



# NEW DIRECTIONS, COMPLEX CHOICES

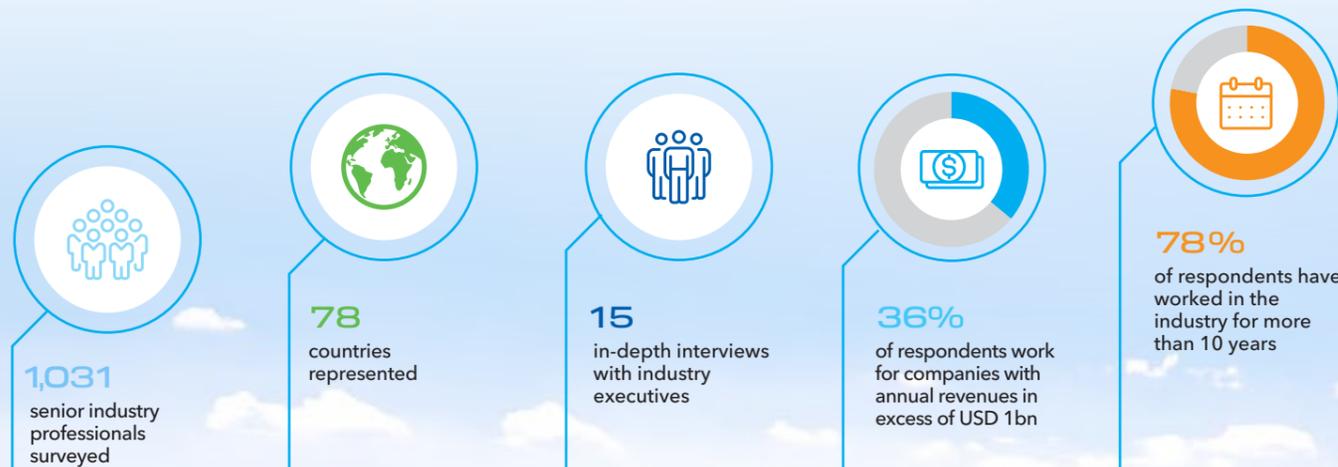
The outlook for the oil and gas industry in 2020

## ABOUT THE RESEARCH

*New Directions, Complex Choices* is an industry benchmark study on the outlook for the oil and gas industry in 2020. The research is published by DNV GL, the technical advisor to the sector. It was launched in 2011 and is now in its tenth year. Each edition builds on the findings of previous research to provide a consistent set of industry insights.

This report assesses industry sentiment, confidence, and priorities, and provides expert analysis of the key challenges and opportunities facing the industry in the year ahead. It is based on a global survey of senior industry professionals and executives, along with in-depth interviews with a range of experts, business leaders, and analysts.

This year, more than 1,030 people participated in the survey, the highest number ever in the decade the survey has been running. The research was conducted during late October and early November 2019, and was carried out by teams from DNV GL, Longitude, and Kantar. The organizations surveyed vary in size: 38% had annual revenue of USD 500 million (m) or less, while 24% had annual revenue in excess of USD 5 billion (bn). Respondents were drawn from across the oil and gas value chain, including publicly listed companies and privately held firms. They represent a range of functions within the industry, from board-level executives to senior engineers. The findings and views expressed in the report do not necessarily reflect the views of DNV GL.



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# 01

## CONFIDENCE HAS STALLED, BUT THE INDUSTRY CONTINUES TO BALANCE DIVERSE PRIORITIES

The oil and gas industry enters the new decade with a full agenda. Organizations across the value chain face the pressure of several evolving threats and opportunities, while navigating current market volatility. Most of the industry must work to balance short-term tactics with decarbonization and business transformation to ensure long-term competitiveness.

In our last Industry Outlook (for 2019), 76% of senior oil and gas professionals were confident about industry growth - more than double the figure from 2017. For 2020, however, confidence in industry growth has stalled. Our latest survey - including 1,031 respondents from 78 countries - finds 66% confident of industry growth in the year ahead. This is still a strong majority, confirming the new-found resilience to lower prices and volatile markets that we reported last year. However, looking ahead to 2020, enough doubt has crept in to correct the upward trend in industry confidence.

Nevertheless, the story beneath this weaker optimism holds several positives for the oil and gas industry. While there is persistent uncertainty and growing complexity, the industry is also taking bold decisions, building greater efficiencies, and rising to long-term challenges as the world pivots to a lower-carbon energy future.

**Organizational confidence is steady, despite industry jitters**  
Underlining these positives is the fact that, when asked about their own organizations (rather than the industry in general), respondents' confidence had not fallen to the same extent. Confidence in the overall prospects for their organizations in 2020 is down just four percentage points, to 70%, compared with 2019. Optimism about reaching revenue targets in 2020 is down just three points, to 66%, and respondents' confidence in reaching their own profit targets is, in fact, up two points, to 64%.

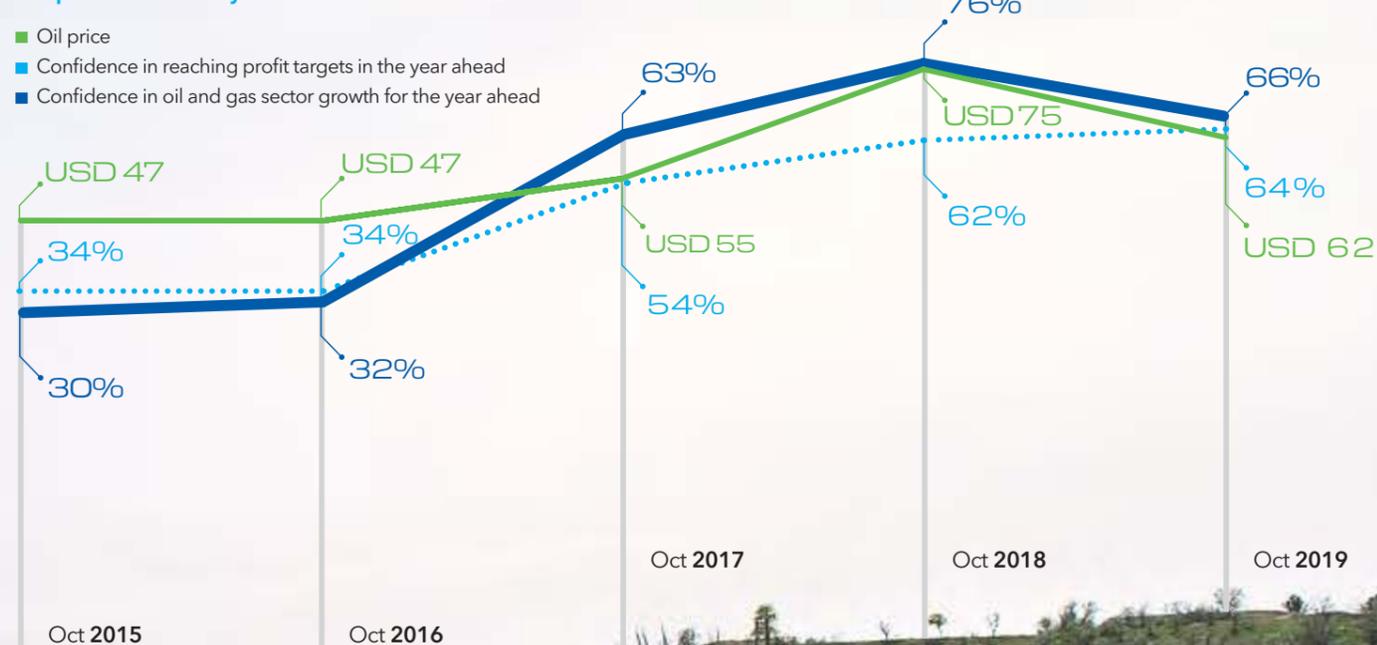
Organizational confidence may be evolving - still correlated with oil and gas prices, but increasingly sustained by stronger efficiency, new business models and digital (and other technological) innovation. Momentum is also growing behind longer-term strategies to decarbonize oil and gas production and consumption, and to diversify away from fossil fuels.

"It is a very interesting time to be in the oil and gas industry," says Liv Hovem, CEO of DNV GL - Oil & Gas. "It is demanding intellectually because everybody is considering new directions and needs to make complex choices that have powerful impacts for the long run, while at the same time we all need to deliver annual results, maintain the shorter-term business, and keep the workforce focused and motivated."

The challenge of these new directions and complex choices is echoed across the industry. As Ben van Beurden, CEO of British-Dutch oil and gas major, Royal Dutch Shell, was quoted as saying:

"We have to find a way to preserve that dividend-paying capacity, while at the same time growing the value of the company, while at the same time also changing the make-up of the company."<sup>1</sup>

Oil price vs industry confidence



<sup>1</sup> Royal Dutch Shell searches for a purpose beyond oil, Financial Times: <https://on.ft.com/2v2W5vF>

**A shift in the key drivers influencing sentiment**

Oil and gas prices are no longer the most important factor influencing how confident respondents are in their organizations' prospects. This has been replaced by organizational strategy, which includes respondents' current projects, planned investments, and expansion into new markets. Strategy is considerably more important to those that report higher confidence in their organizations' overall prospects, as well as those reporting higher confidence in revenue and profit targets. This suggests that, in current conditions, a strong strategy can drive robust confidence, even in the face of considerable market uncertainty.

This is not to say there is a 'best strategy' for any sector of the industry; companies are profiting from a diverse range of approaches to regions, risk, costs, investment, modernization, diversification, decarbonization and more. As Sebastian Koks Andreassen, CEO of the Scandinavia arm of INEOS Oil & Gas,

part of the multinational energy and chemicals company, says: "Companies can choose a strategy and apply it successfully or unsuccessfully. So, sometimes it is more about execution than a right or wrong strategy. We try to be very aware of the deficits and pitfalls of any given approach."

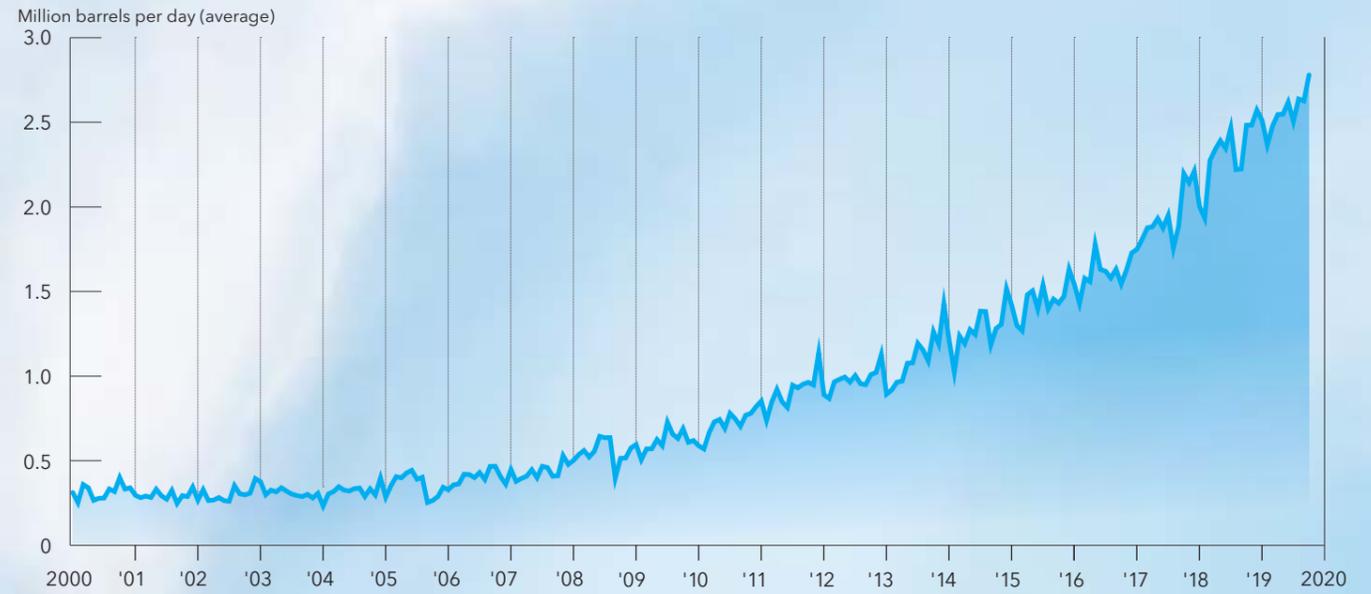
While companies are drawing confidence from their strategies, our survey results indicate that the oil price and the global economy have become the top two barriers to growth, replacing competitive pressure and skill shortages, the top barriers in 2019.

This could signal a shift from bullish to bearish sentiment: 2020 is expected to see macro-economic issues slowing growth, rather than the challenge of rivals jostling to capitalize on stronger growth conditions. At the same time, it is also a shift from barriers that organizations can control themselves to ones they can do less about.

**Top factors influencing respondents' confidence**



**US exports of crude oil and petroleum products over time**



(Source: eia.gov)

**Oil and gas supply: abundant, diverse, flexible**

To put this story in context, we need to highlight developments that are influencing industry sentiment. In 2019, we saw both weaker and more volatile oil and gas prices. Uncertainty about the health of the global economy and ample reserve capacity kept prices from escalating.

In fact, robust supply capacity was maintained despite severe limitations on several traditional sources. For example: the US renewed sanctions on Iran; an economic crisis hit Venezuela; unrest continued in Libya; and Russia and OPEC countries cut production.<sup>2</sup>

The world was so well-stocked with oil and gas that markets could settle astonishingly quickly after shock events, such as Hurricane Barry hitting the southern US in July 2019,<sup>3</sup> and the drone attacks on Saudi Aramco's largest refinery two months later.<sup>4</sup> Even as conflict between Iran and the US threatened to escalate in early 2020, the oil price only jumped by 5% (after Iran fired missiles at US military bases in Iraq) before falling - within a few days - to levels lower than before the conflict began.<sup>5</sup> Like cushioned blows, sudden drops in supply have not hit the industry as hard, or forced prices as high, as the sudden knocks of previous years.

