

Oil & Gas Practice

The big choices for oil and gas in navigating the energy transition

As oil and gas companies respond to the current economic discontinuities, they must choose where and how to compete as the world transitions to a low-carbon future.

This article is a collaborative effort of the Oil and Gas practice experts Chantal Beck, Donatela Bellone, Stephen Hall, Jayanti Kar, and Dara Olufon



The COVID-19 crisis has resulted in a material near-term drop in global energy demand, at one point leading to a 30 percent reduction.¹ Yet this is not the biggest threat the oil and gas industry faces.

The recent crisis has proved just how vulnerable the global economy remains to systemic risks, one of the most important of which is climate change. Long before COVID-19, pressure was building to shift the energy system away from one dominated by hydrocarbons toward one in which low-carbon sources play the lead role. The events of the past year, as a recent report by the International Renewable Energy Agency shows, have “sharpened investors’ interest in sustainable and resilient assets, including renewables.”² Investors are increasingly seeking out positions that reduce their exposure to climate change as well as the risk of stranded assets. According to analyses conducted by the Wall Street Journal, in the first three quarters of 2020 alone, oil and gas companies in North America and Europe wrote down asset values of \$145 billion, roughly equivalent to 10 percent of their market value.³ Climate Action 100+, an investors initiative that aims to ensure major companies take necessary actions on climate issues, has more than 500 signatories which, combined, account for more than \$50 trillion in assets under management.⁴ Likewise, many governments are making sustainable investments a keystone of their economic stimulus strategies. And in an unprecedented global decision, Denmark has cancelled all upcoming North Sea licensing rounds in anticipation of ending oil and gas production in the North Sea by 2050.⁵ Given these dynamics, this is a moment for oil and gas companies to make thoughtful choices: both to improve their economic and reputational resilience, and to consider whether and how to reposition themselves to take advantage of the accelerating low-carbon winds of change.

A number of oil and gas companies have already set net-zero-emissions targets. Despite the current economic challenges, many are sustaining efforts to decarbonize their operations and their value chains.⁶ Occidental Petroleum, one of the largest international oil companies in the United States, has partnered with Canadian start-up Carbon Engineering⁷ to build a plant that will capture and bury 500,000 metric tons of CO₂ each year. In June 2020, China National Offshore Oil Corporation (CNOOC) signed an agreement with Shell to supply China’s first imports of carbon-neutral liquefied natural gas (LNG) cargoes—they would use carbon credits to offset the emissions involved in producing and consuming the two cargoes.⁸ And in December 2020, ExxonMobil announced its carbon ambition: reducing the intensity of operated upstream greenhouse gas emissions by 15 to 20 percent over the next five years—relative to 2016 levels—while continuing to invest in lower-emission technologies and support “sound policies that put a price on carbon.”⁹

So, the current crisis has not muted the need—or appetite—for change. There are three key questions we believe the leaders of oil and gas companies should consider:

1. How can we make our core hydrocarbon businesses more resilient?
2. Should we expand into low-carbon businesses, and if so, how?
3. How will our operating model need to change to flourish in a low-carbon world?

The following article provides some initial perspectives on these questions, in the hope of provoking further reflection around executive and board tables.

¹ For more on the shifting global energy landscape, see “Global Energy Perspective 2021,” McKinsey.com.

² “The post-COVID recovery: An agenda for resilience, development and equality,” International Renewable Energy Agency, June 2020, irena.org.

³ Collin Eaton and Sarah McFarlane, “2020 was one of the worst-ever years for oil write-downs,” *Wall Street Journal*, December 27, 2020, wsj.com.

⁴ For more on this organization, see “About Climate Action 100+,” Climate action 100+, climateaction100.org.

⁵ Robert Perkins, “Denmark to end all North Sea oil, gas production by 2050, bans new exploration,” S&P Global Platts, December 4, 2020, spglobal.com.

⁶ For more on decarbonization in oil and gas, see Paul Gargett, Stephen Hall, and Jayanti Kar, “Toward a net-zero future: Decarbonizing upstream oil and gas operations,” December 6, 2019, McKinsey.com.

⁷ “Engineering of world’s largest Direct Air Capture plant begins,” Carbon Engineering, May 21, 2019, carbonengineering.com.

⁸ “CNOOC to receive Chinese mainland’s first carbon neutral LNG cargoes from Shell,” Shell, June 22, 2020, shell.com.

⁹ “ExxonMobil announces emission reduction plans; expects to meet 2020 goals,” press release from ExxonMobil, December 14, 2020, corporate.exxonmobil.com.

1. Building a more resilient core business

Over the past 15 years, the annual total returns to shareholders (TRS) for the average oil and gas company has lagged the S&P 500 by seven percentage points.¹⁰ This suggests the sector's traditional business model has been under stress for some time now. Our research shows that over the same period, global capital investment by the sector has amounted to more than \$10 trillion in real terms. In practice, cyclical-sector overinvestment has made it harder to earn a productive return than was previously the case.

