and even voices in the EU Parliament recommend divestment².

However, we believe divestment is too simple an investment strategy. It's clear that oil, gas and coal producers will face challenges as demand for their products fade, but the impact on profitability and value is less obvious.

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The fortunes of energy producers will be determined more by their discipline (or lack of it) in adjusting to lower demand, than the impact of falling sales itself. That's why we emphasize dialogue over disinvestment.

Meeting international climate change targets will involve more disruption than we have seen so far. Our recently-launched Climate Progress Dashboard implies that changes currently underway will result in a rise of over 4°C in global temperatures³, well above the two degree commitment global leaders made in Paris in 2015. Hitting those targets will have implications across industries, but fossil fuel producers are in the cross hairs.

The reason is simple: essentially all of the blame for climate change lies with man-made greenhouse gas emissions (GHG), around 80% of which are from fossil fuels⁴. Limiting temperature rises to acceptable levels means cutting those emissions by two-thirds over the next three decades, which is a clear threat to producers. It implies that the world will need to cut fossil fuel production by 1% annually up to 2050⁵, a sharp reversal from the 2% annual growth of the last thirty years. But shrinking demand need not be fatal for producers. The investment case is more complex than the black and white picture that is often painted. Our analysis implies that a disciplined response to production cuts could leave the industry twice as valuable as it would be in an investment free-for-all, even as demand falls.

While the industry's aggregate response will dictate overall profitability, retreating growth will reveal differences in the business models and exposures of individual producers. Some will have much more robust earnings buffers against falling demand than others. Gas producers will benefit from the lower carbon content of their fuel, relative to coal miners. Companies with lower cost operations will be better able to withstand falling consumption.

We have revisited cost curves, a common analytical tool, to compare companies' positions. By focusing on the cash profits companies generate from every ton of carbon their products contain, we have combined cost positions and fuel mixes to create a common basis for comparison. Low-cost producers biased towards gas production sit towards the more attractive end of the spectrum and high-cost coal producers towards the exposed end.

Investors will need to be able to sort the best protected from the most exposed, and the critical role of companies' responses to the challenge will make engagement crucial. We have been vocal in calling for more robust planning and greater transparency and will continue to do so. We believe this thoughtful analysis and robust engagement will be a more fruitful course for investors than them simply washing their hands of the whole industry.

Political commitments mean falling demand growth

Wherever climate policies come to rest, fossil fuel production will almost certainly fall from the 2% annual growth it has seen over the last three decades⁶. The industry has felt little of the impact so far. The temperature rise of 4°C predicted by our Climate Progress Dashboard would be consistent with 2% annual growth in fossil fuel output to 2050, before dropping in the second half of the century. If global leaders manage to implement policies in line with their 2°C commitments, demand would need to drop by 1% per annum (p.a.) over the same period.

Coal producers will bear the brunt of decarbonization's impact. Coal generates twice as much carbon as gas to produce the same amount of energy, with oil lying mid-way between them.

1 <https://gofossilfree.org/commitments>

2 https://www.responsible-investor.com/home/article/ep_fossil

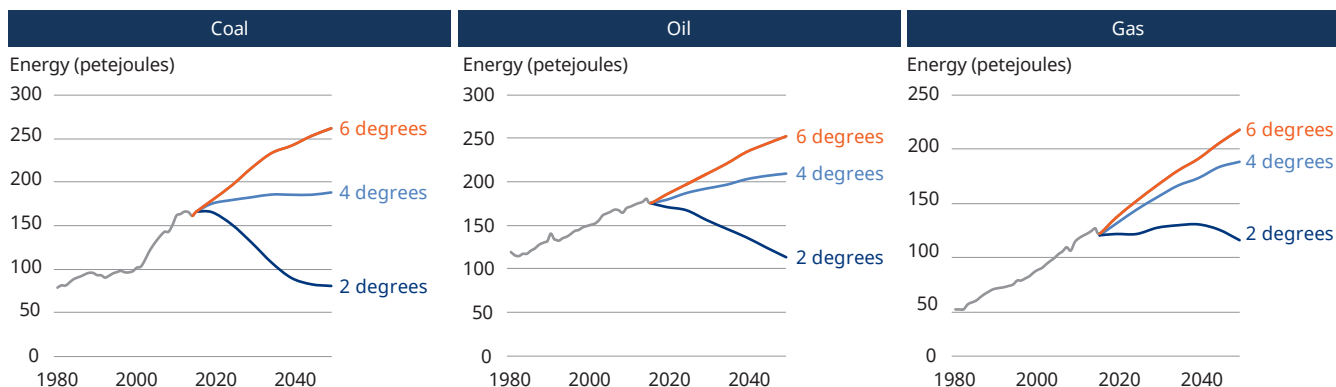
3 The temperature rises described here represent long-term (typically 2100 or beyond) increases stemming from each course of action.