Many of those years were before the US made its meteoric rise up the oil and gas exporter charts. A decade ago, the country had an oil-trade deficit of 12 million barrels a day (Mb/d) but, in September 2019, for the first time in over 70 years, the US

recorded a full month of oil exports exceeding imports.<sup>6</sup> In 2020, US oil exports are expected to grow once again, from 2.8 Mb/d currently, to 3.3 Mb/d, as new pipelines in Texas increase capacity.<sup>7</sup>

Another factor is the significant spare capacity of the OPEC group of countries and co-operating nations (i.e. the OPEC+ group of oil-producing countries). In December 2019, the alliance agreed to cut supplies by 1.7 Mb/d during the first quarter of 2020, which prompted a modest increase in the oil price.<sup>8</sup>

On top of this, Brazil, Guyana, Canada and Norway are about to increase oil production significantly. Together, these four countries will add close to 1 Mb/d to the market in 2020 and another million on top of that in 2021.<sup>9</sup> They also add greater diversity and flexibility to the supply picture, with each of these nations benefiting from greater political and economic stability than the likes of Venezuela, Iraq, Libya or Iran.

Gas prices saw record lows in 2019, making oil prices look robust by comparison. Indeed, in Asia, utilities with long-term liquefied natural gas (LNG) contracts pegged to the oil price paid a premium of USD 23 billion (bn) over the spot price for LNG in the nine months from January to September 2019 alone. See our natural gas trends feature on page 13 for more details.

2 OPEC and its allies consider production cuts as the Aramco IPO complicates its December meeting, CNBC: <https://cnb.cx/3andbo8>  
 3 Hurricane Barry knocked 700,000 barrels of oil per day offline and hardly anyone noticed, Forbes: <http://bit.ly/davblack>  
 4 Attacks on Saudi oil - why didn't prices go crazy?, The Conversation: <http://bit.ly/2R5i9yb>  
 5 Five reasons oil prices failed to soar on US-Iran tensions, Financial Times: <https://on.ft.com/2G3gKSw>

6 US is net exporter of oil for first time in decades, Financial Times: <https://on.ft.com/38jDZUi>  
 7 Infrastructure investments key to unlocking more US oil supply, International Energy Agency (IEA): <http://bit.ly/2tuu2Vs>  
 8 Crude oil breaks \$65 mark after OPEC tightens supplies, Financial Times: <https://on.ft.com/3769ZLB>  
 9 Flood of oil is coming, complicating efforts to fight global warming, New York Times: <https://nyti.ms/2TyPHXa>

**The upbeat downstream**

Confidence in meeting profit targets is highest among our survey respondents in the downstream sector, at 76%, up from 69% one year ago. This is no surprise, given the abundance of cheap natural gas in the market (natural gas is a primary feedstock to produce fertilizers, plastics, fabrics, paint and dozens of other commercial chemicals and products).

Another factor is the introduction by the International Maritime Organization (IMO) of the low-sulphur shipping fuel regulations, which came into force on 1 January 2020.<sup>10</sup> The rules have created demand for new products to power the world's ships, including traditional fuel oil with reduced sulphur content and also alternatives such as LNG and low-sulphur marine diesel oil.<sup>11</sup>

"For the downstream industry there's an opportunity here to suddenly put new products on the market," says Brice Le Gallo, regional manager, Southeast Asia & Australia, DNV GL - Oil & Gas. "The large refineries will continue to develop new types of fuel for the shipping industry. I can see this driving a lot of refinery upgrade projects in the next few years."

**Upstream confidence is weaker**

Optimism is weaker among respondents from upstream-focused organizations, where confidence in industry growth for the year ahead has fallen from 80% for 2019 to 64% for 2020.

"There is less appetite for big greenfield projects," says Julie Cranga, VP subsea digital at TechnipFMC, a global oil and gas services company. "With the high pressure on costs, one focus for the industry seems to be about optimizing currently active assets - ensuring optimal production. This means we are seeing longer tie-backs, rather than new developments that involve costlier drilling. These conditions and strategies benefit from new technology - digitalization, as well as other technology innovations - and so give the industry good reason to invest in them."

The focus on efficiency and maximizing existing assets could move recovery rates from 35% - a typical rate for conventional oil or gas - to 60% or more.<sup>12</sup> As Ahmed Hashmi, chief digital and technology officer, upstream, at BP put it in a conference speech back in 2016: "We have probably reached the point at which the potential for enhanced recovery from known hydrocarbon resources exceeds the potential from new discoveries."<sup>13</sup>

**The 2020s: a decade of long-term uncertainty?**

With a high chance of oil and gas overabundance on world markets in 2020, many oil and gas companies would welcome a surge in economic growth to stimulate demand, soak up surpluses, and support higher prices.

Near-term demand uncertainty is largely a result of ongoing concerns that the US-China trade war could lead to a global economic slowdown. Further ahead, however, the industry is concerned about the impact of carbon risk on the viability of large, protracted oil and gas projects.

"The oil and gas industry has been dealing with short-term volatility for decades. They are masters at this, so it is not an issue for them," says Gerard Reid, co-founder and partner at Alexa Capital, an energy-focused corporate finance and capital solutions company. "The bigger issue going forwards is carbon risk. In other words, what's going to happen in 10 or 15 years? Let's assume you are looking at a multi-billion-dollar offshore project. How long is it going to be viable? Will it be 25 years, 15 years, 10 years? When will it get too expensive to take it out of the ground? That's the difficulty the industry has."

A greater focus on long-term carbon risk may be affecting the outlook for big oil and gas projects in 2020. Two-thirds (67%) of our survey respondents expected to see more large, capital-intensive projects approved in 2019 than in 2018; only 46% think we will see more in 2020 compared to the past year.

Large, capital-intensive oil and gas projects are always challenging to undertake, with multiple risk factors and long-lasting ramifications. The addition of deeper, existential questions makes these even more complex.

"The complexity comes in because the future picture of what we're actually going to deliver to our customers is a bit blurred," says Eirik Wærness, senior vice president and chief economist at Norwegian energy multinational, Equinor. "The industry has concerns about whether the current way of doing business is going to work when we have more products, when we have different types of contracts, when we have different types of customers."

**Extent to which respondents agree that more large, capital-intensive projects will be approved compared to the previous year**



**Spending continues to grow in the key areas of decarbonization and efficiency**

Despite uncertain conditions, respondents are significantly more likely to increase spending on decarbonization and technologies that will enhance efficiency in the long term.

Our survey shows that the industry is responding to growing pressure to meet national and international climate change targets and accelerate the energy transition. Intentions to increase spending on gas projects/portfolios have grown from 35% in 2019 to 40% in 2020. At the same time, the proportion expecting to increase spending on renewable energy has jumped from 34% in 2019 to 44% in 2020. Some 40% of our survey respondents expect their organizations to boost investment in decarbonization in 2020, up from just 27% last year.

A higher proportion of respondents expect to increase spending on digitalization in 2020, up to 65% from 60% in 2019. This will happen as the sector looks for new ways to control costs amid lower and more volatile oil and gas prices, and to keep oil and gas competitive over the long term against the falling price of renewables.

**Percentage of respondents who believe that prospects for their organization improved in 2019, by region**



Several other areas are holding firm, including R&D and innovation spending (a small increase to 38% vs 36% a year ago) and spending on increasing the efficiency of assets in operation (48% vs 45% a year ago). At a higher level, similar proportions expect to increase levels of capital expenditure (capex; 29%) and operational expenditure (opex; 22%) compared to one year ago (30% and 22%, respectively).

The only key area with weaker intention to spend is headcount, with those expecting to increase numbers down from 34% to 28%. This is likely because there will be fewer large projects announced in 2020, and the industry is increasingly focused on cost efficiency, digitalization, and automation (which we explore in the following chapters).

Overall, this picture suggests that, while investments may not be flowing into as many large, capital-intensive oil and gas projects, the industry is investing in future-focused mega trends.

**Respondents' intention to increase capex and opex, by year.**



10 Sulphur 2020 - cutting sulphur oxide emissions, International Maritime Organization (IMO): <http://bit.ly/2sB7cuN>  
 11 Compliance with low sulphur 2020, Australian Maritime Safety Authority: <http://bit.ly/2FY4hj1>  
 12 Oil & Gas 4.0, Financial Times: <https://on.ft.com/376ByEr>  
 13 Squeezing more from brownfields in a low oil price environment, BP: <https://on.bp.com/2RoG4Yo>

### A future financed by oil and gas

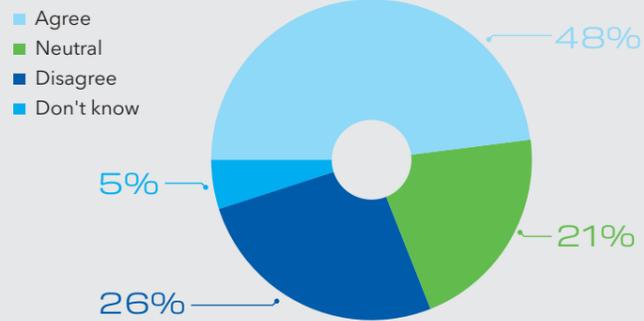
Some oil and gas companies, anticipating an acceleration in the energy transition, are eager to extract and/or sell their oil and gas reserves as soon as possible.<sup>14</sup> Others see favourable market conditions persisting long into the future and are increasing the size of their oil and gas portfolios accordingly. For example, in late 2019, global mining and metals giant BHP announced plans to increase spending on oil and gas projects. In an investor briefing, the company's president for petroleum operations, Geraldine Slattery, said: "In a decarbonizing world, deep water oil and advantaged gas close to established infrastructure can offer competitive returns for decades to come."<sup>15</sup>

Most forecasts do indeed stress the importance of oil and, especially, gas in meeting global energy demand until at least the middle of the century.<sup>16</sup> DNV GL's Energy Transition Outlook forecasts that, at the current rate of development, oil and gas will account for 46% of the world's energy mix in 2050, compared with 54% today.<sup>17</sup>

Despite this, almost half (48%) of respondents to our survey believe gas and renewables are competing against each other. What is clear from the forecasts, is that in order to resolve the energy conundrum - of how to ensure a secure, affordable supply of decarbonized energy - the industry will need to exploit the synergies between gas and renewables, not choose one or the other.

Several oil and gas majors are already transforming themselves into broad-portfolio, lower-carbon-energy companies, with interests in a diverse range of sources, carriers, and distribution models.<sup>18</sup> As some have put it, many of the world's oil and gas giants are shifting from 'big oil' to 'big energy'.<sup>19</sup>

### Extent to which respondents agree that gas and renewables are competing against each other



"Simplistically, you could divide oil and gas companies into two baskets," says Koks Andreassen of INEOS. "Some have chosen to diversify away from fossil fuels, and there could be different drivers for these, including the equity story, investor appetites, available capital and so forth. Others, like INEOS, believe we are still serving society by providing a critical resource in oil and gas products, which will be important for decades to come. But this does not mean we disregard the green agenda or climate issues, it is just a strategic choice, for now, to stay in the fossil fuels world, while striving to minimize our carbon footprint in all that we do."

Oil and gas revenue will be key to building momentum in the industry's decarbonization efforts. As Equinor's Wærness puts it: "Almost everything we do now in trying to respond to the energy transition - whether it's on the electricity side, on the carbon capture side, on the digital side, hydrogen or whatever - is fundamentally financed by oil and gas."

### Top drivers for investment in natural gas and/or LNG



■ 2019  
■ 2020

### Natural gas trends

Natural gas markets faced some headwinds in 2019 but long-term demand remains strong and the industry continues to invest. Gas is expected to overtake oil to become the world's largest energy source in the mid-2020s, and annual gas-related capital expenditure is expected to be similar in 2030 (USD 741bn) to that in 2020 (USD 729bn).<sup>20</sup>

Gas remains the quickest way for major economies to displace coal and oil in energy-intensive industry, power generation, and heating. Moreover, until battery technology, hydrogen, and other energy-storage solutions mature, fast-starting gas-fired power plants remain the best way to secure baseload electricity generation to complement intermittent wind and solar.

