

TURMOIL AND TRANSFORMATION

The outlook for the oil
and gas industry in 2021



ABOUT THE RESEARCH

Turmoil and Transformation is an industry benchmark study on the outlook for the oil and gas industry in 2021. The research is published by DNV GL, the technical advisor to the sector. DNV GL's Industry Outlook was launched in 2011 and is now in its eleventh 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 more than 1,000 senior industry professionals and executives, along with in-depth interviews with a range of experts, business leaders, and analysts.

The research was conducted during November and December 2020. It was carried out by teams from DNV GL and Longitude (a Financial Times company). The organizations surveyed vary in size: 32% had annual revenue of USD 100 million (m) or less, while 27% had annual revenue in excess of USD 1 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.

Acknowledgements

We extend our thanks to all participants, and, in particular, to the following interviewees for sharing their time and insights with us:

Wendy Brown,
environment director,
International Association of
Oil & Gas Producers (IOGP)

Michael Cohen,
chief US economist and head
of oil analysis, BP

Erlend Fjøsna,
head of innovation and digital
partnering – information and
digital services, TechnipFMC

Li Gang,
chairman and general
manager, Sinopec Yanshan
Petrochemical Company

Ahmed Heikal,
chairman and founder,
Qalaa Holdings

Jane Liao,
vice president,
CPC Corporation

John Morea,
CEO, SGN

Chris Ong,
CEO, Keppel Offshore & Marine

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

Andy Samuel
CEO, The Oil and Gas
Authority (OGA)

René Schutte,
program manager hydrogen,
Gasunie

Eirik Wærness,
senior vice president and chief
economist, Equinor



1,010
senior industry
professionals
were surveyed



79
countries
represented



12
in-depth interviews
with industry experts



27%
of respondents had
annual revenue in
excess of USD 1bn



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CONFIDENCE FALLS HARD, AND THE INDUSTRY CONSIDERS WHETHER THIS DOWNTURN IS DIFFERENT

All oil and gas companies were challenged in 2020. Flights were grounded, fleets were parked, factories were closed and workers stayed home. By March, global demand for oil and gas products and services had been decimated. The Russia-Saudi Arabia price war forced an oversupply disaster, collapsing prices and pushing US oil into negative territory for the first time in history.¹ The market crash left the entire oil and gas value chain in disarray. As the year progressed, demand and prices slowly stabilized, but far below the levels at the start of the year.

Our annual survey of senior oil and gas professionals shows how 2020 has taken its toll on the industry. Only 39% are confident about industry growth in 2021, and the same proportion (39%) are pessimistic. Just two years ago, 76% were confident and only 7% were pessimistic.

But there are some positives that the industry can take into 2021. The industry appears to be more confident about the year ahead than it was following the last oil price crash in 2014, when only 28% of our survey respondents were confident about industry growth in the year ahead – some 11 points lower than this time around.

Uncertainty over capex flows

Another difference is spending, where the industry is not hitting the brakes as hard as it did after the last crisis. While the proportion of respondents expecting to either maintain or increase capital expenditure (capex) in the year ahead has fallen to 62% – down from 72% going into 2020 – by the fourth quarter of 2015, a similar period (roughly a year) into the last downturn, it had fallen to 43%.

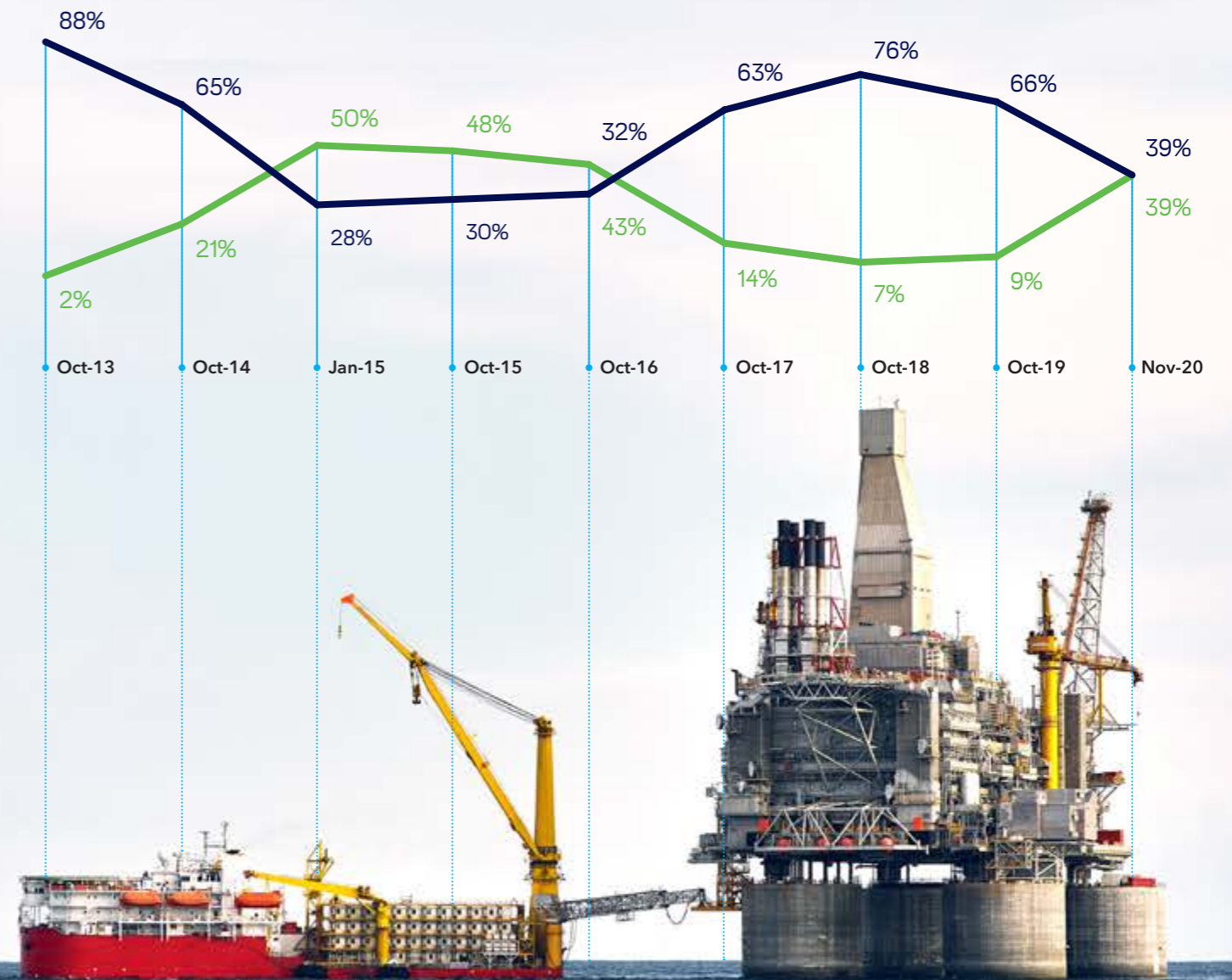
There are two possible explanations for this difference. On the one hand, the industry may be expecting the COVID-19 vaccination roll-out to prompt a strong and quick recovery in demand for oil and gas. In 2015-17, by contrast, there was an oversupply imbalance without the expectation of a sharp increase in demand, so it was reasonable then to expect a longer period of pain.