Financial resilience, and the potential for outperformance, have historically been judged by the position of oil and gas assets on the industry cost curve, particularly in upstream and refining. As the physical risks from a changing climate (that is, the direct and indirect risks to assets from climate-related hazards) are better understood, and transition risks (such as societal pressure, technological disruption, or shifting consumer preferences) become more widespread, financial resilience is increasingly becoming a function of climate resilience.¹¹ Investors and analysts have also started to test the contribution of oil and gas companies to a changing climate. Demands for oil companies to standardize reporting of greenhouse gas emissions produced by operations as well as entire value chains are growing. Some are working, as in the example of Open Group, to advance technologies that allow the digital tracking of the integrated carbon footprint of oil and gas companies.¹² Others are pushing to test the robustness of investments against broader environmental, social, and governance (ESG) requirements.

The first response of oil and gas companies, therefore, must be to build a portfolio that is resilient to both lower commodity prices and higher carbon prices. There are two important steps leaders can take to strengthen their positions, beyond no-regrets decarbonization of their operations and supply chain.

High-grade portfolios toward advantaged hydrocarbon growth opportunities

Improving the financial and climate resilience of one's portfolio implies concentrating future investments on resources that are "advantaged," that is, they offer the best combination of lower break-even prices and lower emissions intensity. Our research looked at how the competitiveness of the world's known upstream oil-focused investment projects varies at different carbon and commodity prices (Exhibit 1). The model considers all fields in production and pre-final investment decision and assumes Scope 1 and Scope 2 emissions estimates according to Stanford University's Oil Production Greenhouse gas Emissions Estimator. While there are many sources of emissions estimates and a wide variance across sources, this dataset offers several simple conclusions:

- With no carbon price, 90% of all defined oil-focused projects are projected to break even at or below \$60 per barrel. With a carbon price of \$100/ton CO₂e, this share drops to 80% overall.
- With commodity prices below \$30 per barrel, just a quarter of global projects break-even at a zero-carbon price. This falls to less than 20 percent at \$100/ton CO₂e.
- In conventional onshore and shallow water, which together are projected to comprise almost two-thirds of global crude production in 2030, 25 to 35 percent are viable with a carbon price of \$100/ton CO₂e. For deepwater, ultradeepwater, and unconventional resources, this share drops to less than 5 percent. These performance trends across resource types conceal performance differences within each basin that are often wider than performance differences across basins. In the Permian, for example, the carbon-intensity difference is eightfold between the top and bottom deciles.

¹⁰ Filipe Barbosa, Giorgio Bresciani, Pat Graham, Scott Nyquist, and Kassia Yanosek, "Oil and gas after COVID-19: The day of reckoning or a new age of opportunity?," May 15, 2020, McKinsey.com.

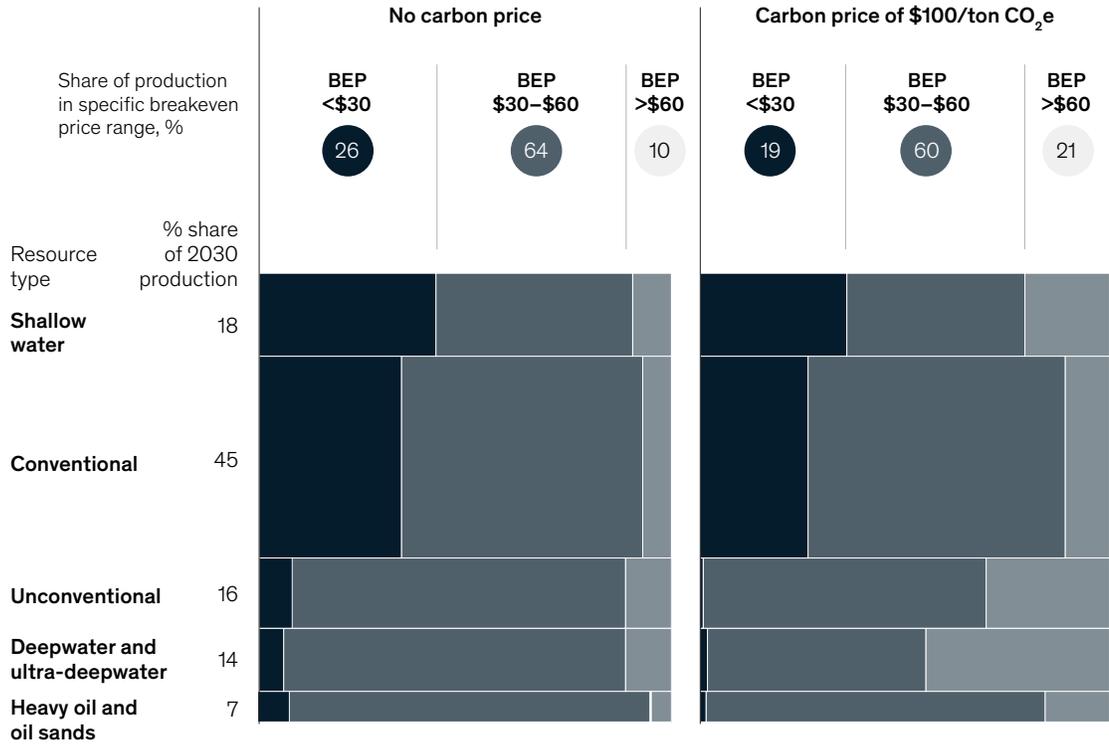
¹¹ Jonathan Woetzel, Dickon Pinner, Hamid Samandari, Hauke Engel, Mekala Krishnan, Brodie Boland, and Carter Powis, "Climate risk and response: Physical hazards and socioeconomic impacts," McKinsey Global Institute, January 16, 2020, McKinsey.com.