4 https://www.eia.gov/energyexplained/index.cfm?page=environment_where_ghg_come_from

5 Based on IEA scenario analysis, combining different fuels on a contained energy basis.

6 Production growth calculated on a contained energy basis, converting cubic meters of gas and tonnes of coal production to oil equivalent values based on the energy they contain relative to a barrel of oil.

Figure 1: Primary fuel demand in different climate scenarios



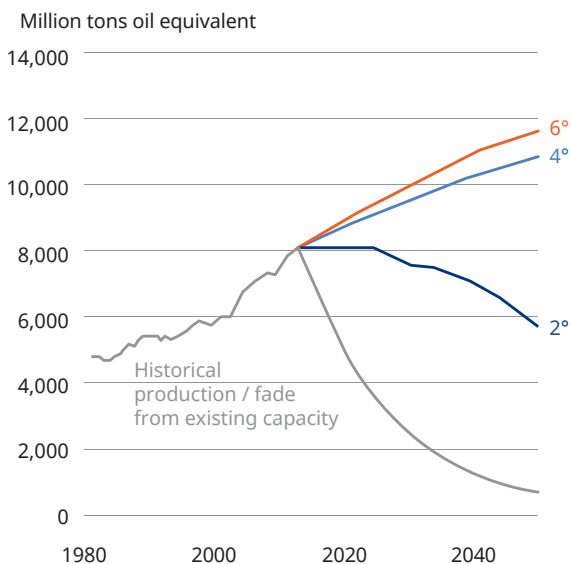
Source: BP Statistical Review, IEA and Schrodgers. Forecast views reflect those of the Schrodgers Sustainable Investment Team.

In its scenario analysis – which estimates the likely volume and mix of fossil fuel use consistent with a range of temperature rises – the International Energy Agency (IEA) places the greatest burden on the coal industry, while gas is relatively well protected. Indeed, demand for gas could remain stable for several decades, provided coal and oil demand fall quickly enough (Figure 1).

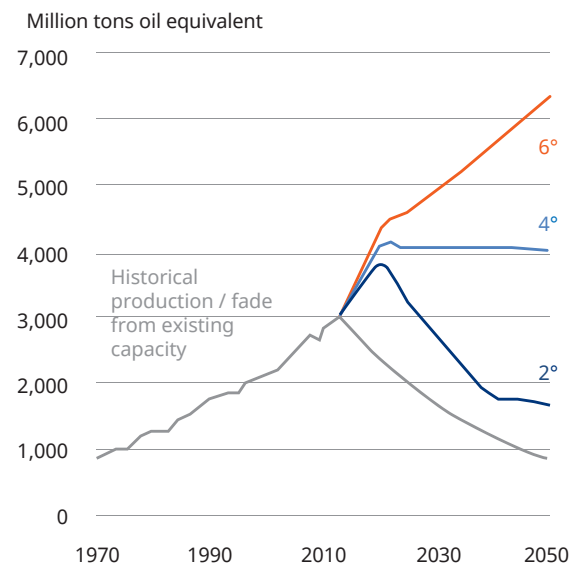
The merging of traditionally distinct oil (transport) and gas (power) markets through vehicle electrification provides a further stimulus to gas demand.

We have compared demand forecasts for different levels of warming to the production we calculate current operations could deliver without any expansionary investment (Figure 2)⁷. Every likely demand scenario lies above that natural fade rate of production, implying some new investment will be needed to meet even the most aggressive climate goals. This implies that assets are not yet stranded⁸, but could become so unless fossil fuel producers demonstrate a willingness to sustain production cuts. Oil & gas producers able to shift their portfolios towards gas and away from oil will benefit from a relatively larger cushion, given the more robust demand prospects for gas.

Figure 2: Different temperature targets could hit oil production hard



...and coal production even harder

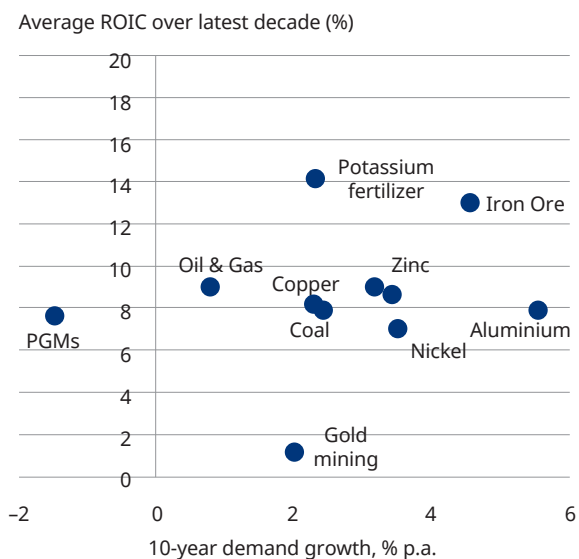


Note: Fade from existing capacity assumes production falls in line with the typical pace at which fields or mines deplete. Forecast views reflect those of the Schrodgers Sustainable Investment Team. Source: Schrodgers, based on the most recently published BP Statistical Review, IEA and OECD data (typically 2016).