Of the 1,031 oil and gas professionals we surveyed, three-quarters (74%) plan to invest in (or maintain spending on) gas projects or portfolios in 2020, up from 65% for 2019. Asia Pacific respondents reported the sharpest rise in intent to invest in gas - jumping from 67% to 81% of respondents, despite a challenging year. In 2020, many still expect oversupply of natural gas and LNG to continue, preventing prices from rising.<sup>21</sup>

In 2019, European consumers enjoyed the lowest natural gas prices in 10 years, as Russia and the US competed to sell new supplies to the region via pipelines from the east and LNG from the west.<sup>22</sup>

The US is producing so much gas from the Permian Basin that prices have turned negative several times in the past year. A lack of gathering infrastructure and pipeline capacity effectively makes the natural gas worthless. Many companies extract vast amounts of gas alongside the more profitable oil they are targeting, and it is more economical to vent or flare it away than transport it (at a loss) to a buyer.<sup>23</sup> Flaring is supposed to be limited to a short period after a new well is drilled,<sup>24</sup> but at the moment the practice has reached record high levels in the area.<sup>25</sup>

Meanwhile, in late 2019, Chevron announced it would write down USD 10bn and sell shale gas fields in the US Appalachian region - a sign that the sustained weakness of natural gas prices has been straining major players.<sup>26</sup>

In Asia, we have seen record-low LNG prices, as new supplies come online from Australia, the US, and Russia. This has meant painful bills for the many utilities in the region that have long-term contracts pegged to the oil price (these contracts account for the bulk of natural gas sales in the region). Since oil prices have not fallen (proportionally) as much as gas prices in 2019, S&P Global Platts estimates that utilities in Japan, Korea, and China paid USD 23bn above the LNG spot price in the nine months from

January to September 2019 alone. Platts estimates utilities could pay an average premium of USD 20bn per year over spot prices to 2022, when supplies are expected to tighten, pushing up prices.<sup>27</sup>

Apart from Qatar, nations in the Middle East have not yet managed fully to exploit the vast reserves of natural gas in the region. There are, however, signs that this is changing, and output has been rising steadily over recent years.<sup>28</sup> In Saudi Arabia, for example, the recently floated oil and gas conglomerate, Saudi Aramco, plans to invest USD 150bn over the next decade to increase gas production by more than 50% (becoming an exporter in the process).<sup>29</sup> Qatar meanwhile, will continue to lead global LNG production, increasing capacity by 64% in the years to 2027 by exploiting the massive North Field (which holds 1,760 trillion (trn) cubic feet of natural gas) and adding new production facilities.<sup>30</sup>

Natural gas has long been seen as an ideal energy transition fuel.<sup>31</sup> Its status in the energy mix has been strengthened by an increasingly competitive LNG market, with burgeoning liquidity and hedging securities available.<sup>32</sup> However, in 2019, politicians, academics, activists and others have argued strongly and publicly against gas, citing excessive flaring, leaks during transportation, and emissions from final consumption.<sup>33</sup> Efforts are being made to decarbonize gas - with biomethane and, increasingly, hydrogen - which is tabled as a compelling long-term path for gas-powered heat and industry.

In November 2019, the European Investment Bank took the decision to end lending for all unabated fossil-fuel projects by the end of 2021.<sup>34</sup> This includes natural gas power plants, which makes it the first multilateral lender to extend prohibitions to gas-fired projects.

Despite these signs of shifting sentiment, most sources still forecast a continuing increase in demand for gas. In the near term, the International Energy Agency (IEA) expects demand to grow to 4.3trn cubic metres by 2024 - a rise of more than 10%.<sup>35</sup> Longer-term demand is expected to be even more expansive. For instance, DNV GL's Energy Transition Outlook 2019 forecasts that natural gas demand will peak at just below 5.5bn cubic metres of gas per year in 2033. Thereafter, natural gas consumption will plateau, reducing only slightly, to 5.17trn cubic metres a year by 2050 - which is still some 13% higher than today's level. During this time, gas fuels will increasingly move over the oceans, with global seaborne natural gas trade (LNG and liquefied petroleum gas combined) expected to quadruple between 2017 and 2050.<sup>36</sup>

14 Oil is our gold and we aim to use all of it, ADNOC official says, Reuters: <https://reut.rs/38gy16K>  
 15 Petroleum briefing - 11 November 2019, BHP: <http://bit.ly/2uuAcY>  
 16 Royal Dutch Shell searches for a purpose beyond oil, Financial Times: <https://on.ft.com/2v2W5vF>  
 17 Energy Transition Outlook 2019, DNV GL: <https://eto.dnvgl.com/2019>  
 18 2019 Strategy & Outlook Presentation - 24 September 2019, Total: <http://bit.ly/37i005K>  
 19 From big oil to big energy, Munich RE: <http://bit.ly/30uHdlo>  
 20 Energy Transition Outlook 2019, DNV GL: <https://eto.dnvgl.com/2019>

21 Global NatGas market still oversupplied in 2020; Weak pricing seen threatening U.S. LNG shut-ins, Natural Gas Intelligence (NGI): <http://bit.ly/2Rx99Re>  
 22 European gas prices fall to one-decade low, Oilprice.com: <http://bit.ly/2R4xf23>  
 23 Negative gas prices are set to stay in an industry based on faith, Financial Times: <https://on.ft.com/2TEIXvB>  
 24 Pipeline giant sues Railroad Commission, alleging lax oversight of natural gas flaring, Texas Tribune: <http://bit.ly/30yLp3w>

25 Permian gas flaring reaches yet another high: Rystad, JWN Energy: <http://bit.ly/2R3J3qg>  
 26 Chevron to take \$10bn writedown on shale gas glut, Financial Times: <https://on.ft.com/3770mfG>  
 27 Asian energy companies overpaying on LNG contracts, Platts warns, Financial Times: <https://on.ft.com/368ESxA>  
 28 Can the Middle East realize its enormous gas market potential?, Rystad Energy: <http://bit.ly/30wkVzH>  
 29 Saudi Aramco aims to become gas exporter with \$150 billion investment, Reuters: <https://reut.rs/2R7oauh>  
 30 Biggest LNG producer targets 64% jump in capacity by 2027, Bloomberg: <https://bloom.bg/2FZHN0n>

31 Natural gas and the transition to net zero, BP: <https://on.bp.com/2NFAcc9>  
 32 The future is now for LNG as derivatives trading takes off, Bloomberg: <https://bloom.bg/3apfB5s>  
 33 Burning the gas 'bridge fuel' myth: Why gas is not clean, cheap, or necessary, Oil Change International: <http://bit.ly/38jr5pm>  
 34 EIB to phase out lending to fossil fuel projects by 2021, Financial Times: <https://on.ft.com/2R4ORj9>  
 35 Gas 2019: Analysis and forecasts to 2024, International Energy Agency (IEA): <http://bit.ly/38b4LyI>  
 36 Energy Transition Outlook 2019, DNV GL: <https://eto.dnvgl.com/2019>

# 02

## STRONG COST DISCIPLINE IS KEY TO SHORT-AND LONG-TERM GOALS

Capital and operational expenditure levels in the oil and gas industry are a world away from those of five years ago, when deep cost-cutting initiatives were kicking off in all segments, as the industry fell into a major downturn. Companies slashed budgets to survive, removing costs in bulk and cutting the excesses that had crept in during the years of high oil prices.

Cost efficiency is not just about short-term belt-tightening, however; it must be a long-term priority if efficiency targets are to be met. Many expect lower-for-longer oil and gas prices to prevail, while the cost of renewable energy is expected to continue to fall over the next 30 years, making those sources increasingly competitive with oil and gas.<sup>37</sup> Indeed, two-thirds (66%) of respondents to our survey say that most of their cost-efficiency initiatives since 2014 have become permanent changes.

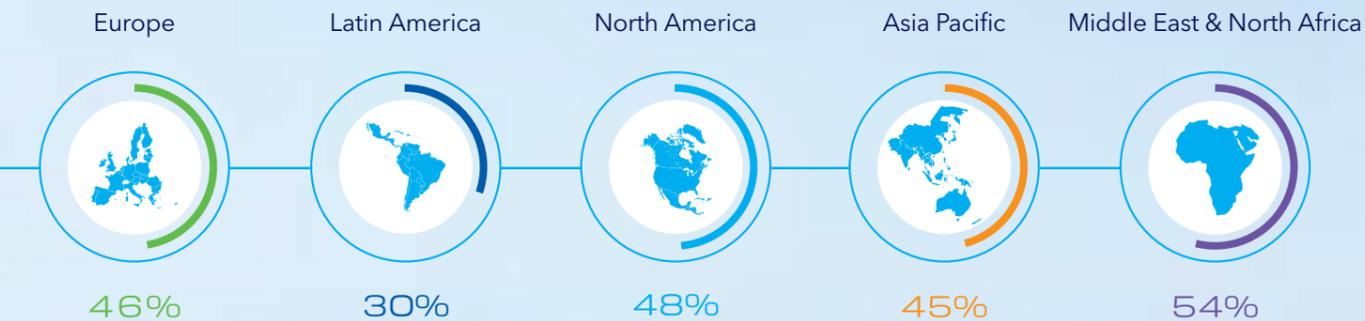
The industry is now building new efficiencies on top of those hard-won gains, not just to survive, but to thrive. As a result, parts of the industry have become impressively lean. In our survey, some 46% say that, if the oil price were to average less than USD 50 per barrel in 2020 (Brent-WTI average), their

organizations would still achieve acceptable profits. This is a large proportion, given that only one of the past 15 years (2016) saw annual average prices under USD 50 per barrel.

Among those respondents from organizations that would make acceptable profits in 2020 with an average oil price under USD 50 per barrel, 80% are confident about the overall prospects for their organizations, compared to 53% for those that would not make acceptable profits with the oil price at that level.

Our research shows an inverse correlation between industry confidence and the priority placed on cost efficiency. With the outlook for more volatility in traditional oil and gas markets in 2020, our survey respondents reported lower confidence in industry growth and a greater focus on cost efficiency. In our 2019 research, respondents were more confident and we recorded a lower priority being given to cost efficiency. But, while these short-term fluctuations unfold, our research also suggests that the industry is sharpening its focus on a longer-term path.

### Extent to which respondents agree that their company would achieve acceptable profits if the oil price were to average below USD 50 per barrel in 2020, by region



### Where will the next efficiency gains come from?

After falling in priority as we entered 2019, cost efficiency is climbing the oil and gas industry's agenda again. It is the top priority for nearly one-third of respondents' organizations (32%), up from 21% a year ago. With so much progress already made in reducing costs, it is worth wondering where the next efficiency gains will come from.

It may be that there are still savings to be made by systematically cutting expenses. "Cost reduction is about leaving no stone unturned. Whether you are saving 10 dollars a million times or 10 million dollars once, it all counts," says Mark Paton, CBDO at Hibiscus Petroleum Berhad, Malaysia's first listed independent oil and gas exploration and production company.

This view is shared by Sebastian Koks Andreassen of INEOS: "Some people will argue that small costs do not matter. They say: 'Why bother about the cost of the toothpaste because it's a USD 1bn business?' But you need to ask all the questions, gather all details to make a difference to overall expenditure. That is what we do when we turn a business from cash-negative to cash-positive."

### The inverse correlation between confidence for industry growth and focus on cost efficiency



Koks Andreassen cites the recent turnaround of the company's Danish oil business as a case in point, for which a deep restructuring drive was needed to reach profitability and position the unit for future growth.<sup>38</sup>

"We don't try to reinvent the wheel; we stick to things that have worked before," says Paton. Indeed, 75% of those surveyed will look to further standardize tools and processes to reduce costs in 2020.

In addition to reducing costs, standardization also represents one of the best ways for the industry to share universally applicable knowledge. For example, collaboration over the standardization of subsea systems (as these become increasingly digitalized and electrified) should support greater innovation across the industry.<sup>39</sup>

37 Energy Transition Outlook 2019, DNV GL: <https://eto.dnvgl.com/2019>

38 INEOS has settled its Danish oil business, EnergyWatch: <http://bit.ly/2R4Rp0H>  
39 Standardization can boost subsea's prospects, DNV GL: <http://bit.ly/2NEimfX>

**Supplier-driven inflation increases slowly**

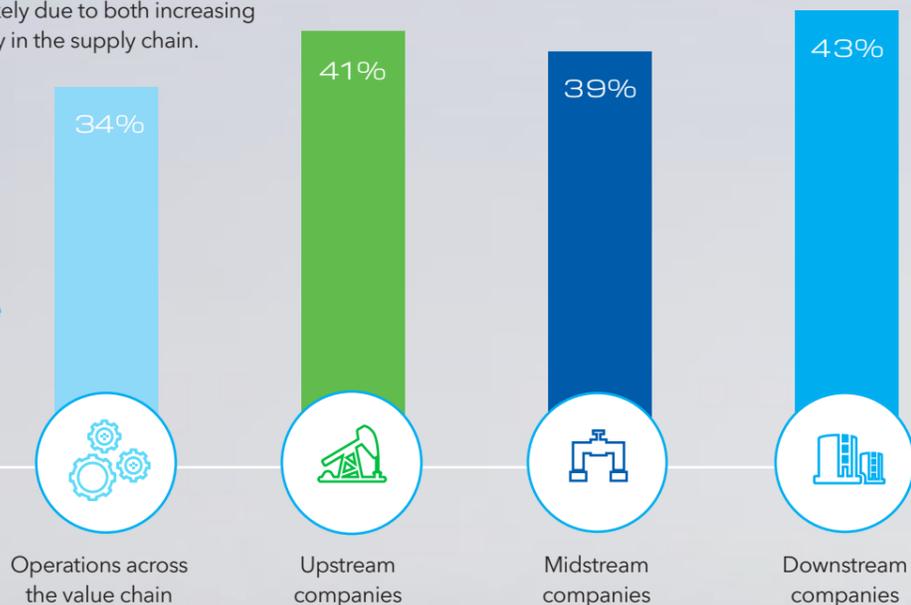
While the industry finds new ways to be more efficient, it is important to support strong, sustainable relationships between operators and suppliers. Indeed, operator-supplier collaboration can be a source of new cost efficiencies – but only if suppliers receive fair rewards and operators get value for their outlay.

Suppliers pushed price inflation to a greater extent in 2019 (with 47% of our respondents reporting this) than in 2018 (41%). Hibiscus Petroleum Berhad's Mark Paton describes the importance of having suppliers compete to access the best prices, but also mentions the clear disparity between prices in other regions. "The main difference between operations in Malaysia and the UK is costs," he says. "There is a big difference in what is achievable for projects that tap into the Asian supply chain. Manufacturing, labour, production facilities; everything can be done at a fraction of the cost of other regions."