¹² "The Open Group launches the Open Footprint™ Forum," August 25, 2020, opengroup.org.

Exhibit 1

“Advantaged” resources offer the best combination of lower break-even prices and lower emissions intensity.

% of production at specific break-even (BEP) price points in 2030, million barrels per day¹



¹Includes existing and pre-FID fields. Includes crude and condensate oil, and excludes gas, NGLs, and other liquids (e.g., biofuels). Assumes Scope 1 and 2 emissions.
Source: McKinsey Energy Insights, Rystad Energy, Stanford University OPGEE Model for emissions estimates

- At \$200/ton CO₂e, only 3 percent of global oil projects break even on current economic forecasts at \$30 per barrel.

Depending on asset type, there is large variance of emissions by basin creating even more emphasis on performance. Actions to improve operating efficiency and capital discipline can drive down break-even economics in the same way that efforts to decarbonize operations can mitigate carbon-price exposure, and completely change the inherent position of an asset on the cost- or emissions-performance curves. Without significant efforts in these areas, opportunities for profitable growth in the hydrocarbon sector will narrow. And as financial

markets push for greater transparency of the risks and returns of individual investments under different commodity and carbon-price scenarios, oil and gas companies will need to high-grade their portfolios to access market capital at favorable rates.

Rationalize the least resilient hydrocarbon assets in place

Retiring the least productive and most carbon-intensive wells and associated assets can improve both emissions performance and profitability of existing oil and gas portfolios. One operator in the North Sea discovered that retiring 20 percent of its well stock, specifically the wells with the highest water-cut, lowest-hydrocarbon throughput,

and highest energy intensity, would materially strengthen the cost efficiency and emissions intensity of its portfolio. In another example, an upstream company in Nigeria found that the accepted norm of restoring every closed-in string neither maximized value nor improved emissions performance from well campaigns. In fact, its creaming curve of well opportunities, tested against value and emissions, indicated that two-thirds of the gains could be captured by a third of the well opportunities at no net increase in emissions.

Thus, high-grading physical asset footprints with the aim of improving the financial and regulatory resilience of existing hydrocarbon portfolios is a no-regrets move for most oil and gas companies.

2. Exploring profitable growth options in low-carbon businesses

Many oil and gas companies are currently reevaluating their strategic responses to the energy transition. For one, they may need to go well beyond decarbonizing their own operations to reduce their emissions considerably.¹³ Scope 3 emissions, which are associated with the use of the sector's products, remain the dominant challenge, at more than three-quarters of the sector's emissions footprint. Equally important, low-carbon sectors represent rapidly growing investment classes in their own right. How should oil and gas companies explore alternatives for profitable growth that also improve climate resilience?

Strategic responses among oil and gas players are typically spread across three broad archetypes: the resource specialist, the integrated energy player, and the low-carbon pure play.

Resource specialists are, in effect, sticking to their knitting. They are betting on a future that promises a material need for hydrocarbons for another 30 to 50 years, even on a declining trend. Companies

in this class recognize that the mature phase of any industry's development is often its most profitable for the strongest performers, typically enhanced by consolidation opportunities. They are offering investors high yield potential, if not top-line growth, and an investment proposition that is not complicated by new businesses to which their competencies may not naturally stretch. A vast majority of independent oil and gas companies remain resource specialists. Among medium-sized companies, Lundin Energy is a notable example. Lundin Energy has carefully high-graded its hydrocarbon portfolio to meet competitive break-evens.¹⁴ Electrification of the Edvard Grieg and the Johan Sverdrup Phase 2 operations is expected to help drive their emissions intensity to below one kilogram per barrel by 2022, at the same time improving production reliability. Lundin Energy is also making select investments in regional hydrogen and wind projects to help reduce its future Scope 2 emissions.

Integrated energy players are looking to retain their profitable core while also capturing some of the large global opportunities now emerging in low-carbon markets, including renewable power, bioenergy, next-generation mobility, energy services, and hydrogen. Players are betting that they will emerge as the natural owners of some or more of these investment classes based on their capabilities, technologies, relationships, and other incumbent advantages. Well-known examples include oil and gas supermajors such as BP, which recently announced its transition from an international oil company to an integrated energy company.¹⁵

Low-carbon pure plays are, in effect, taking this thinking one step further. They are betting heavily on building future-proof, low-carbon businesses while divesting themselves of legacy, high-carbon portfolios which could create management distractions and present investment propositions that are too mixed for both equity and debt investors.