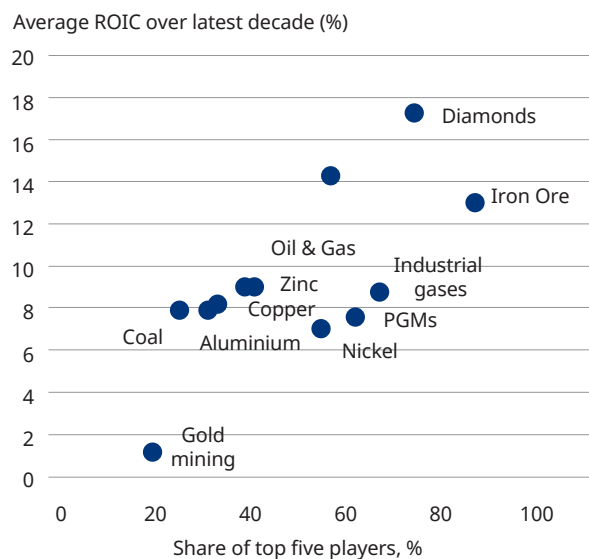
7 Which would assume a 5% annual decline from oil and gas fields and 3% from coal mines.

8 Stranded assets are those whose productive lives will be cut from their optimal level by falling demand.

Figure 3: Most sectors derive limited benefit from demand growth...



...but concentration seems to boost returns on capital



Source: British Geological Survey, Datastream, industry groups and Schroders. Based on latest data available, typically the decade ending in 2015 or 2016.

The industry’s response to weaker demand will be critical

While the prospect of shrinking demand captures headlines, the long-run performance of commodity companies has rarely been determined by growth in demand for their products. Looking across resource markets, there is no obvious relationship between demand growth and profitability (Figure 3, left-hand chart). Supply-side discipline and industry structure have proven much more important, as shown in right-hand chart in Figure 3.

The greater the concentration of supply – which in turn typically leads to more disciplined rationing of investment – the higher the returns on capital. Investors should be less worried about the prospect of weaker fossil fuel demand growth in itself and more focused on the discipline with which the industry responds to weaker consumption.

Why discipline matters

To explore the implications of supply discipline on industry economics, we have modeled the impact of industry responses to slower growth on profitability, cash flows and valuations. Our assumptions are based on the historical relationship between investment and returns. Like most resource markets, both coal and oil & gas markets tend to swing through periods of strong profitability and over-investment, followed a few years later by excess supply and shrunken earnings. We have assumed the average lag between investment and the subsequent production increase stands at three years in oil and gas assets and five in the coal sector. In both cases, there is a clear relationship between investment intensity and subsequent returns on capital. We have looked at three combinations of investment and profitability that are consistent with that past relationship (Figure 4 on the next page).

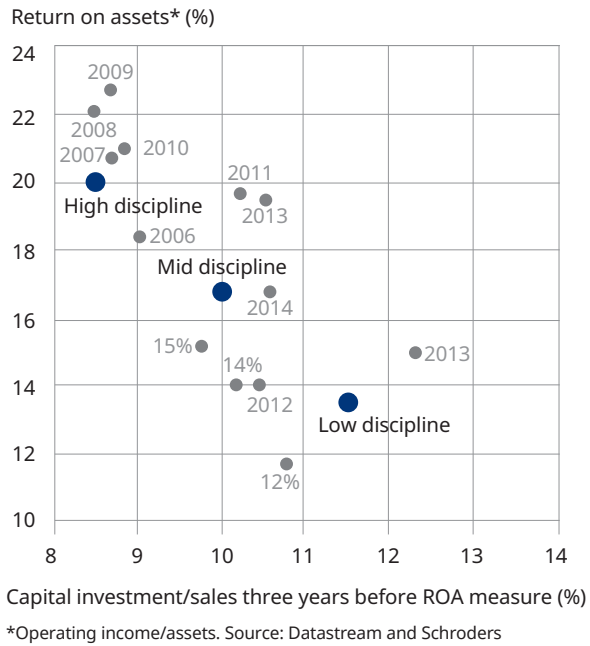
That analysis leads us to the three scenarios plotted on the charts:

- **High discipline:** where oil & gas and coal producers ration investment (capital investment/sales) to 8% and 3% respectively, returns on investment (EBIT/total assets) of 20% and 18% respectively have been supported.
- **Mid discipline:** where producers stick closer to long-run levels of investment (10% and 9% for oil & gas and coal), returns of 17% and 13% have been more likely.
- **Low discipline:** where most companies indulge in a race for growth, investing an average of 13% and 9% of sales respectively, this ultimately creates over-supply and weak profitability, with average returns of 11% and 15%.