This may be starting to change, however. In our survey, more than half (53%) of respondents from Asia Pacific experienced price inflation from suppliers in 2019, compared to 41% in both Europe and North America. A stronger inflationary trend also seems to be in play in the Middle East, with 55% reporting price inflation last year. Greater numbers of both Asia Pacific (45%) and Middle East (46%) also expect to see notable supplier-driven price inflation in 2020, compared to 37% in Europe and 31% in North America.

Overall, only 26% in our survey believe the supply chain is reaching full capacity. While this suggests it is still a buyers' market, this number has ticked up from 18% a year ago, so inflationary pressures are starting to build. This is likely due to both increasing demand volumes and reduced capacity in the supply chain.

**Extent to which respondents agree that their organization is more focused on short-term strategies than long-term strategies**



**New models for further efficiency**

More than eight out of ten (81%) in our survey believe the industry needs to develop new operating models to achieve further cost efficiencies – recognizing the fact that much of the more obvious cost-cutting has already taken place. A key aspect of this for the supply chain will be to evolve the relationship between headcount and revenue. "I think many companies in the oil and gas supply chain make money by selling hours, which is a direct link to headcount," says Liv Hovem, CEO of DNV GL - Oil & Gas. "But, as digital tools become more fundamental, we need to look at new models based on outcomes, availability, or other kinds of benefits. This could also mean the nature of payment changes, so we could see more profit-sharing than in the transactional models of today."

New models are also being driven by the oil and gas industry's ventures into new horizons. Indeed, half (51%) of those we surveyed work for organizations that are increasingly focused outside of oil and gas. Interestingly, the efficiency gains of recent years may eventually prove key to succeeding in these new domains. "Our strength comes more and more from our operational excellence," says Soichi Ide, vice president, Latin America and Ghana, chief digital officer of MODEC Group, a global supplier of floating solutions for the offshore oil and gas industry. "We can look at potential business models in engineering, operations, or production areas for any sector, based on our operational excellence. That, in itself, is a point of difference, or sales message, for us in new areas."

**Balancing the short- and long-term agendas**

The lean profiles some organizations have developed allow them to focus once again on longer-term strategies, rather than short-term firefighting. "If you look at dividend policies and share buybacks, it shows there's ample cash in the industry," says Equinor's Eirik Wærness. "This gives us room to manoeuvre, to look further ahead than when we were in a cash-strapped position."

Indeed, only 39% say their organizations are currently more focused on short-term than on long-term strategies. Some long-term investments are, of course, designed to build new businesses to replace revenue falls after peak oil (forecast for the mid-2020s according to DNV GL's 2019 Energy Transition Outlook) and peak gas (forecast for 2033).<sup>40</sup> However, within oil and gas, long-term investments also help to stabilize the supply chain, while the pursuit of shorter-term opportunities can have the opposite effect.

"Projects have shorter and shorter durations currently, compared to five or more years ago. As companies finish work on mega projects, they need to fill the void this leaves with several smaller projects," says DNV GL's Hovem. "That means they need to be more active in the selling space and their predictable time horizon decreases. It makes the supply chain more vulnerable because sudden changes can leave companies without work."

Developing strategy may never have been so complex for oil and gas companies. Many are balancing several key priorities: building greater cost efficiencies and exploring new business models – within and outside of oil and gas – while driving decarbonization and digital transformation. This makes it especially challenging to balance short-term and long-term opportunities and threats. "We have a long-term view, but combined with a day-to-day focus where you can tactically move your business to a better place, even within the year or within the quarter," says Koks Andreassen. "It is about the constant application of questions, asking ourselves why we do things, how we do things, where we can improve and what we are expecting."



# 03

## DECARBONIZATION TAKES CENTRE STAGE

Our 2020 research suggests the oil and gas industry is moving through an inflection point on the transition to sufficient, sustainable, affordable and emission-free energy.

In our survey, the percentage of respondents reporting that their organizations are actively adapting to a less carbon-intensive energy mix has jumped from 51% to 60% in one year. The proportion expecting to increase or maintain investment in decarbonization has leapt to 71% for 2020, compared to the 54% expected for 2019.

The industry appeared to step up the priority of decarbonization in 2019. This is evidenced in steps ranging from reducing emissions from traditional oil and gas operations, to investing in renewable energy and supplementing natural gas supplies with decarbonized gas such as hydrogen.

This shows greater recognition of the urgency of the world's climate problem, and also of the fact that a transition away from unabated use of fossil fuels will involve a combination of various sources and measures.

As Antony Green, head of engineering and asset management at National Grid, a British electricity and gas utility, says: "It will be a hybrid future. It will not be a gas future, an electric future, nor a question of just insulating homes - we'll need all of these to deliver net-zero targets.

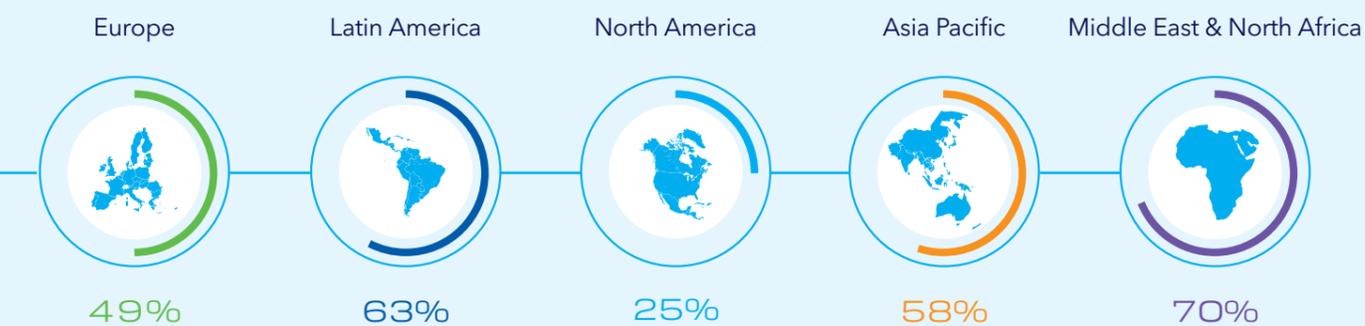
### Investing in the hybrid future

While our research suggests that approvals for large, capital-intensive oil and gas projects may be more difficult to come by in 2020 than 2019, nearly three-quarters (72%) of our respondents say their organizations will increase or maintain levels of capex, and a considerable proportion of this will flow into renewable energy portfolios.

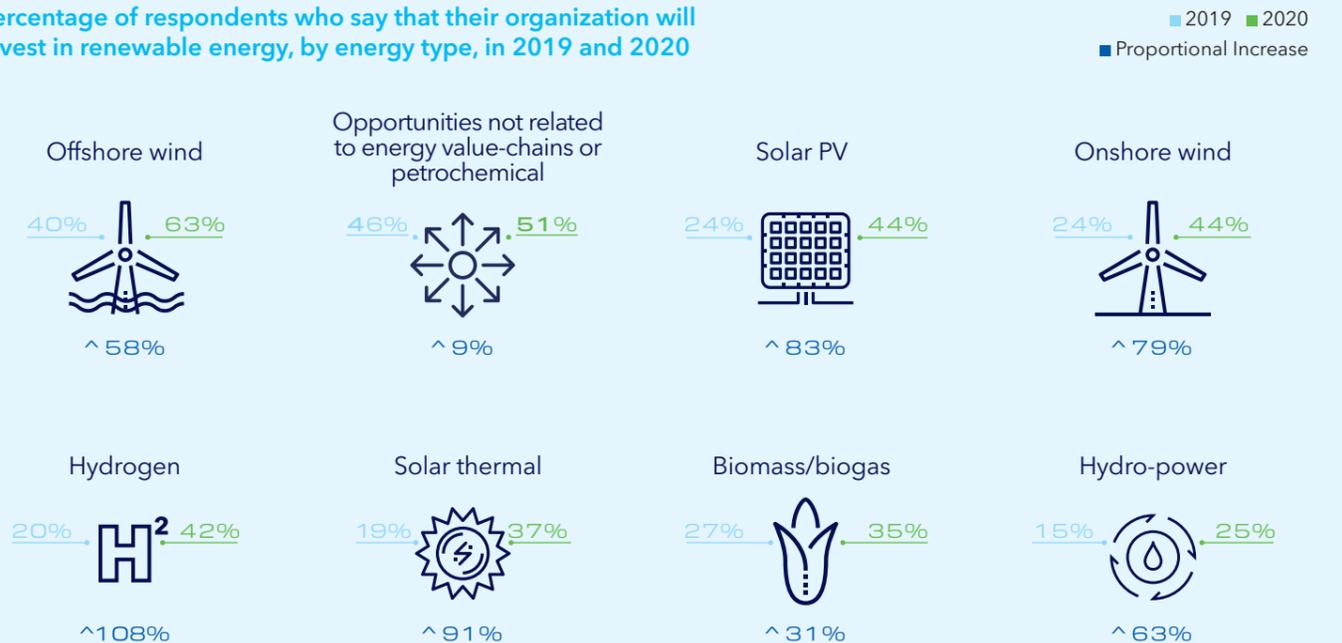
Among our respondents, those expecting to increase or maintain investment in renewable energy projects/portfolios has risen sharply, from 54% for 2019 to 71% for 2020. Three of the top four drivers of investment in renewable energy - the energy transition (34%), long-term competitive advantage (30%) and shifts in long-term strategy (25%) - suggest that these investments are designed to begin a gradual pivot towards low-carbon-energy business models, offsetting expected demand shifts away from oil and the carbon risk associated with fossil-fuel energy sources.

Offshore wind is the most popular choice, with 63% (of those looking to invest outside of oil and gas<sup>41</sup>) saying their organizations are likely to invest in this area in the year ahead - a figure that has jumped up from 40% one year ago. Organizations from Europe (71%) are particularly likely to invest, as are respondents with upstream operations (73%).

### Percentage of respondents who agree that their organization should decarbonize faster, by region



### Percentage of respondents who say that their organization will invest in renewable energy, by energy type, in 2019 and 2020



\*This question was only asked of the 51% (528 of the full sample of 1,031 respondents) who reported that in 2020 their organization would be increasingly focused on opportunities outside of oil and gas. Percentages reflect the proportion of these 528 respondents, not of the full sample

There are good reasons for this. Europe has strong offshore wind potential in terms of raw resource availability and suitability,<sup>42</sup> and the region also has the social and political will to push wind energy forwards.<sup>43</sup> In 2019, the UK and France joined the small but growing list of countries to pass net-zero emissions targets into law.<sup>44</sup> Many others are close to doing the same and, towards the end of 2019, the European Commission has been discussing plans for an EU-wide climate law that would create binding targets for net-zero greenhouse gas emissions for the bloc by 2050.<sup>45</sup>

Upstream oil and gas organizations have capabilities that suit the specific demands of offshore wind projects. Equinor, with most of its operations in European upstream activities, is a good example. As Equinor's Eirik Wærness puts it: "Offshore wind plays to our competitive strengths. We know how to operate offshore. It involves large construction and maintenance programmes that look somewhat similar to what we do in oil and gas. Offshore

wind also has the biggest potential we think, in terms of scale and size." Equinor is already looking to harness that potential, with the company winning an auction in 2019 to build a 3.6 gigawatt offshore wind farm - the world's largest - off the coast of the UK.<sup>46</sup>

There are other reasons that large majors with offshore experience are strong players in the offshore wind space. "Safety is one of Shell's core values, and I believe that safety leadership is part of our competitive advantage as we go into further renewables," says Elisabeth Brinton, global vice president for strategy and portfolio at Shell New Energies. "It also leverages our deep expertise in government relations and our proven track record in ethical governance and leadership. That's what governments are looking for in these major renewables projects." In 2019, Shell won its largest power contract to date, the 804 megawatt Mayflower Wind Energy project off Massachusetts (a joint venture of Shell New Energies US and EDPR Offshore North America).<sup>47</sup>

41 This question was only asked of the 51% (528 of the full sample of 1,031 respondents) who reported that in 2020 their organization would be increasingly focused on opportunities outside of oil and gas. Percentages reflect the proportion of these 528 respondents, not of the full sample.

42 Europe's onshore and offshore wind energy potential, European Environment Agency: <http://bit.ly/2R50aYz>

43 Clean energy: The EU's push for renewables and energy efficiency, European Parliament: <http://bit.ly/2RraF7C>

44 What does "net-zero emissions" mean? 6 common questions, answered, World Resources Institute: <http://bit.ly/30uVyye>

45 Proposed EU-wide 'climate law' would set net-zero carbon target by 2050, The Guardian: <http://bit.ly/362r8nV>

46 World's largest wind farm to run on GE's biggest turbines, Bloomberg: <https://bloom.bg/3a0srRK>

47 Mayflower Wind Energy wins bid for 804-MW offshore project off Massachusetts, Windpower Engineering & Development: <http://bit.ly/369tD7X>

**European majors buying into a greener future**

Many of the industry's investments in renewables are via acquisitions. Globally, there were 70 deals in renewables (including solar, wind, and biofuels) in the first nine months of 2019 (around the same number as for the whole of 2018). In this respect, European oil and gas organizations are leading the world into the industry's clean-energy future. According to BloombergNEF, three-quarters of all deals done since 2010 were made by seven companies, five of which are from Europe (Shell, Equinor, Total, BP and Repsol).<sup>48</sup>

In late 2019, Spanish major, Repsol, announced it will transition to net-zero carbon dioxide emissions from its activities and products by 2050. The company will focus on value instead of output growth from its current oil and gas portfolio and, accordingly, has written down these assets by USD 5.3bn. At the same time, Repsol kicked off plans to invest in 1,600 megawatts of new wind and solar projects.<sup>49</sup> Equinor, in January 2020, pledged to cut its emissions from production in Norway by 40% by 2030, 70% by 2040, and to near zero by 2050.<sup>50</sup>

**Major shift in overall attitudes and intent**

These developments are indicators of an historic shift in the attitudes and intent of the oil and gas industry, but it is important to note that this trend is much stronger in Europe than elsewhere. In Asia, the focus is more on meeting the soaring demand for energy to maintain economic growth and development. "I think the drive to displace oil and coal is probably not as strong in Asia as in other places in the world. Energy security remains a crucial topic, with such high demand in the region," says Brice Le Gallo, regional manager, Southeast Asia and Australia, DNV GL - Oil & Gas.