¹³ Chantal Beck, Sahar Rashidbeigi, Occo Roelofsen, and Eveline Speelman, "The future is now: How oil and gas companies can decarbonize," January 7, 2020, McKinsey.com.

¹⁴ "Launch of the Decarbonization Strategy targeting carbon neutrality by 2030 and proposed name change to Lundin Energy AB," Lundin Energy, January 27, 2020, lundin-energy.com.

¹⁵ "From international oil company to integrated energy company: BP sets out strategy for decade of delivery toward net zero ambition," press release by BP, August 4, 2020, bp.com.

Several medium-sized companies have recently made this shift, including Ørsted and Neste. Ørsted, a Danish energy company, has stated its goal is to become the “first offshore wind major.”¹⁶ Neste, a Finnish energy company, has shifted its historical asset base from oil refining and marketing toward processing biofuels.

Two overall questions can help to inform the choices among these three strategic archetypes. First, what is the true growing momentum around low-carbon technologies? And second, what are the risk-reward trade-offs between hydrocarbon and low-carbon businesses?

Growth momentum in low-carbon technologies

The UN Paris Agreement, signed by 196 countries in 2016, committed the world to limit warming to 1.5 to 2.0 degrees Celsius above pre-industrial levels. To achieve a 1.5-degree pathway, all sectors of the global economy will require dramatic emissions reductions over the next ten years.¹⁸ For this to happen, low-carbon technologies will need to grow quickly (Exhibit 2). The primary technologies—renewable power; electrification of infrastructure; bioenergy; hydrogen; carbon capture, utilization, and storage (CCUS); negative emissions technologies, such as nature-based solutions and direct air capture; and carbon trading—all represent potential growth markets. Voluntary carbon markets, for instance, could scale 15 times by 2030 relative to their current size, and become a \$15 billion to \$40 billion a year market.

To deliver these dramatic rates of growth, enormous capital investment is needed. According to McKinsey’s 1.5-degree-pathway scenario, over the next decade \$750 billion is needed to flow to CCUS, \$200 billion to EV infrastructure, and \$700 billion to hydrogen-production capacity. Renewable power is another

magnitude larger; capital expenditures of \$8.5 trillion are required to build the solar and on- and offshore wind capacity required from 2020 to 2030.

To help address this need, pandemic-related public stimulus policies promise to provide considerable new investment in green technologies. The European Green Deal, for instance, proposes €1 trillion in sustainable investments over the next decade.¹⁹ And the complementary Just Transition Mechanism aims to mobilize at least €100 billion from 2021 to 2027 in financial and technical assistance to all parties most affected by the transition.²⁰ At the national level, many policies have also been put in action. For example, France announced plans to spend more than \$8 billion on a decarbonized hydrogen economy through 2030, starting with a European hydrogen project in 2021.²¹ On the other side of the globe, South Korea announced plans to spend almost \$100 billion on green investments to support their post-pandemic recovery.²²

Capital markets are already driving dramatic growth in the value of companies that are strongly aligned with the energy transition megatrend. Our research shows that renewable and biofuel pure plays have seen their earnings before interest, taxes, depreciation, and amortization (EBITDA) multiples increase by 15 to 20 percent in the past two years alone, as investors start to anticipate long-term growth in these sectors. The combined capitalization of what the Wall Street Journal called, “the new green energy giants”—Enel, Iberdrola, and NextEra—has increased by more than 200 percent, growing from \$110 billion to \$350 billion over the past ten years. Meanwhile, the largest international oil companies—BP, Chevron, ExxonMobil, and Shell—have seen their combined capitalization shrink by 40 percent, from \$980 billion to \$570 billion, over the same period.²³

¹⁶ “Ørsted’s renewable-energy transformation,” July 10, 2020, McKinsey.com.

¹⁷ For more on this organization, see “About Neste,” neste.com.

¹⁸ For more on a 1.5° pathway, see Kimberly Henderson, Dickon Pinner, Matt Rogers, Bram Smeets, Christer Tryggestad, and Daniela Vargas, “Climate math: What a 1.5-degree pathway would take,” *McKinsey Quarterly*, April 30, 2020, McKinsey.com.

¹⁹ “A European Green Deal,” European Commission, ec.europa.eu.

²⁰ “A European Green Deal,” European Commission, ec.europa.eu.