Using these return and investment assumptions, we can model the cashflows companies would generate in each scenario. The charts in Figure 5 (also on the next page) show the very different results in each case. All the paths assume the industry moves steadily from its current situation to one of the discipline levels described above by 2020, maintains those levels for five years and then gradually reverts to a high level of discipline by 2030. In each case, the industry ends up in the same place: an orderly, restrained market, which we assume will be the result of either the pain they suffer or the benefits they enjoy. The differences lie in their differing experiences in getting there. In all three cases, companies’ responses to slower production growth have a more important impact on cash flows than the changed outlook for production volumes.

While there are differences between the prospects for oil and gas production, insofar as industry majors tend to span both markets, we have treated them as a single industry in this analysis.

Figure 4: The relationship between returns and capex discipline is clear for both oil...



...and coal

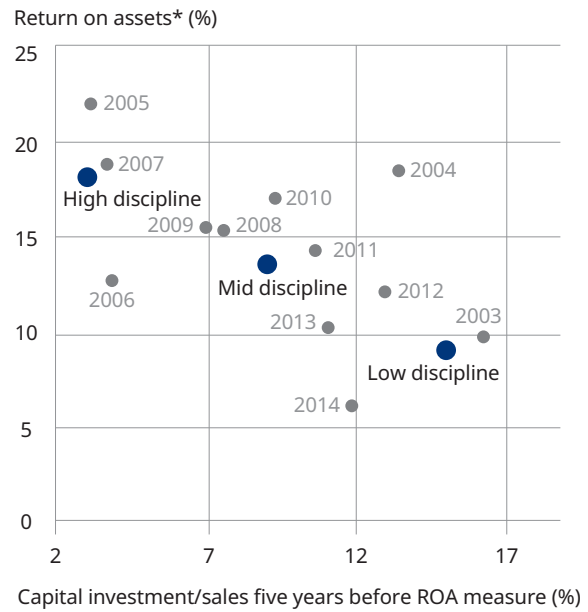
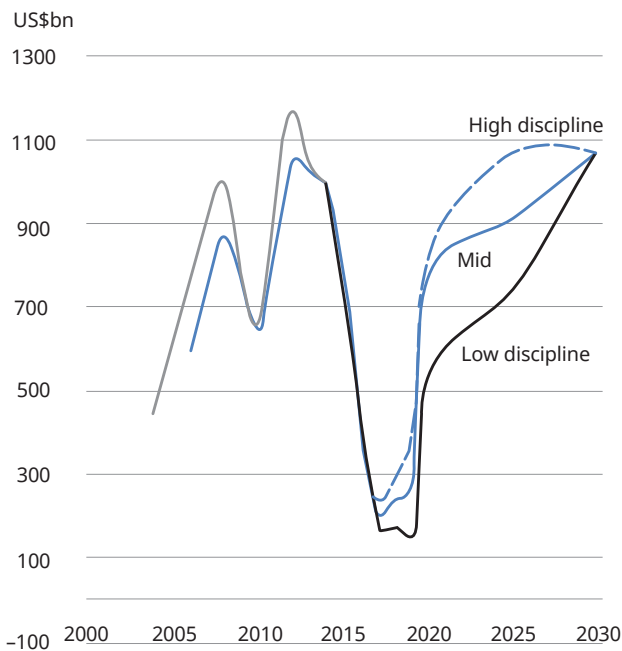
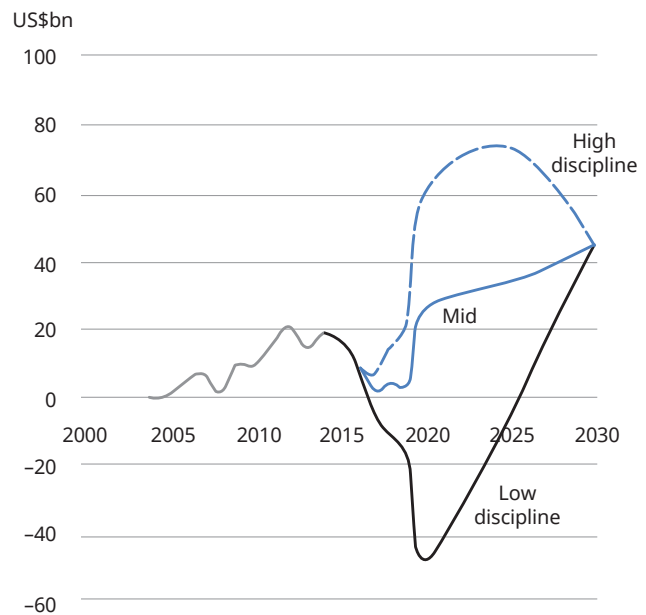


Figure 5: Discipline will help oil & gas companies master their own destiny...