"We are convinced that we must set more ambitious objectives to fight climate change. [...] Addressing the significant challenges that lie ahead with strategic clarity is what will allow us to turn them into opportunities. We are convinced that this strengthens our project in a way that is sustainable, attractive, and profitable for all our stakeholders."

Josu Jon Imaz, CEO at Repsol, quoted in a statement released in December 2019<sup>51</sup>

Meanwhile North American majors are focused on the opportunity to export to Asia and other energy-hungry markets. In our survey, just 47% of respondents from North America reported that their organizations are actively adapting to a less carbon-intensive energy mix, compared to 62% of those from Europe.

**Hydrogen has suddenly grown in importance**

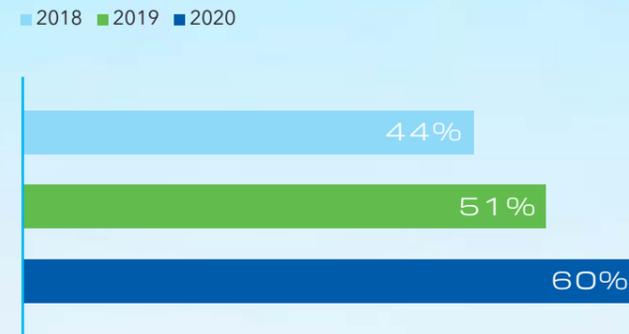
In our survey, hydrogen has seen the largest proportional increase of all clean energy sources (among those looking to invest outside of oil and gas) - twice as many respondents (42%) are intending to invest in the hydrogen economy in 2020, compared to 20% for 2019.

Hydrogen is an ideal complement to variable sources of renewable electricity generation, such as wind and solar. It can be generated from the surpluses those sources produce when the weather is conducive to supplying more power than demanded. It can also store energy indefinitely and it is transportable, so hydrogen can be used to carry clean energy around the planet.

**Percentage of respondents who expect their organization to increase investment in decarbonization, by year**



**Percentage of respondents who agree that their organization is actively adapting to a less carbon-intensive energy mix, by year**



Compared to batteries or grid-supplied electricity, hydrogen is also better-suited to greening many energy-intensive industrial processes (for example, steelmaking),<sup>52</sup> powering heavy vehicles (such as mining trucks)<sup>53</sup> and, ultimately, even fuelling commercial aircraft.<sup>54</sup>

However, hydrogen use must be scaled up to become cost-competitive. Most believe this will require increased use of 'blue hydrogen' initially, while infrastructure and markets are established.<sup>55</sup> Blue hydrogen is typically made from natural gas in a process called steam methane reforming. In isolation, this process creates 'grey hydrogen' but, when the resulting emissions are prevented from escaping with carbon capture and storage (CCS), the result is blue hydrogen. Hydrogen can also be produced without fossil-fuel energy sources. This 'green hydrogen' uses sources such as wind, solar, or hydropower to split hydrogen from water molecules via electrolysis.

Blue hydrogen is currently cheaper and easier to create in large volumes than green hydrogen. It is expected that blue hydrogen will create enough scale and momentum to make the green kind cost-competitive enough to take over once the required infrastructure and market dynamics are in place.

**A stronger outlook for CCS**

Of course, this vision only works if CCS scales up alongside the hydrogen economy, but our research for 2020 paints a stronger outlook for CCS than in previous years. Compared to 2019 (56%), more respondents (62%) now believe that the oil and gas industry should drive CCS adoption forwards immediately, and not wait for government policies and incentives. More than half (56%) think that there will be a significant increase in investments in CCS within the oil and gas industry over the next five years.

"There really has been a change in 2019," says Ernst Axelsen, managing director of Technology Centre Mongstad, the world's largest facility for testing and improving carbon capture technologies. "Today, we find people are more interested, not just in the technology, but also in the business model and how to make it work. Our advisory services business is growing, and the collaborations we have now are more focused on practical ways to kick-start wider adoption of carbon capture. My feeling is that both governments and industry have an increased desire to move forwards."

Greater legislative support is needed to scale CCS, as it remains too costly to be implemented in most contexts. "Technologies like CCS are very high-cost. In practice, if it isn't mandated by law, nobody is willing to do it," says Hong tao Yan, deputy director-general at the China National Offshore Oil Corporation (CNOOC), East of South China Sea Oilfield Bureau. "If it becomes mandatory, for some less profitable oil plants, closure is the most likely result, so we support more market-driven solutions such as carbon exchanges."

**The industry needs clarity**

Almost three-quarters (73%) say oil and gas companies will decarbonize only if it makes financial sense for them - this finding is one of the few examples in our research that varies by less than five percentage points from the average across all regions and all parts of the value chain.

This is a strong indication from the industry that, despite the increased willingness of the industry to lead the way, legislative incentives (or disincentives) are required to create a level and predictable playing field for industry participants.

Furthermore, the growth in progressive attitudes towards decarbonization and renewables has not prompted any increase in optimism about worldwide alignment over climate action, according to our survey: 39% think there will never be a globally effective carbon price (no significant difference from 40% a year ago).

"I am more and more convinced that the only way we can decarbonize is with financial levers: a carbon dividend, a carbon tax, or similar," says Gerard Reid, co-founder and partner at of Alexa Capital. "But we need to put a very clear system in place that allows an oil and gas company to know where the price of carbon will be in 10 years' time. Then, the industry can manage its assets accordingly through this transition. That's what many in the industry want: real clarity around the regulatory environment."

48 Shell leads big oil in the race to invest in clean energy, Bloomberg: <https://bloom.bg/2u784rv>  
 49 Repsol is first oil major to pledge zero emissions by 2050, Bloomberg: <https://bloom.bg/2v1pgzc>  
 50 Equinor pledges to slash greenhouse gas emissions in Norway, Financial Times: <https://on.ft.com/2sB9ie9>  
 51 Repsol will be a net zero emissions company by 2050, Repsol: <http://bit.ly/2u8sHnc>

52 How hydrogen could solve steel's climate test and hobble coal, Bloomberg: <https://bloom.bg/2ub0l6u>  
 53 Hydrogen powered mining trucks are coming, PV Magazine: <http://bit.ly/37cuCWE>  
 54 This company wants to fill the skies with hydrogen-powered planes by 2022, The Verge: <http://bit.ly/2uakrrd>  
 55 Source and scale are biggest challenges as hydrogen interest grows, S&P Global Platts: <https://bit.ly/37lhtk42>

# 04

## THE INDUSTRY'S DIGITAL LEADERS ARE CONFIDENT, RESILIENT, AND EFFICIENT

The digitalization of the oil and gas industry continues at pace, despite both short-term uncertainty, driven by the oil and gas supply-demand equation, and long-term uncertainty about the rate and dynamics of the global energy transition. Digitalization has been key to efforts to improve efficiency since the 2014 downturn, but it is a trend far from its peak potential, and one that will be increasingly important as renewables become more competitive.

Rystad Energy, an independent energy consulting service, estimates that digitalization and automation could save 10% – some USD 100bn of the current USD 1trn – of the combined budget upstream organizations globally have allocated to opex, wells, facilities and subsea installations.<sup>56</sup> In a recent example, BP used digital tools to optimize the use of progressive cavity pumps on its floating production storage and offloading vessel, Glen Lyon, operating in the North Sea. The solution allowed BP to produce an additional 20,000 barrels of oil per day, roughly equivalent to an added USD 400m in annual revenue.<sup>57</sup>

“In our industry today, we waste so much time redoing things,” says Julie Cranga, VP subsea at TechnipFMC. “We are too document-centric; engineers have to spend too much time trying to access reliable information. We see digitalization as a way to solve these issues, boost our efficiency, and reduce our costs. It is also a way to help us reduce the number of people we have offshore. This is mostly because we want to limit risk, but it also helps lower costs.”

Cranga also points to other ways in which digitalization projects are motivated by more than cost savings: “It can help us unlock new possibilities; for example, a more reliable design, or a way to reduce risk, or using operational data to improve our performance in designing field architecture and subsea products,” she says.

Benefits are available throughout the value chain. For instance, gas transportation provider, the Oman Gas Company, has used a centralized digital platform to improve reliability performance by 9%.<sup>58</sup> Further downstream, in Rotterdam, at Europe’s biggest refinery, Shell uses machine learning to analyse data from 50,000 sensors and predict problems before they happen.<sup>59</sup>

Almost all respondents (92%) in our survey expect either to increase or maintain their level of spending on digitalization in 2020. When we look purely at the expectation of increased spending, we see a strong and steady rise in investment over the past four years, from 39% for 2017, up to 65% for 2020.

### The strategic priority of digital technology

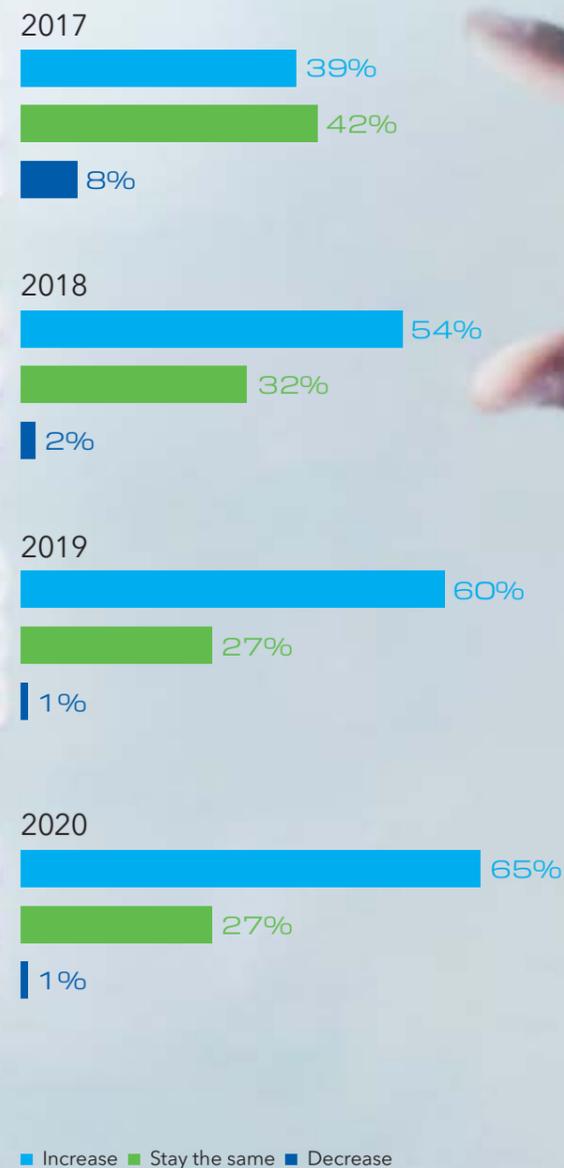
Digitalization aligns with several strategic priorities for oil and gas organizations. For example, operators can use digital tools to improve recovery rates and extend the life of existing assets, rather than launching large-scale, long-burning greenfield investments. Further downstream, gas networks can use real-time demand models to reduce costs and carbon emissions, while increasing their adaptability to future trends.<sup>60</sup>

In fact, some believe that digitalization will help the industry raise recovery rates from 30-40% up to 60% or more.<sup>61</sup> In our survey, 85% expect to maintain or increase spending on efficiency of assets in operation in 2020, while most (80%) will also maintain or increase investments to extend the lifespan of existing assets.

MODEC has reduced equipment downtime by using advanced analytics and artificial intelligence (AI) on data from its fleet of floating production, storage and offloading (FPSO) units in Brazil. “We tested several models,” says Soichi Ide, vice president, Latin America and Ghana, chief digital officer of MODEC Group. “There were many challenges – AI is not magic, people often don’t understand what is involved – but it delivered useful insights that we then built into our management system. AI is now just one of our tools for operations excellence.”

The project was so useful that MODEC immediately decided to scale it up across most of its Brazilian fleet – some seven FPSOs – as well as another two in Ghana. “Now, we have connected nine FPSOs into our cloud-based data platform and we are ready for the next phase, where we will look at production optimization,” says Ide. For MODEC, opex savings are small compared to the potential impact of production optimization. As Ide puts it: “If we improve production by just 1%, then that is huge in terms of the financial results for the business.”

Extent to which respondents expect their organizations to invest in digitalization, by year



56 The oil industry can save \$100bn on digitalisation: Rystad Energy, OilandGasMiddleEast.com: <http://bit.ly/30uV6Qw>

57 Digital transformation strategy advances in oil and gas, IoT World Today: <http://bit.ly/2udsJdm>

58 Case study: Oman Gas Company digitalises its reliability and integrity programme, OilandGasMiddleEast.com: <http://bit.ly/2bGxiS>

59 AI sensors keep fuel flowing at Europe's largest refinery, Financial Times: <https://on.ft.com/37504FX>

60 Real-Time Networks, SGN: <http://bit.ly/3apLXNx>

61 Is digitisation the fourth stage of the hydrocarbon revolution?, Financial Times: <https://on.ft.com/2Rsj4YC>

### Profiling Digital Leaders and Digital Followers

In our 2020 outlook survey, for the first time, we asked respondents to tell us whether they would classify their organizations as industry leaders in digitalization – just 21% said they would.