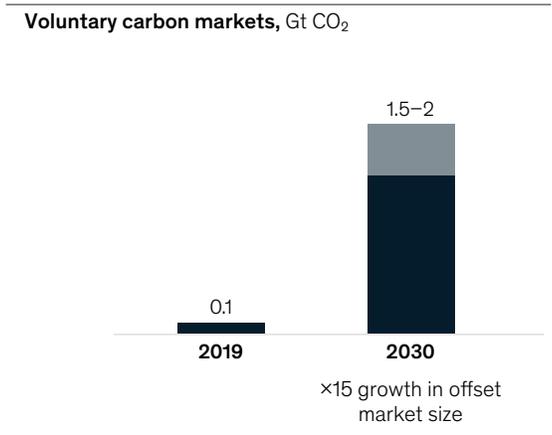
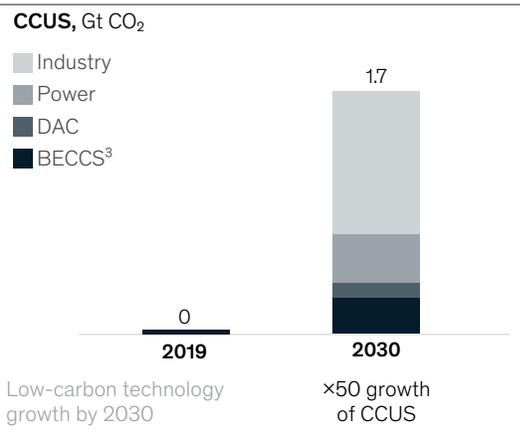
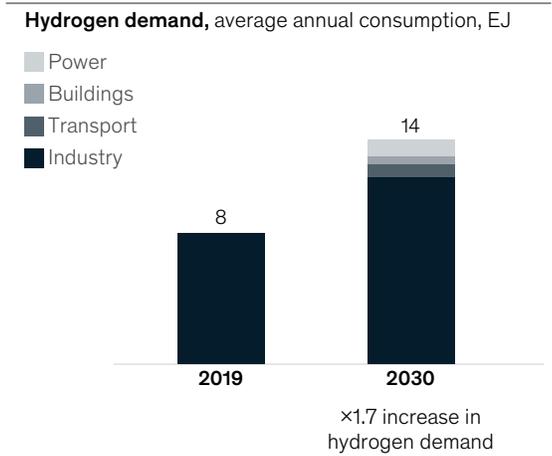
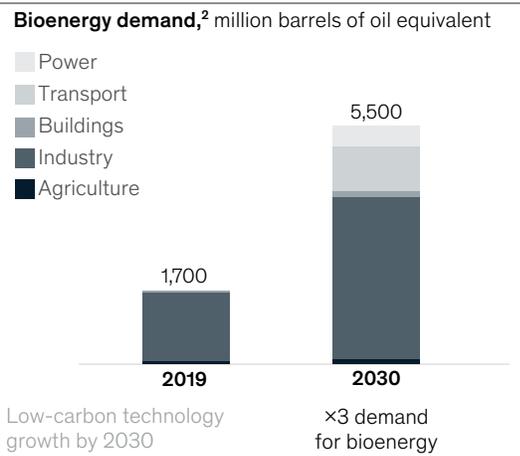
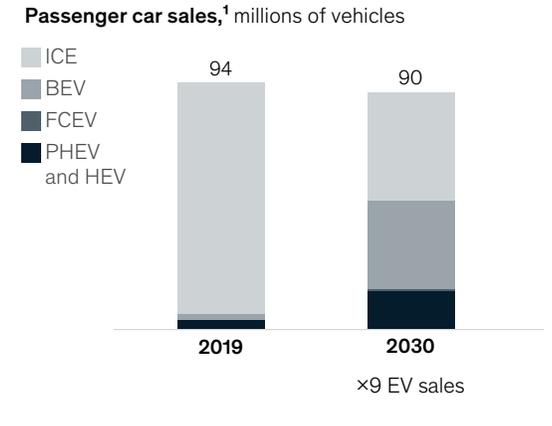
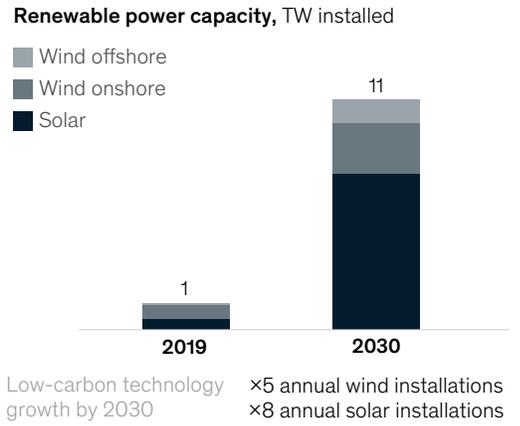
²¹ Andreas Franke, “France cranks up hydrogen plans with 6.5-GW, 2030 target, plays down new nuclear,” S&P Global, September 8, 2020, spglobal.com.

²² South Korean government launches plan for a green new deal,” International Institute for Sustainable Development, July 16, 2020, iisd.org.

²³ Katherine Blunt and Sarah McFarlane, “The new green energy giants challenging Exxon and BP,” *Wall Street Journal*, December 11, 2020, wsj.com.

Exhibit 2

A 1.5°C scenario requires significantly increased adoption of low-carbon technologies by 2030.