...and coal companies even more so



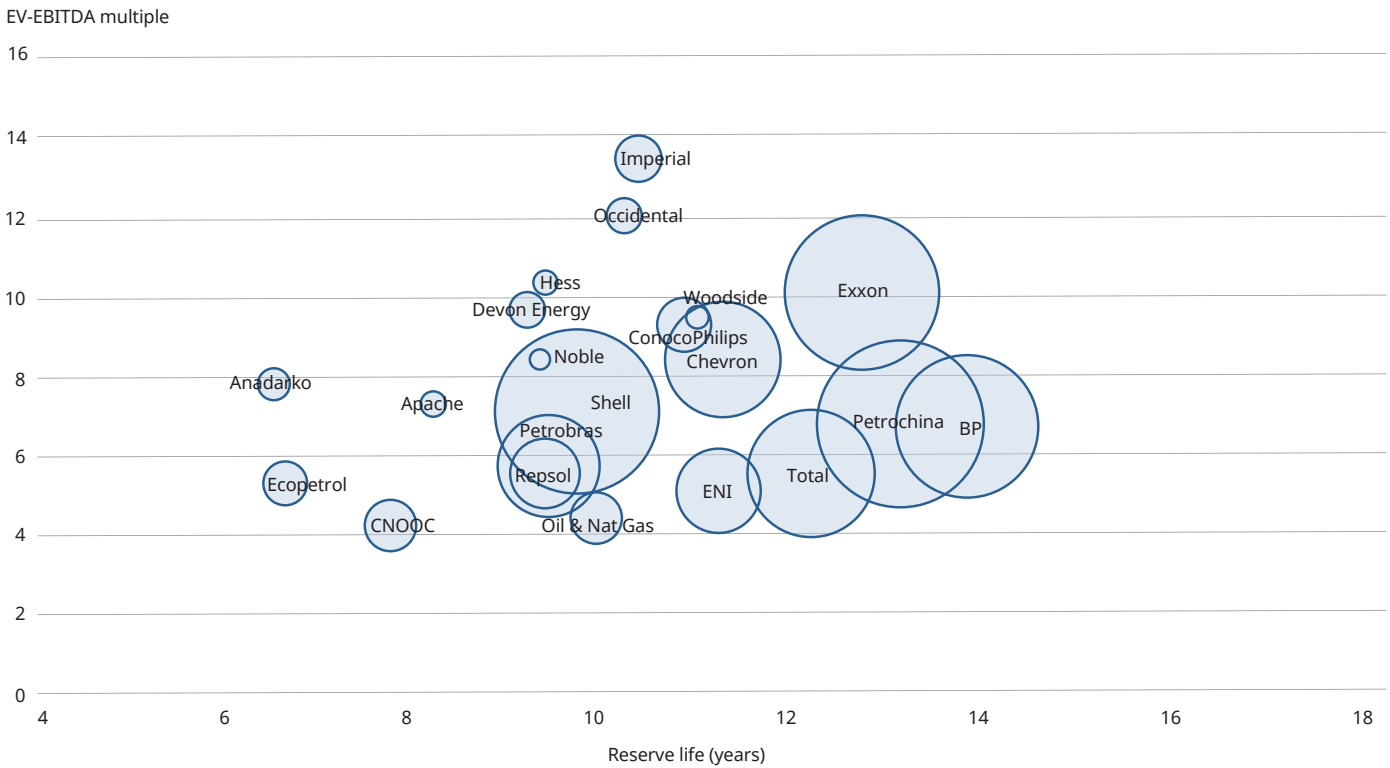
These are not forecasts. They make no allowance for different economic growth rates, OPEC action or other influences on fuel prices and earnings. However, they provide a useful measure of the value of industry discipline. In the case of both coal and oil & gas, producers would be valued at least twice as highly under the high discipline scenario as under the low, based on the present value of cash flows under different discipline assumptions.

There is an understandable tendency to assume fossil fuel producers' values should be closely tied to the volume of reserves they own and will develop. On that logic, slower

demand growth means the industry develops fewer reserves, which in turn should reduce its value.

In fact, the effect is small; there is no clear relationship between companies' reserves (measured in terms of the years of production they would support at current output) and their valuation (Figure 6 on the next page). The profitability of each barrel, cubic metre or tonne is more important than the volume produced, and that matters more in the short term than in a decade from now.