In the following analysis, we will call these organizations ‘Digital Leaders’, while ‘Digital Followers’ will refer to the 40% who indicated that their organizations are not leaders (the remaining 39% were neutral or unsure and are excluded in this analysis).

At a high level, Digital Leaders and Followers come from all parts of the oil and gas value chain, though the integrated oil and gas and oil-refining/gas-processing segments have more Digital Leaders than average.

Latin American respondents were the least likely to report their organizations to be Digital Leaders – just 8%, compared to the average of 21% – and more likely to classify as Followers (56%, compared to 40% overall).

Digital Leader organizations are also more likely to be publicly listed companies than privately held or state-owned organizations, and are more likely to be larger organizations (i.e. those with over USD 5bn in annual revenue).

So, how do Digital Leaders differ from Followers in respect of their digital strategy and outlook?

- Increased their focus on digitalization over the past year: 95% of Digital Leaders; 59% of Digital Followers
- Digitalization has had a transformative impact on the organization: 80% of Digital Leaders; 40% of Digital Followers
- Digitalization is critical for the organization’s survival: 85% of Digital Leaders; 58% of Digital Followers
- Respondents understand why their company is digitalizing: 93% of Digital Leaders; 69% for Digital Followers
- Prioritizing improvement of data quality and availability in 2020: 90% of Digital Leaders; 55% of Digital Followers.

### A proxy indicator for confidence, resilience, efficiency and responsibility

The striking feature of these findings is the total commitment of Digital Leaders to their digital transformation efforts, and the priority it will have in their strategies for 2020.

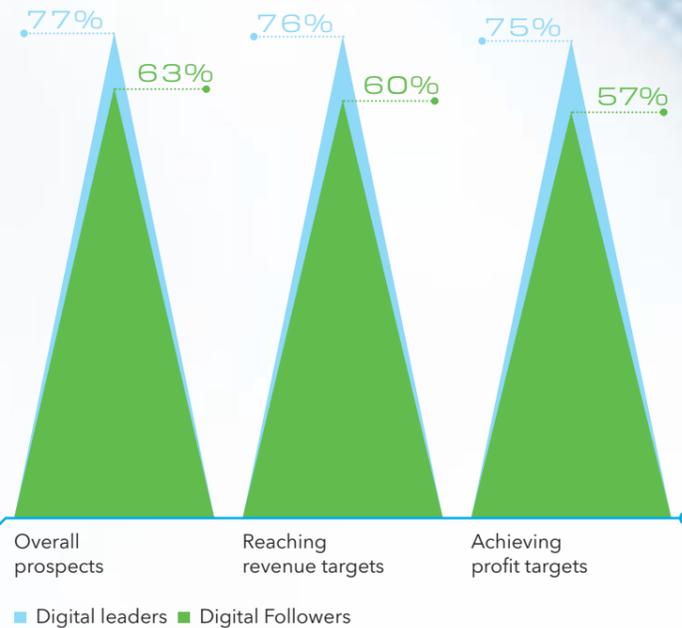
However, our research also reveals intriguing points of difference between the two groups that stretch far beyond technologies. In fact, digital leadership is a strong proxy indicator for many other organizational attributes.

For example, Leaders (77%) are more confident about industry growth in 2020 than Followers (63%), and they have a similarly higher optimism about their own organization’s prospects for the year ahead.

“Over the last few years, the Internet of Things has combined with massive computation capacity and virtually free storage. It has made it possible to make use of the massive amounts of data in the oil and gas industry.”

**Eirik Wærness**, senior vice president and chief economist, Equinor

### Digital Leaders' and Digital Followers' confidence for their own organizations in 2020



### Investment priorities: Digital Leaders vs Digital Followers

■ Digital leaders  
■ Digital Followers



Far more Digital Leaders also say the overall prospects for their organizations improved in 2019 (72%) compared to Followers (54%), which could reflect gains made in efficiency and the benefits of more data-driven decisions.

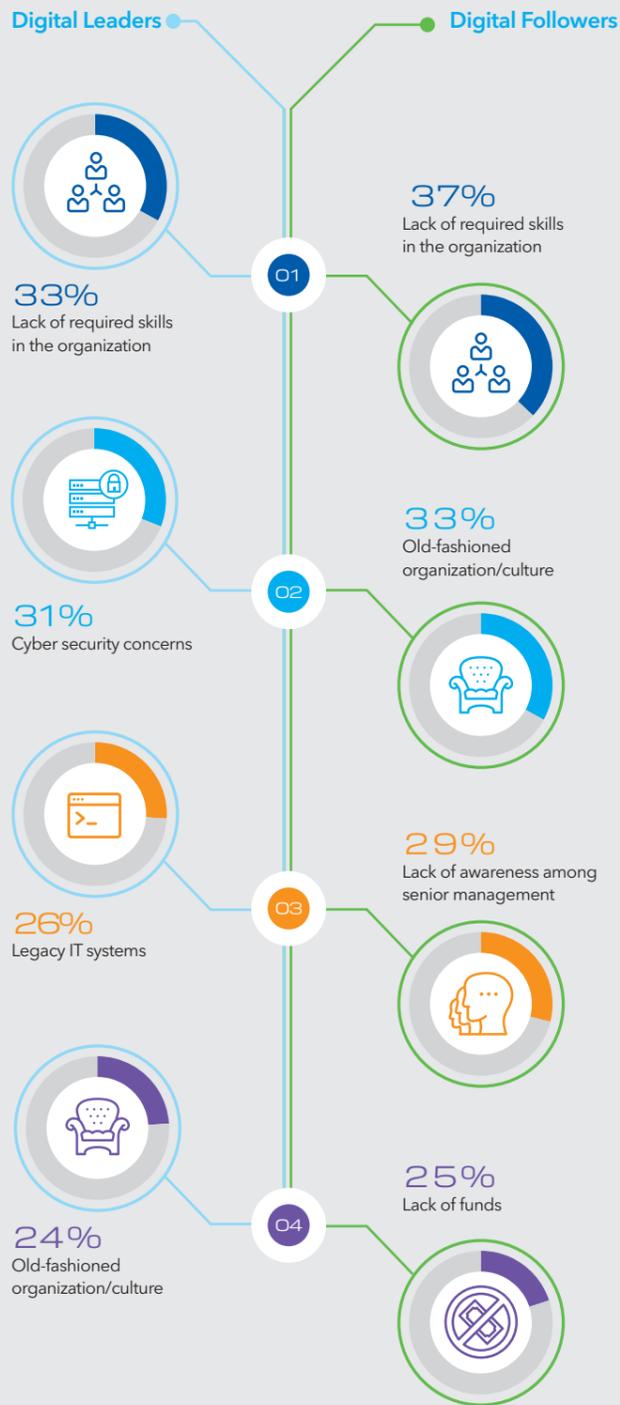
Efficiency is a primary goal in many digitalization projects and achieving greater efficiency appears to have helped Digital Leaders build more resilient organizations: significantly more Digital Leaders (58%) than Followers (43%) are able to say that they would make acceptable profits even if the oil price averages less than USD 50 per barrel in 2020 (Brent-WTI average).

To summarize, these initial findings show that Digital Leaders appear to be in a stronger business position than Followers, but there are several more strategic differences:

### Leaders are focused on the long term

- Fewer Digital Leaders (38%) than Followers (47%) claim to be more focused on short-term than long-term strategies
- More Leaders (77%) than Followers (63%) say that their cost-efficiency initiatives made since 2014 have become permanent changes
- Leaders (92%) are more likely than Followers (76%) to increase/maintain spending on R&D (as well as almost every other spending/investment area) in 2020.

**Top four barriers for Digital Leaders and top four barriers for Digital Followers**



**Digital Leaders are clean energy leaders**

- Digital Leader organizations are actively adapting to a less carbon-intensive energy mix (75%) at a far greater rate than Followers (50%)
- More Digital Leaders are increasingly focused on opportunities outside of oil and gas (59%) relative to Followers (47%)
- Leaders (81%) are more likely than Followers (64%) to be planning to invest in and/or develop a range of renewable energy sources.

**Digital Leaders are creating attractive workplaces, particularly for younger talent**

- Far more Leaders (75%) than Followers (50%) claim their organizations listen to and act on employee input to make their companies a better place to work
- Leaders and Followers agree that the industry is struggling to attract young employees (56% and 57%, respectively), but far more Leaders (74%) than Followers (43%) say their own organizations are attractive to young people. This suggests that digitalization leadership (and these associated characteristics) could make organizations more attractive to the next generation of talent.

Digital Leaders and Digital Followers have some different challenges ahead in terms of moving digitalization forwards, but they have their top barrier in common: a lack of the required skills.

“Leading digital companies seem likely to have a more innovative culture in place. They seem more open to new ideas, to talking with different people, involving other organizations. We are perhaps seeing organizations that have a broadly innovative approach, and digital is just one aspect of that.”

**Liv Hovem**, CEO, DNV GL - Oil & Gas

**Digitalization is driving greater collaboration**

Three-quarters of Digital Leaders (74%) report that, in 2020, they will increase the scale of their collaborations with other organizations, compared to 63% for Digital Followers.

A case in point is the recently announced partnership between US energy multinational Chevron, international oilfield services firm Schlumberger, and computer software and electronics multinational Microsoft. The collaboration is designed to “dramatically accelerate the speed with which we [Chevron] can analyse data to generate new exploration opportunities and bring prospects to development more quickly and with more certainty,” according to comments at the launch by Joseph Geagea, executive vice president of technology, projects and services at Chevron.<sup>62</sup>

Further initiatives are also likely to be fruitful, particularly in helping to break the data silos that exist between organizations involved in projects together. “There is no standard yet in how we collaborate,” says TechnipFMC’s Julie Cranga. “First, people were thinking that we all needed to use the same system to exchange information, but that was not possible. So, companies are building different types of technologies, but we want to be able to share data. So everybody needs to leverage open and connected technologies with the ability to communicate through APIs. The level of maturity in the industry is diverse, however, and there are no standard data-exchange protocols, so this is an area very much under construction.”

There are signs that this construction is building momentum. In our survey, 75% of respondents say they will seek to achieve greater standardization of tools and processes to reduce costs in 2020, while 62% say they will increase the scale of collaborations with other organizations in the year ahead.

**Leaders and Followers align on some issues**

Two-thirds of Leaders (66%) and Followers (65%) agree that digitalization is not happening fast enough across the industry, and high numbers say their organizations need to embrace digitalization to increase profitability (85% for Leaders; 73% for Followers).

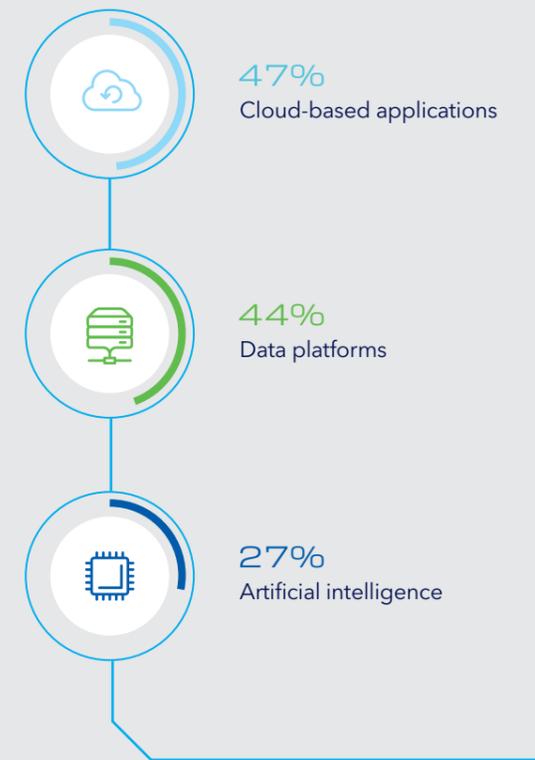
These findings suggest that Follower organizations do in fact recognize the value and importance of digitalization. There could be many reasons then for their lack of advancement. Some have made a strategic choice to wait until others prove the value of new technologies; other Followers face deficits that prevent modernization. Indeed, in our survey, the top three barriers to digitalization for Followers are a lack of required skills, an old-fashioned organization, and a lack of awareness among senior management. Leaders (85%) and Followers (83%)

agree that the industry needs to develop new operating models to achieve further cost efficiencies. But, only Leaders are actively building new ways of working that will help them to thrive in a more data-driven, automated, efficient, diversified and sustainable industry.

“I think that many people misunderstand the context of digital. Many just think of basic IT; some iPads, some software. But, it is the strongest tool we have to change our way of doing things. It is so significant that it challenges the majority of the executives in a company with the questions: Can you adapt? Can you change yourself to move with this disruption? Soon, those that cannot will struggle to survive in the industry.”