¹ICE = internal combustion engine, FCEV = fuel cell electric vehicle, BEV = battery-electric vehicle, PHEV = plug-in hybrid electric vehicle, HEV = hybrid electric vehicle.
²Excluding biofuels used for road transport.
³Bioenergy with carbon capture and storage (BECCS) and direct air carbon capture and storage (DACCS).
 Source: McKinsey 1.5°C Analysis (Scenario A); Global Energy Perspective (GPM Model, Reference Case 2019); McKinsey Center for the Future of Mobility; Hydrogen Council

Changing risk-reward trade-offs

The second question is whether low-carbon markets can offer returns comparable to the existing hydrocarbon core in oil and gas portfolios. The pattern of returns across different energy sources has shifted materially over the past ten years. Company-level returns on invested capital varied across energy sectors (hydrocarbon versus low carbon) from 2010 to 2020 (Exhibit 3).

The data support several conclusions:

- Projected returns in oil and gas have followed commodity prices materially downward over the past decade. Median forecasted project internal rates of return (IRR) have declined from 30 percent during 2010–11 to 15 percent during 2019–20. Crucially, performance of the top quartile has also declined over the same period, dropping from 40 to 30 percent, the median level ten years ago.

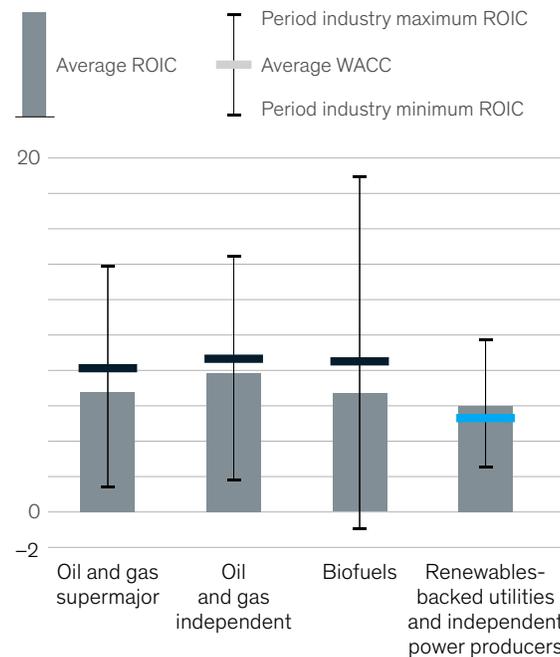
- The best-performing low-carbon companies are now achieving comparable returns over their (lower) cost of capital versus their oil and gas peers. The spread over the cost of capital for low-carbon energies such as renewables can be 200 to 250 basis points higher relative to oil and gas players.
- As in all sectors, the range in returns between the best and worst players is far wider than the spread of average returns between sectors.

As companies evaluate their strategies in light of growth and return projections, they should increasingly focus not just on ROIC but on the spread between ROIC and the cost of capital, as the underlying risk profile looks different across these new businesses and value pools. History shows that knowing where to play is critical, but *how* companies play and perform is equally important, as evidenced by the spread in returns within company segments. Advantaged resources

Exhibit 3

The spread over cost of capital for low-carbon energies can be positive, and higher relative to oil and gas peers.

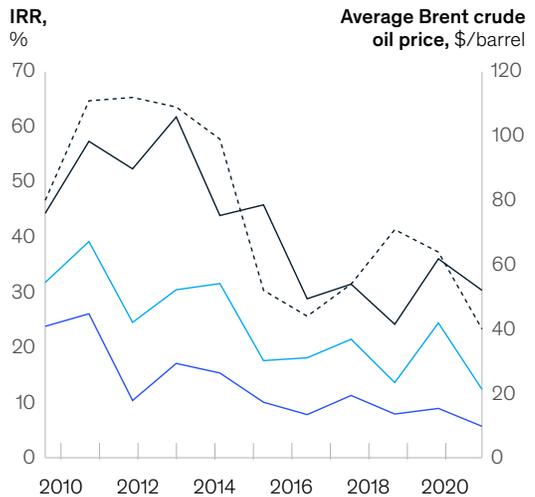
Average ten-year ROIC for industry,¹ %



Annual average project IRR² by peak production year, upstream oil and gas, %

Median, top quartile (TQ), and bottom quartile (BQ) forecasted project lifecycle IRR

— Median IRR — TQ IRR — BQ IRR - - - - Oil price



¹Calculated for 2010–19. Companies consist of five supermajors, 94 oil and gas independent, 12 biofuels, and 16 renewables-backed utilities and independent power producers; excludes income from and investments in affiliates.

²Weighted average IRR by peak production year at Wood Mackenzie base case for commodity prices (2020 Brent: \$40/boe; 2024 Brent: \$54.12/boe) across a global sample of all oil and gas projects. Sample excludes unconventional assets; projects with capital expenditures of less than \$100 million, subsea tiebacks, and extended drilling developments.

and superior technical and operating capabilities have typically created disproportionate value.