Figure 6: Reserve lives bear little relationship to valuations for large oil companies

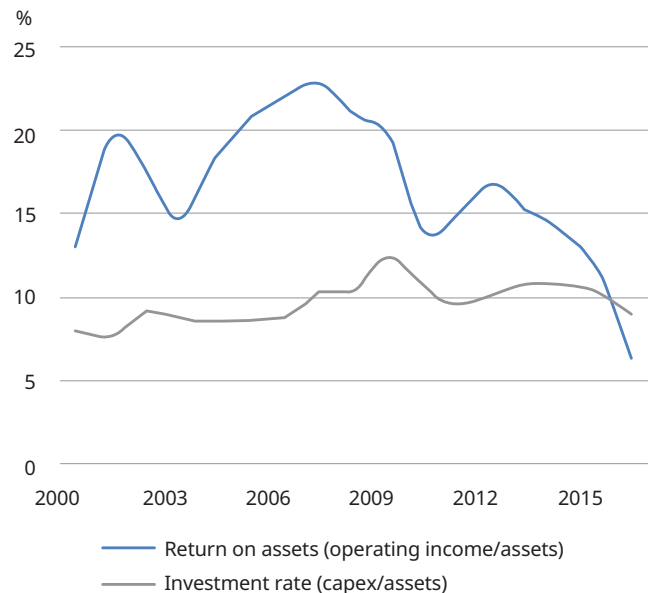


Source: Bloomberg, Datastream and Schroders. Data as of April 2017 using current year forecasts and latest reported reserves. Bubble size reflects market capitalization. Companies referenced above are for illustrative purposes only and do not serve as any recommendation to buy or sell any security.

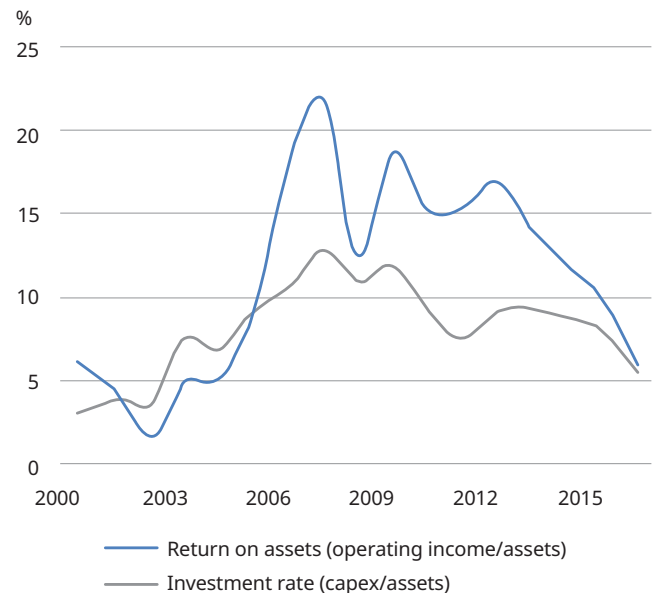
The clear message is that, while production is likely to shrink, and probably more quickly than had climate concerns not intervened, the effect on the value of the energy industry is not yet defined. If the industry is disciplined in cutting investment and supply in line with lower growth, it could become more valuable than it is today. On the other hand, an ill-disciplined investment free-for-all could be disastrous. The biggest challenge facing fossil fuel producers is not “how to maintain production” but instead “how to use the opportunity to improve industry discipline”.

Unfortunately, energy markets don’t have a great track record when it comes to discipline and long-term planning. The graphs in Figure 7 plot the aggregate returns and investment intensity of coal and oil & gas companies. Profitability in both industries has dropped sharply over the last decade, with capital investment in coal falling much more significantly from peak levels. As a result, there is a good chance that tougher climate action will lead the industry into tougher times, unless it takes action to change its ways.

Figure 7: Oil & gas profitability and investment have dipped...