**Ide Soichi**, vice president, Latin America and Ghana, chief digital officer, MODEC Group

**Top three priorities for digitalization in 2020**



<sup>62</sup> Schlumberger, Chevron and Microsoft to transform energy sector, The Record: <http://bit.ly/3a0s89y>

# 05

## A NEW GENERATION IS RESHAPING THE OIL AND GAS WORKFORCE

Despite lessening in severity relative to 2019, skills shortages and an ageing workforce remain top-five barriers to growth for our survey respondents' organizations in 2020. Many workers that were released in the challenging years after 2014 were lost to other industries.<sup>63</sup> Compounding this, the industry cut back on apprenticeships and graduate recruitment during that time, limiting current ability to promote from within.<sup>64</sup>

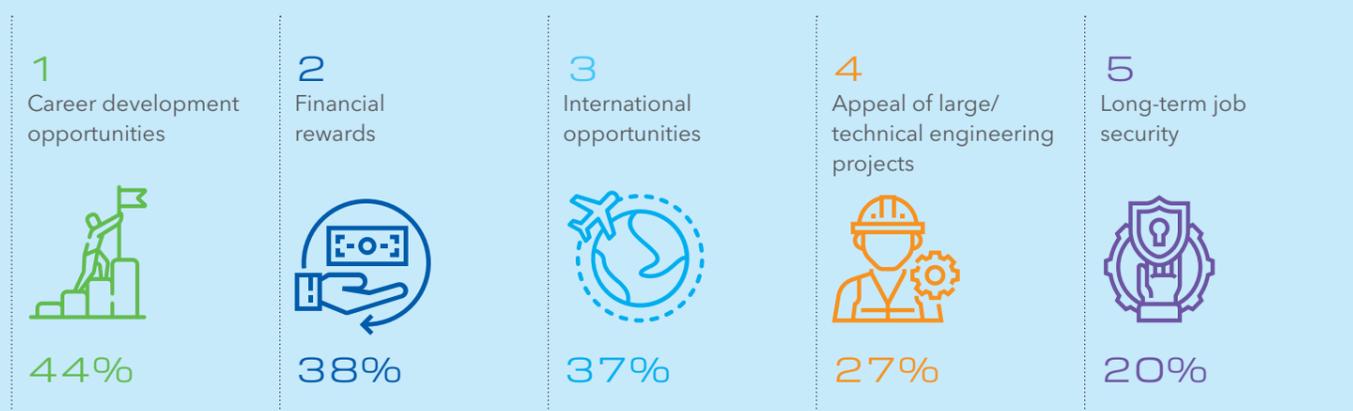
While some recruitment doors are opening again, attracting younger talent has become more difficult than ever.<sup>65</sup> Some 45% of respondents say that the industry will face a critical skills shortage in 2020, while more than half of respondents are currently concerned about losing talent to rivals (54%) and other industries (51%). So how do oil and gas companies retain the skills they have and attract a new generation of workers?

### Reasons for joining the oil and gas industry by sub-sector

Overall, career-development opportunities represent the biggest reason why respondents chose to join the oil and gas industry. There are, however, some key variations in what attracts people to different parts of the industry. For those from downstream organizations, long-term job security and better entry-level opportunities are bigger drawcards than in other parts of the

industry. International opportunities are less of a factor. Upstream respondents are attracted by the appeal of large or technical engineering projects to a greater extent than are the mid- or downstream. Meanwhile, financial rewards were not as big a factor for those in the midstream compared to other parts of the industry.

### Top reasons why respondents joined the oil and gas industry



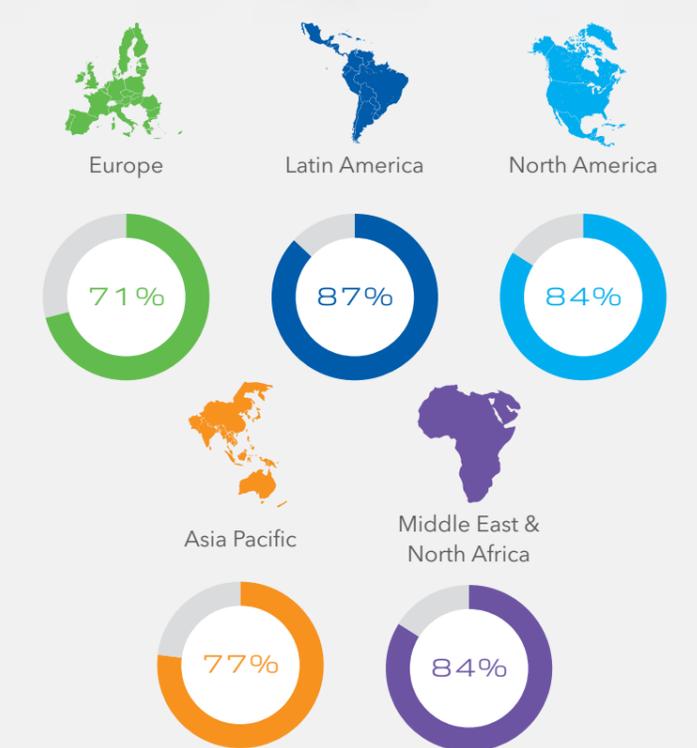
### Workforce requirements are evolving

Current and future workforce challenges are further complicated by the depth and pace of change in some parts of the oil and gas industry. The dynamics of the energy transition and the impact of digital technologies are often discussed at a high level, as features of business, economics, and the world's energy future. It is important to remember, however, how they affect the perspectives of people working in the oil and gas industry, as well as those considering joining it.

Digital transformation demands more than just new skills in the workforce. Organizations need to build whole new ways of working to accommodate the changes. "When you want to digitalize your organization, you are really looking at people processes," says Brice Le Gallo, regional manager for Southeast Asia & Australia, DNV GL - Oil & Gas. "You are looking to fundamentally change how you run your business, and this needs to happen through a lot of engagement with your people. Doing digital transformation without engaging with anyone doesn't lead to success." This kind of change often involves a cultural shift, as well as training, motivation, and reassurance. As Augusto Borella, digital transformation general manager at Brazilian petroleum multinational, Petrobras, put it: "We need to change fear to inspiration."<sup>66</sup>

At the same time, many organizations are also transforming towards a lower-carbon model, and increasingly integrating, or coupling, different energy carriers - such as electricity, gas, and end-use fuels - for electrical appliances, heating, mobility and industry. This, too, creates new demands on the workforce. "As a natural gas transport company, we have grown used to a monopolistic situation, rather than a challenging commercial business environment," says Hans Coenen, vice president, corporate strategy and business development at Dutch gas network company, Gasunie. "However, we are transforming now into an energy infrastructure company. So, we now want to develop carbon dioxide infrastructure, hydrogen infrastructure, heat infrastructure - all of which are not in a regulated environment yet. We need to gain the commercial skills to meet this challenge, to work in more joint ventures and with more partners. Then, there are operational skills, safety experts, and new practical skills needed to take on these new projects."

### Percentage of respondents who agree they are proud to tell people they work in the oil and gas industry, by region



63 Most laid-off energy workers remain out of work, UH study says, Houston Chronicle: <http://bit.ly/2G0Fyuv>

64 Oil and gas sector 'facing skills crisis', BBC: <https://bbc.in/2R5nYf1>

65 Oil has a millennial problem as talent pipeline trickles, Bloomberg: <https://bloom.bg/2touPaz>

We must head off anti-fossil fuel sentiment, warn industry bosses, Financial Review: <https://bit.ly/2v4xzKA>

66 Petrobras puts people at the heart of its digital transformation, DNV GL: <http://bit.ly/30yStgz>



### Profiling the next generation of leaders

We are in the early stages of what could be a sea change in the oil and gas industry, driven by digitalization and decarbonization. Younger workers will likely spend much of their careers steering their organizations through transformation.

Against this backdrop, it is interesting to consider how those newer to the workforce differ from those in the later stages of their careers, particularly as this can offer us insights into what it will take to restructure the workforce and drive future growth.

We explored these differences by analysing the responses to our survey from two specific groups: those with 10 years' or less experience in the oil and gas industry, and those with more than 30 years' experience. The first group (which we will call 'Shorter Tenure') give us indications about the perspectives of future leaders, while the second group ('Longer Tenure') represent the views of the incumbents at the helm.

Shorter Tenure will most often be younger, while Longer Tenure will generally be over 50 years of age. Shorter Tenure are understandably less likely to occupy top-level roles at present. In our survey, they were more likely than average to be technical specialists or mid-level managers. Half (50%) of Longer Tenure are in top-level senior roles (e.g. C-suite, senior vice president, director, head of unit or head of country), compared to 23% of Shorter Tenure.

### Digital differences

As one might expect, Longer Tenure do not give digitalization the same level of importance as those with Shorter Tenure. Many more Shorter Tenure respondents (74%) believe that their organizations need to embrace digitalization to increase profitability than do Longer Tenure (62%). There is an even greater divergence around whether digitalization is critical to their organizations' survival, with 71% of Shorter Tenure respondents believing this, compared to just 57% of Longer Tenure respondents.

Shorter Tenure are also more likely to think digitalization is not happening fast enough across the industry (63% vs 49%) and that digitalization has already had a transformative impact on their organization (57% vs 39%).

These are significant differences, particularly when you consider that there are many people that buck the stereotype for their age group - from younger workers that lack any kind of digital aptitude<sup>67</sup> to a range of older digital champions.<sup>68</sup> Such large divergences suggest that there are fundamental differences in how these Shorter and Longer Tenure groups perceive the value, potential, and urgency around digitalization.

### Divergence on decarbonization

Shorter Tenure respondents are more likely than Longer Tenure respondents to want their organizations to move faster to reduce their carbon footprint. They have also become more concerned, in the wake of climate change activism, about their organizations' environmental impact, and believe the industry should drive CCS technology adoption (rather than wait for regulations). They are also less likely to feel personally aligned with their organizations' environmental policies.

This suggests that companies that have progressive attitudes to decarbonization may have greater success at attracting new talent.

"I think it is becoming harder to convince young people to work in the oil and gas industry," says Frank Ketelaars, regional manager for the Americas at DNV GL - Oil & Gas. "This makes some level of diversification into renewable energy a very important part of the story that energy companies tell to attract new talent. It shows that there is a pathway where, at some stage, the company will move with the energy transition to a lower-carbon future, so people can feel they are involved in a positive shift for tomorrow, while also serving today's energy needs. Without this, it could be more difficult to convince people that our industry is responsible and committed to the energy transition."

"It has become extremely difficult for us to hire young workers in China. We need designers and project managers for our deepwater platforms. On the other side of things, we also face a shortage of workers such as welders, cutters, painters and offshore maintenance workers. Not many millennials want to do this kind of work. So, we have to offer higher salaries for our deepwater employees, while also cooperating with small companies to access contractual workers. There is no better solution at present."

**Hong tao Yan**, Deputy Director-General, China National Offshore Oil Corporation (CNOOC), East of South China Sea Oilfield Bureau



The effect of tenure on respondents' sentiment towards digitalization at their organization



67 The perception and reality of digital skills, ICDL Foundation: <http://bit.ly/2u7NN5g>  
 68 No longer just for the young: 70% of seniors are now online, World Economic Forum: <http://bit.ly/377O7zg>

**The effect of tenure on respondents' sentiment towards decarbonization**



**Changes that can draw in a new generation**

Our research suggests that progressive stances and tangible steps forward on both digitalization and decarbonization can potentially help attract and retain young talent. At the same time, our survey shows that all the universally applicable boxes need to be ticked, from remuneration to long-term progression opportunities.

"The younger generation are just as diverse as the older generation, so it's not like one answer fits them all, but I think many of them just want to have a job in which they can learn and develop," says Liv Hovem, CEO of DNV GL - Oil & Gas. "I don't feel that they are reluctant to work for oil and gas companies *per se*, but they want to see their company driving towards decarbonization. It is important that a company is perceived as modern, up-to-date with technology, and aligned with social priorities."

More respondents from downstream organizations say their organization is attractive to young people (60%) than either midstream (55%) or upstream (49%). Those from downstream organizations are also more likely to be Digital Leaders, and more likely to be actively adapting to a less carbon-intensive energy mix, which supports our hypothesis of these trends being key to attractiveness. However, there are also examples of organizations driving efforts proactively in local communities, which can help to attract talent.

"We think a lot about workforce resilience in our organization," says Paul Denniff, network and safety director at UK gas distributor, SGN. "We work on retaining critical knowledge in the business, and simultaneously recruit graduates and trainees to ensure we train the next generation. We've now

recruited well over 200 apprentices. We're also looking at how we can promote STEM [Science, Technology, Engineering and Mathematics] ambassadors. We do a lot of work with an organization called Solutions for the Planet, for which managers within SGN go into secondary schools and mentor students."

Downstream organizations also have many projects in motion that are decarbonizing gas supplies and helping to build a sustainable energy future. Gasunie's Coenen explains how his firm's transformational projects, particularly those related to decarbonization, are attractive to younger people. The company has its headquarters in the northern part of the Netherlands, but needs to attract people to the western parts of the country, where most of its decarbonization-related projects are carried out. "It is a competitive environment for young talent, so what can we offer? I think we can offer a challenging working environment with a company that's contributing to a new energy world. Younger people really don't want to work for an old-fashioned natural gas company anymore; they want to work on building the infrastructure for a sustainable future."

Shorter Tenure respondents are inheriting an industry in flux. The contrast between their outlook and those of our most experienced respondents has offered us a glimpse of how the industry will change, and how future leaders will prioritize key issues in the decade ahead. Above all, our findings show that oil and gas industry organizations need to prioritize their attractiveness as employers - particularly towards younger people - in order to prevail in the competition for talent. As Denniff says: "There's no point having a great asset management plan if you don't have the human resources to fill the roles."

**Oil and gas industry skills in greatest demand in 2020**

Widespread digitalization is creating strong competition for specialist talent. Among our respondents, artificial intelligence (AI) and data specialists are the second-most in demand types of workers - and the number one for North America - from a list that includes all aspects of oil and gas operations. Software developers are also in demand, ranked fifth overall. Project managers, risk management professionals, and subsea engineers round out the top five skills in demand for 2020.



## CONCLUSION: ADAPTING TO GRASP NEW OPPORTUNITIES

From some perspectives, the oil and gas industry has settled into a new era. As Mark Paton, chief operating officer at Hibiscus Petroleum Berhad, puts it: “The companies that have survived the downturn have cut costs and gained more control of their operations. The market has been less active, so prices in the supply chain are down. It seems like we’ve reached a new equilibrium. It’s a new world now, essentially.”