3. Changing company operating models to increase competitive edge

Industries such as automotive, telecommunications, banking, insurance, and media have all experienced analogous major discontinuities in technology, regulations, or consumer preferences. In many of these cases, it was the attackers rather than the incumbents that emerged as winners. Attackers ought not to win; they typically start with modest capabilities, customer relationships, technologies, brands, and balance sheets. Their combined ability to overtake large incumbents in dominating growth sectors therefore seems counterintuitive. Such attackers typically succeed not because of their intrinsic strengths but because incumbents fail to respond adequately as circumstances change. Oil and gas companies are now working hard to update their strategies and shift capital in the context of the energy transition. But are they doing enough to change their operating models?

Those that elect to—or continue to—follow the *resource specialist* archetype primarily need to get better at what they already do. We anticipate significant consolidation within the sector as many current players become major net sellers of assets and others go bankrupt, with their assets recycled to the remaining natural owners. In North America, for instance, bankruptcies rose starkly in 2020, with nearly 85 Chapter 11 filings by industry players through October. Based on Rystad Energy projections, at West Texas Intermediate (WTI) prices of \$40 per barrel and Henry Hub Natural Gas prices of \$2.5 per MMcf, 190 companies might face bankruptcy before the end of 2022.²⁴ Resource specialists must relentlessly improve their capital returns and their operating performances while squeezing their operational carbon emissions and neutralizing, or compensating for, their residual well-to-wheel emissions footprints.

In terms of those following the *low-carbon pure play archetype*, several medium-sized companies have opted for more accelerated transitions to new business focuses and corresponding organizations. As an example, Ørsted has divested its hydrocarbon positions to become the world's largest developer of offshore wind.²⁵ There are material risks to Ørsted's all-in strategy, but so far the market response has been positive. Neste is now becoming one of the world's leading producers of renewable diesel and jet fuel.²⁶ Companies in this category need to build material new-business-development muscle; they will typically need to participate in shaping demand for their new low-carbon products and work with external stakeholders—within and across traditional boundaries—in creating markets, scaling supply chains, or developing approaches to attract funding, such as farm-downs, end-user equity partnerships, or demand-stabilizing purchase agreements. To put this into perspective, think of how the era of large US oil companies shaped the evolution of the car-based economy a century ago.

Many larger oil and gas players hope to steer a middle path toward becoming *integrated energy players*. Companies in this category are attempting to evolve their business mix, capital allocation, and organizational capabilities even as they defend their current dividend streams and market valuations that are built upon their hydrocarbon legacies.

To lift off amid the low-carbon winds of change, oil and gas companies need to consider first where they are best suited to compete in the various low-carbon energy arenas. Then, they need to reimagine their longstanding operating models and forge new capabilities, leadership, and cultures to enable these new businesses to grow under their ownership.

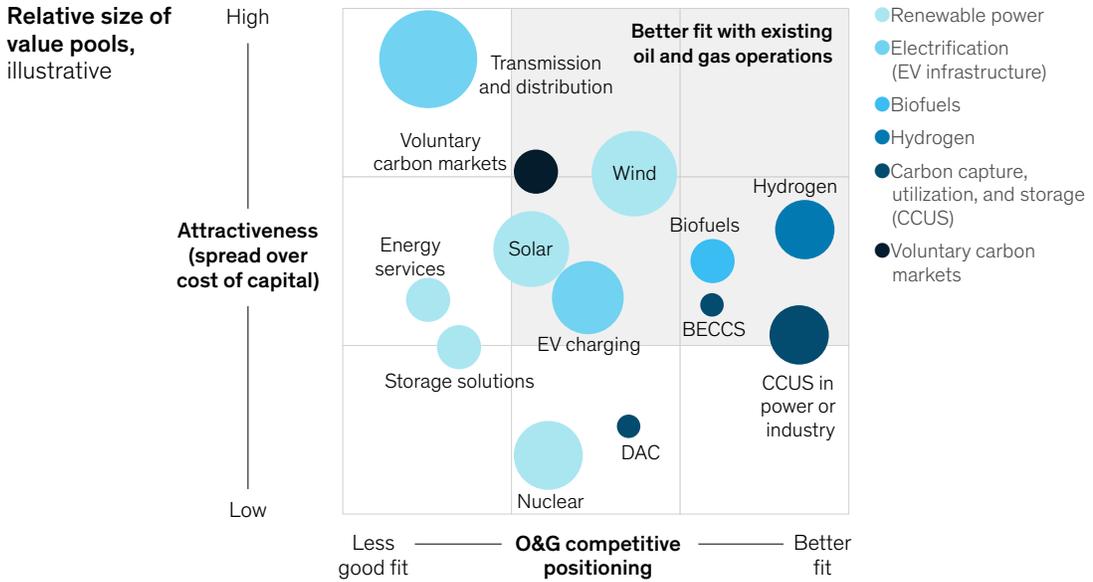
Oil and gas titans have an abundance of capabilities that may be valuable for parts of a new low-carbon energy system. Leaders can frame their strategic choices around where to compete amid economic uncertainties, considering the relative, innate attractiveness of different low-carbon sectors (as

²⁴ "North American oil and gas bankruptcy debt reached an all-time high in 2020 and is set to grow," press release by Rystad Energy, October 22, 2020, [rystadenergy.com](https://www.rystadenergy.com).