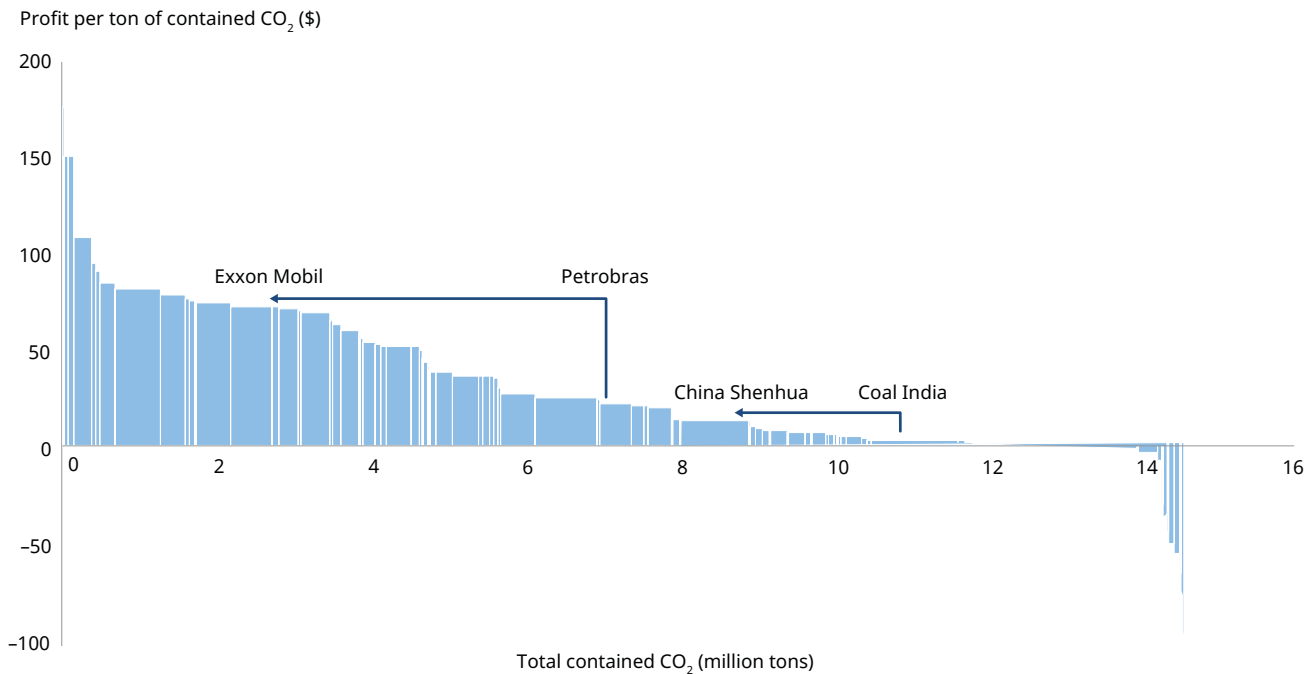


...alongside coal profitability and investment



Source: Datastream and Schroders

Figure 8: Many fossil fuel producers have a good buffer against demand constraints



Source: Bloomberg, Thomson Reuters and Schroders. Companies referenced above are for illustrative purposes only and do not serve as any recommendation to buy or sell any security.

A retreating tide will reveal stark differences

While the industry's response to slower growth will determine its overall profitability, the prizes will not be shared equally. Higher-cost producers of carbon intensive fuels have a far smaller buffer against those pressures than less carbon intensive companies with world-class reserves.

To assess the exposures of different companies, we have produced a "carbon profit curve". This concept is similar to conventional commodity cost curves. Whereas the conventional approach is to compare costs to production volumes, here we compare profits to the carbon contained in the fuels each company produces. This allows us to combine carbon intensity and profitability into one picture.

In Figure 8 we have looked at the largest fossil fuel producers. Each bar represents a different company. The height of each bar reflects its earnings (EBITDA) per tonne of carbon contained in its production. The width of each bar represents the tonnes of carbon contained in the fuel extracted. Companies towards the left of chart have a stronger earnings buffer against the pressures of a challenging transition to decarbonization. Those on the right are most exposed to painful changes ahead.

We have highlighted several large oil & gas and coal companies to demonstrate the differences. Oil industry leader Exxon has a buffer three times that of Petrobras, while the coal miner China Shenhua is similarly better-protected than its peer, Coal India. Coal miners are generally grouped toward the most exposed right, while the left is more dominated by oil & gas companies. By focusing on the carbon content of companies' annual production, this analysis makes allowance for the relatively stronger position of companies biased toward gas over oil production assets.

We recognize that this approach does not take account of companies' development pipelines, strategic plans, capital investment programs or business preparations, all of which will provide important defences against the challenges ahead. However, the carbon exposures of companies' current assets are important to understanding the risks they face. We realize the true picture is more complex than this single chart can fully articulate, notably in that a snapshot cannot reflect the costs of future projects which are as important as current operations. Nonetheless, using objective data, it provides an important part of the overall picture. Only by identifying the most exposed companies and engaging with them to assess their plans is it possible for investors and analysts to navigate the challenges ahead effectively.

The importance of engagement

The critical role of strategic planning and discipline underlines the importance of robust engagement and stewardship by investors. Many companies have been reluctant to describe how tougher climate policies would affect their businesses or how they would respond. It is therefore important for asset owners and their agents to push managements to be more open in explaining their preparations for slowing or shrinking demand. The likelihood of tougher times is rising and failure to prepare or communicate plans is looking increasingly negligent. The attention gathered by the TCFD⁹ initiative should drive clearer scenario analysis.

"Two degree" scenario plans are an important starting point. In principle these should fill a similar role to the stress tests to which financial institutions are periodically subjected, describing how organizations would be affected

9 Task Force on Climate-Related Financial Disclosures. See <https://www.fsb-tcfd.org/> for more information

by tougher industry conditions and how their strategic plans and investment decisions would change. Whereas financial stress tests are designed for periods of unpredictable volatility, climate challenges are more predictable and offer more room to prepare and adapt. BHP Billiton was the first major fossil fuel producer to publish the results of its climate scenario planning analysis, and others have followed. However, no large companies have detailed a clear enough view of their assumptions to allow investors to compare plans and none provide enough detail on the ways their strategies would be affected to gauge their readiness.