The growing forces of change are undeniable. Crucially, though, the progress the industry has made in recent years gives it the strength to handle surprises and transform change into opportunity. “The bulk of the industry’s cashflows, and thereby our ability to invest, is driven by oil and gas; that hasn’t changed,” says Equinor’s Eirik Wærness. “But, at the same time, the improvement that we’ve seen in cashflows, and the overall financial strength in the oil and gas industry over the years since the crash of 2014, has given us more confidence to make wider investments, whether its transformational digitalization projects or daring to do more with renewables.”

On the basis of our research, the oil and gas industry certainly appears ready to dare further into renewables in 2020, and in decarbonizing hydrocarbon operations and products. However, there are serious questions being raised about the political and regulatory frameworks needed to support these endeavours. “People are talking a lot about the energy transition and there is economic and commercial pull building in the supply chain and from customers themselves – this is exciting, but government policy and regulations are lagging,” says Elisabeth Brinton, global vice president, strategy & portfolio, at Shell New Energies.

“Things like carbon pricing have, unfortunately, become a partisan or political issue. This is slowing down the industry’s ability to have clear line of sight to future business models. Our projects are very capital-intensive and so we all need support and certainty from regulators and lawmakers.”

“There’s no emphasis on the demand side. That’s the biggest issue. The tax and incentive frameworks in Europe make clean energy uncompetitive against fossil fuels. As a customer in Germany, I have no incentive whatsoever to electrify my heat or install a heat pump. My electricity costs 30 cents and my gas costs five cents; that, to me, is a crazy disincentive. These are major issues that people just don’t talk about enough. The incentives need to encourage the rational customer to decarbonize.”

**Gerard Reid**, co-founder and partner, Alexa Capital, and member of the World Economic Forum’s Global Future Energy Council

### Adapting to the present and the future

Golfers say, “Every shot pleases somebody.” A ball in the water, for instance, gives one player a penalty but creates opportunity for another. This is how it seems in the oil and gas industry, too, where a diverse range of strategies, public policies, and prices can support benefits for some and make problems for others.

Market volatility, for instance, a negative for many in the industry, allowed Netherlands-based Vitol, the world’s largest independent commodities trading company, to make approximately USD 1bn in profits in just the first six months of 2019.<sup>69</sup>

Or, consider the recent fortunes of Chesapeake Energy, once a leading light in the US shale sector. In late 2019, Chesapeake warned that its business would not be viable if oil and natural gas prices continued at low levels.<sup>70</sup> At the same time, the shale boom to which Chesapeake contributed, and which has kept oil and gas prices down, has also produced an abundance of cheap ethane, a by-product of oil and gas refining. Ethane is a primary ingredient in the manufacture of plastics, and so this market dynamic has created a boom in the plastics industry, with more than 300 new petrochemical and plastics plants planned or under construction in the US alone.<sup>71</sup>

We may see more volatility and low prices in 2020; the trends of 2019 may last through the 2020s. Or, this new equilibrium could be disrupted by shock economic policies, conflict, natural disasters, new regulations or technology breakthroughs. Whatever the year – and the decade – ahead holds for the oil and gas industry, the winners will be the organizations that leave the past behind them, react to the present, and adapt to thrive in a more data-driven, automated, low-carbon future.



“We shall keep steady growth going in terms of oil and gas exploration, development, and capital expenditure in China. At CNOOC, our highest priority has become building investment in exploitation, followed by boosting production of our current oil plants. Cost control might be third in priority.”

**Hong tao Yan**, deputy director-general, China National Offshore Oil Corporation (CNOOC), East of South China Sea Oilfield Bureau

<sup>69</sup> Vitol emerges as big winner from volatile energy markets, Financial Times: <https://on.ft.com/2ufcAEC>

<sup>70</sup> Fracking pioneer Chesapeake Energy warns it might not outlast natural gas slump, Dallas Morning News: <http://bit.ly/2u79UZr>

<sup>71</sup> The U.S. natural gas boom is fueling a global plastics boom, NPR: <https://n.pr/2TzPRh1>

# A DECADE OF OUTLOOK RESEARCH

To mark this 10th anniversary edition of our oil and gas industry outlook research, we have brought together selected insights and findings from previous reports. These capture the evolution of market forces, trends, and industry sentiment at key stages of the last decade: from the booming market prior to 2014, through the industry downturn, and on to the more efficient, transforming industry of today.

Top barrier to industry growth, by year



Rising costs



Skills shortages and/or ageing workforce



Competitive pressure



Oil price

## 2011 Deep Water Ahead?

Ten years ago, we opened the very first industry outlook report with words that are also quite well-suited to current circumstances: *"The oil and gas industry has faced significant challenges over recent years. Unprecedented volatility - with record prices followed by a crash and then a slow recovery."*

Many believed ultra-deepwater, arctic and other extreme environments would become more important: *"An overwhelming majority (70%) of our respondents believe that a growing proportion of oil and gas projects will be located in geographically challenging terrain."*

Meanwhile, there was a growing appreciation of the importance of natural gas as a key fuel for the energy transition: *"Natural gas has gained widespread credibility as a relatively low-carbon 'transition fuel', especially for electricity generation. Global demand for liquefied natural gas has grown as countries in Asia and Europe have sought to increase their supply options."*

## 2014 Challenging Climates

Signs of uncertainty were creeping in when we conducted our 2014 research, which was published before the oil price drop in that year: *"Nearly a fifth (18%) of those polled for our survey agree that the prospects for growth in 2014 are less certain than they were last year. A further 38% say they are unsure."*

While confidence in industry growth was still extremely high (88%), the rate of investment was slowing: *"The proportion of companies planning to increase investment in new projects has now declined for three years in a row. Over three-fifths (62%) of respondents say they face growing pressure to extend the life of existing assets and increase the return on these investments."*

Despite this, respondents remained confident of meeting revenue and profit goals: *"Overall, 72% of respondents think they will hit next year's revenue targets, slightly up on last year. Marginally fewer (69%, compared with 70% in 2013) expect to hit profit targets."*

## 2012 Big Spenders

In 2012, the industry remained committed to exploration: *"A majority of respondents identify the upstream as the key area for business growth in 2012, meaning that exploration will be a major beneficiary of increased investment."*

The industry continued to adapt to changing regulatory frameworks following the Deepwater Horizon oil spill of 2010: *"A combined 55% of respondents confirm that in the aftermath of the 2010 oil spill in the Gulf of Mexico, drilling permits have become harder to obtain. Even more decisively, an overwhelming majority of respondents (82%) agree that in the post-Macondo period regulatory issues have become more important."*

Rising operating costs were the main barrier to growth in 2012: *"When questioned in detail about costs, more than 50% of respondents say that they expect an increase in wages over the next 12 months. The second-biggest concern is the rising cost of contractors, with 54% expecting costs to increase, compared with only 11% anticipating a decline."*

## 2015 A Balancing Act

By early 2015, oil prices and industry confidence had crashed: *"Just 28% of our respondents remain confident about the oil and gas industry, sharply down from 88% in 2014, and a high of 89% in 2013."*

The industry cut costs across the board but still needed to find new ways to build operational efficiency: *"Rising costs and a tighter squeeze on margins are driving an urgent need for creative ways to save money, including the adoption of new technologies."*

With the industry in survival mode, most new investment was cancelled or postponed: *"A far smaller proportion of companies in the industry is planning to increase capital investment in 2015 - falling from a high of 63% in 2012, to just 12% this year, although a further 33% will keep spending at 2014 levels."*

## 2013 Seismic Shifts

There was near universal confidence about growth in the oil and gas industry in 2013 - the highest level recorded in the 10 years of this research: *"Overall, nearly nine in ten (89%) of the industry professionals polled for this study are confident about 2013 overall, up from 76% in 2011 and 82% in 2012."*

Confidence was unaffected by signs of increasing risk: *"Despite a heightened risk profile, increasingly tough regulation and fiscal terms, weak gas prices, and ever more challenging exploration frontiers, our research finds confidence to have risen."*

Skills shortages became the top barrier to growth in 2013, further adding to cost pressures: *"For those who are bumping up spending, a challenge still remains in finding the right people, skills and experience to deploy this. Skills shortages now tops the list of key barriers for the year ahead. In turn, this becomes another pressure that bumps up costs. Elsewhere, tougher regulation is also raising costs."*

## 2016 A New Reality

The year 2016 began with the lowest oil price in 12 years and there was little hope for a quick recovery: *"Some 73% of survey respondents said that they were preparing their company for a sustained period of low oil prices, and more than four in ten (42%) believed that oil prices would not increase in 2016."*

Cost reduction efforts had been successful, but deeper cuts were planned: *"Three quarters (74%) of survey respondents said that they were either highly successful or somewhat successful in reducing costs in their businesses last year. Nearly nine out of ten (88%) said that cost reduction would be top, or a high priority, for them in 2016. This is up from 85% last year."*

Organizations needed to strike a challenging balance: *"Companies across the value chain continue to struggle with finding the correct balance between making cost-efficiency gains in the low-oil-price environment, while still focusing on their long-term goals. Over half of respondents (56%) said that the oil and gas industry is repeating many of the same mistakes made in prior price downturns."*



# 2017

## Short-term Agility, Long-term Resilience

Like the oil price, industry confidence stopped falling in 2017, but it remained dramatically lower than preceding years, and there was little consensus on whether the worst was over: "Companies need to figure out when the new normal begins: has the oil price now bottomed out, or is there more to come? While 27% believe the worst of the price falls are over, 42% disagree."

A defining feature of 2017 was the increasing speculation about the ultimate future of oil and gas, with much debate and uncertainty about when oil demand would peak: "Beyond cyclical patterns, there are signs that recent years could be the beginning of a new reality for oil and gas companies. As we begin 2017, much of the industry is focused not just on surviving the low prices, but also on reorganizing for a new era."

Renewable energy prices continued to fall, but natural gas remained key to future plans: "Five years ago, nobody would have believed that half a million solar panels would be installed every day in 2015. Or that, in that year, China would install two wind turbines every hour. If this trend continues, will the world leap-frog gas and go directly to renewable sources? Not according to our survey respondents: 77% expect gas to become a more important component of the global energy mix over the next 10 years."

# 2018

## Confidence and Control

In 2018, as oil prices stabilized, a fresh sense of optimism emerged in the oil and gas industry: "Looking ahead, 63% of the senior oil and gas professionals we surveyed are confident about growth in the industry. This is a long way off the 88% we recorded ahead of 2014, but it is nearly double the 32% we reported just one year ago."

Although confidence was returning, it seemed most likely that the industry of old was not: "Leaders are actively evolving their organizations - shifting from an expansion mindset to margin mindset - and implementing new models and technologies to improve operational efficiency."

Our research indicated that commitments to sustainability are increasingly linked to positive growth prospects: "Sustainability is a high or top priority for more respondents from companies that expect to meet their profit targets (64%) as opposed to those that do not (35%). Overall, the top three drivers of sustainability initiatives are all related to commercial success: business opportunities (40%), reputation and brand (39%), and competitive advantage (36%)."

# 2019

## A Test of Resilience

Stronger operating models and market fundamentals supported a positive outlook for the industry in 2019, signalling a renewed focus on capital-intensive investments: "Some 70% of respondents are looking to maintain or increase capital expenditure in 2019, up from 66% in 2018, and just 39% in 2017. Two-thirds (67%) also say that more large, capital-intensive oil and gas projects will be approved in 2019 than in 2018."

Respondents reported increased confidence in the industry - more than double the levels of 2016 and 2017 - as well as rising optimism about the prospects for their own organizations: "Three-quarters of global respondents (74%) are enthusiastic about the prospects for their own organizations in 2019, up from two-thirds (66%) in 2018. This is similarly reflected in the confidence that respondents have in hitting both their revenue (69%) and profit (62%) targets - each up eight percentage points, compared to 2018."

Much of the industry's research and development spend was focused on using digitalization to enhance efficiency: "The industry is looking to digital technology to provide the long-term efficiency gains it needs to maintain its competitiveness over the declining cost of renewable energy in the coming decades. Three-quarters (73%) now say that their organizations need to embrace digitalization to increase profitability, compared to 49% in 2017."

# 2020

## New Directions, Complex Choices

For 2020, confidence in industry growth has stalled, but the industry remains resilient: "Two thirds (66%) are confident of industry growth in the year ahead, down from 76% for 2019. This is still a strong majority, confirming the new-found resilience to lower prices and volatile markets that we reported last year."

Attitudes to decarbonization have shifted significantly: "In our survey, the percentage of respondents reporting that their organizations are actively adapting to a less carbon-intensive energy mix has jumped from 51% to 60% in one year. The proportion expecting to increase or maintain investment in decarbonization has leapt to 71% for 2020, compared to the 54% expected for 2019."

Increasing the breadth and scale of digital tools is a near universal priority in the industry: "Almost all respondents (92%) in our survey expect either to increase or maintain their level of spending on digitalization in 2020."

Percentage of respondents who expect their organization to increase capital expenditure, by year



Oil price vs confidence for industry growth, by year



Oil price calculation: average oil price (WTI, Brent) during relevant fieldwork periods (Source: eia.gov)

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**ABOUT DNV GL**

DNV GL is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. Operating in more than 100 countries, our professionals are dedicated to helping customers in the maritime, oil and gas, power and renewables and other industries to make the world safer, smarter and greener.

As the technical advisor to the oil and gas industry, we bring a broader view to complex business and technology risks in global and local markets. Providing a neutral ground for industry cooperation, we create and share knowledge with our customers, setting standards for technology development and implementation. From project initiation to decommissioning, our independent experts enable companies to make the right choices.