²⁵ "Ørsted's renewable-energy transformation," July 10, 2020, [McKinsey.com](https://www.mckinsey.com).

²⁶ "Neste opens four new renewable diesel filling stations in California," Green Car Congress, July 24, 2020, [greencarcongress.com](https://www.greencarcongress.com).

Oil and gas companies have an abundance of capabilities that may be valuable for parts of a new low-carbon energy system.



Sources of advantage for oil and gas companies

<ul style="list-style-type: none"> ● Renewable power • Familiarity with operating environments • Capital project delivery • Supply-chain scale and relationships 	<ul style="list-style-type: none"> ● Electrification (EV infrastructure) • Balance sheets and alliances for innovation • Access to B2B customers • Adaptable refueling networks 	<ul style="list-style-type: none"> ● Biofuels • Adaptable process assets • Liquid fuel and chemical engineering expertise • Access to B2B customers 	<ul style="list-style-type: none"> ● Hydrogen • Access to CH4 and CCUS to scale blue H₂ • Refueling and logistics networks • Operational familiarity and safety processes 	<ul style="list-style-type: none"> ● Carbon capture, utilization, and storage (CCUS) • Physical assets (depleted fields) • Deep subsurface knowledge • Proximity to industrial clusters with end users • For BECCS, all the advantages for biofuels • For DAC, adaptable process assets and access to low-cost power 	<ul style="list-style-type: none"> ● Voluntary carbon markets • Large-scale marketing and commodities trading • Synergies with CCUS investment
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defined by the expected capital return spread), against the relative competitive position of oil and gas players in low-carbon technologies (Exhibit 4).

For many oil and gas companies, operating CCUS, for instance, represents a natural extension of core capabilities such as managing reservoirs and pipelines.²⁷ But today it remains unclear whether this can become a business that will

deliver attractive returns, outside of specific, advantaged niches. Likewise, growth into hydrogen production and sales relies on several traditional oil and gas capabilities, such as access to capital, managing engineering complexity, and operating infrastructure safely and efficiently. Renewable power generation, by comparison, represents the largest scale opportunity among these items, but it is unclear whether today's oil and gas

²⁷ Krysta Biniiek, Kimberly Henderson, Matt Rogers, and Gregory Santoni, "Driving CO₂ emissions to zero (and beyond) with carbon capture, use, and storage," June 30, 2020, McKinsey.com.

companies can emerge here as winners, versus the development specialists and leading utility players, such as NextEra and Enel. Regardless of the strategic archetype chosen, all oil and gas companies will need to quickly adapt their operating models to build carbon management capabilities. Each company needs to know exactly how much carbon it generates, how much is in its products, how to reduce its carbon intensity, and how to communicate this effectively with regulators, investors, and customers. They also need to understand investor sentiment on carbon and how it could impact valuations and access to funding.

Diversification into alternative, profitable growth options in low-carbon businesses raises the following questions on reimagining operating models:

- How can (re)organization balance legacy core hydrocarbon businesses while also diversifying into a range of low-carbon options? Winning in new arenas requires building an agile, attacker mindset while also retaining the resilience and risk-avoiding mindset of the hydrocarbon resource specialist. bp, for instance has chosen to combine its legacy exploration and production and refining businesses into one unit and has grouped many—but not all—of its low-carbon growth businesses into another.
- How can new entrepreneurial capabilities and cultures be built in the growth areas, while also maximizing the value of integration with existing parts of the businesses, such as midstream and trading? Company management processes such as capital allocation and risk management also need to adapt to optimize effectively across both hydrocarbon and low-carbon opportunities.

- How can investor propositions be created where the value of both “old” and “new” businesses are fully reflected in the share price? Can investors be expected to “rerate” stocks before at least 20 percent of installed capacity has transitioned to low-carbon businesses? And how can companies attract capital at competitive rates when the cost of capital to compete effectively for low-carbon opportunities needs to be 2.0 to 2.5 percent lower than for traditional core oil and gas investments?
- Finally, at what point, if at all, should companies let the new low-carbon businesses emerge as fully separate businesses with their own corporate leadership and balance sheets?

While the exact pace and path of the energy transition is unknown, the end destination—a low-carbon energy system—is no longer in doubt. Each oil and gas company will evolve their strategy in different ways based on their starting point and aspirations. As the CEOs associated with the Oil and Gas Climate Initiative, put it in an open letter in May 2020, “the COVID-19 crisis is further crystallizing our focus on what is essential: health, safety, and protection of the environment while providing the energy and vital products that society needs to support economic recovery.”²⁸ And as CEOs, they will shape the economic future of their companies. One of the lessons of economic history is that successful incumbents can be swept away as a new era emerges. The challenge for today’s oil and gas CEOs is how to adapt to a low-carbon era—where to place their bets and how to evolve their companies. Exploring the three foundational questions outlined above will hopefully put them on course.

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²⁸ “Open letter from the CEOs of the Oil and Gas Climate Initiative,” May 26, 2020, prnewswire.com.