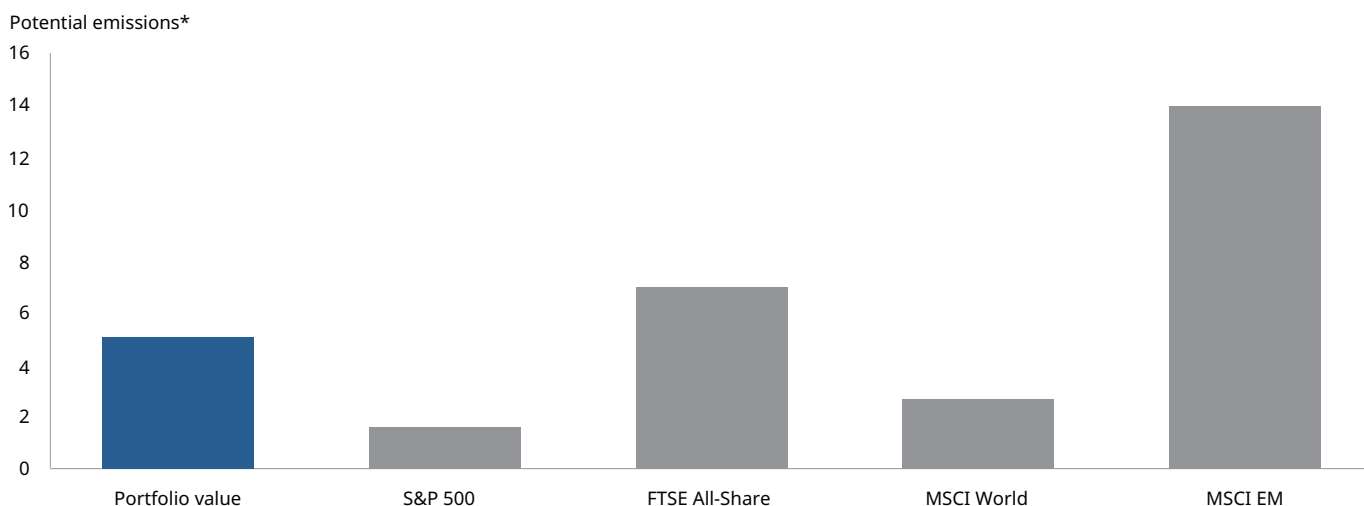
For our part, we would like companies to use consistent assumptions, such as those described in IEA scenario analysis, as the basis of their scenario planning. We would like to understand how companies assess the likelihood and timing of risks as the scenario crystallizes. We would like them to describe the mechanisms they will use to assess both decisions to invest in projects whose lives may be curtailed and investments that diversify their business away from fossil fuels or return capital to shareholders. As important as these financial and strategic questions are, we'd like to understand how businesses with a long history of finding and drilling oil wells are reprogramming their culture and purpose to allow for the possibility of alternative business models.

We actively engage producers to push for more transparency and use the votes we control to formalize that expectation in shareholder resolutions, both directly and through our involvement in initiatives like the Aiming For A Coalition⁹.

It is more critical to understand companies' strategic plans and capacity to adapt when portfolios or funds have higher concentrations of fossil fuel producers. Producers with low-cost assets and reserves will generally be better protected and better able to deliver growth, but the strategic foresight to adapt investment plans to future carbon scenarios is crucial.

There are no short cuts to examining industries and companies in detail to properly understand the complex challenges and opportunities they face. A critical first step in this analysis is being able to dissect the portfolio to reveal its exposure to carbon emissions. Figure 9 illustrates the differences in emission risks inherent in different indices, along with a hypothetical Schroders portfolio comprising our largest holdings in the funds we manage. It plots the volume of CO₂ emissions embedded in the reserves companies in each portfolio or index own, relative to the total sales of companies in each group.

Figure 9: Comparing companies' potential emissions is a good starting point for analysis of portfolio risks



* Potential emissions from fossil reserves relative to market cap (tons of CO₂/\$million). The hypothetical portfolio is based on the energy constituents of the five largest funds managed by Schroders and four widely referenced, unmanaged equity proxies. Investors cannot invest directly in any index. Actual emissions exposure would vary, and will vary over time. Source: Bloomberg, Datastream and Schroders. Data as of May 2017.

Conclusion

The challenges facing fossil fuel producers will only grow as the threat from global warming increases. Policy makers, public opinion, technology advances and industry economics are already starting to line up against oil & gas and coal companies. But investors shouldn't indiscriminately follow suit. Divestment simply sidesteps complex challenges facing an industry that could yield opportunities as well as the more obvious risks. We remain convinced that the fortunes of the industry lie in the collective hands of the producers, which range from those better protected from carbon emissions controls to those that are dangerously exposed. Sorting the former from the latter will offer investors the chance to create stronger portfolios, and potentially help push the laggards in the right direction. But the thoughtful company analysis that will be required will, in our view, have to be combined with active engagement to push companies toward the discipline and preparation they will need to face a much more difficult world ahead.

9 <http://investorsonclimatechange.org/portfolio/aiming-for-a/>

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