Another possibility, however, is that these more robust capex intentions are due to strengthened commitments to transformation into a lower-carbon energy system. Our research supports this, with greater expectations to increase capex among those who are actively adapting to a low-carbon energy mix (65% compared with 52%); meanwhile 57% of respondents overall say that their organization will increase investment in renewable energy projects in 2021.

Where companies do invest in oil and gas projects, they are likely to choose quicker and more flexible options. “For 2021, in a period of uncertainty, I would not expect companies to embark on any new multi-billion-dollar greenfield projects,” says Michael Cohen, chief US economist and head of oil analysis at energy major BP. “It will be a world for advantaged hydrocarbons, those with low marginal costs and short cycles – and that’s not just tight oil, it’s also tiebacks, brownfield redevelopments and enhanced oil recovery for example.”

Industry confidence and pessimism cross for the first time in four years

■ Net confident about industry growth in the year ahead ■ Net pessimistic about industry growth in the year ahead



1. US oil prices turn negative as demand dries up, BBC

Is it different this time?

It is not clear what a post COVID-19 world will look like. As US Federal Reserve chairman Jerome Powell said in late 2020: "We're not going back to the same economy."²

The idea that things are not going back to what we are used to has been a thread running through every theme of this year's research. "The oil and gas industry is used to being submerged under water during cyclical downturns – we hold our breath and then come up again when conditions improve," says Erlend Fjøsna, head of innovation and digital partnering at Technip FMC, a global oil and gas services company. "We are used to adapting, but this is not like what we are used to. This is a step change down in the total volume of projects. It is sustained lower demand and lower prices."

Aside from the shorter-term difficulties presented by the pandemic and the global economy, the outlook for the industry is also influenced by the possibility that – in fundamental, lasting ways – this downturn is different from those of the past.

This possibility is supported by the unique features of the oil price crash we saw in 2020. The wide reach of the pandemic and its resulting impact on demand, for example, makes the crisis more global than many of the past.

Another significant difference – compared with past downturns – has been the response of policymakers. In the first few months of the crisis, more than USD 10 trillion (trn) was pledged by governments to help societies and economies cope and recover.³ Many governments are now pushing plans to stimulate their economy via policies and investments designed to decarbonize industries and green their energy systems.⁴

Importantly, the world's top two contributors to fossil fuel CO₂ emissions have both shifted in a significantly greener direction. New US president Joe Biden has recommitted the nation to the Paris Agreement in early 2021,⁵ and China has committed to becoming carbon neutral by 2060.⁶ Europe, meanwhile, which is the third-largest emitter going into 2020, continues to lead the energy transition by proliferating net-zero targets at EU and national levels.⁷ DNV GL's Energy Transition Outlook 2020 forecasts that policy-driven transitions in Europe, North America and China will lead the decarbonization of the world's energy system.

Major strategic shifts

At the same time, the pandemic has had a catalysing effect on the energy transition within parts of the oil and gas industry, which is now shifting gears on transformation plans. "COVID-19 has meant that many companies have needed to do things differently," says John Morea, CEO of SGN, a UK gas network operator. "It has made climate change an even more important strategic driver for many, and an increasing number of organizations in the oil and gas industry now appear to be taking greater steps towards decarbonization."

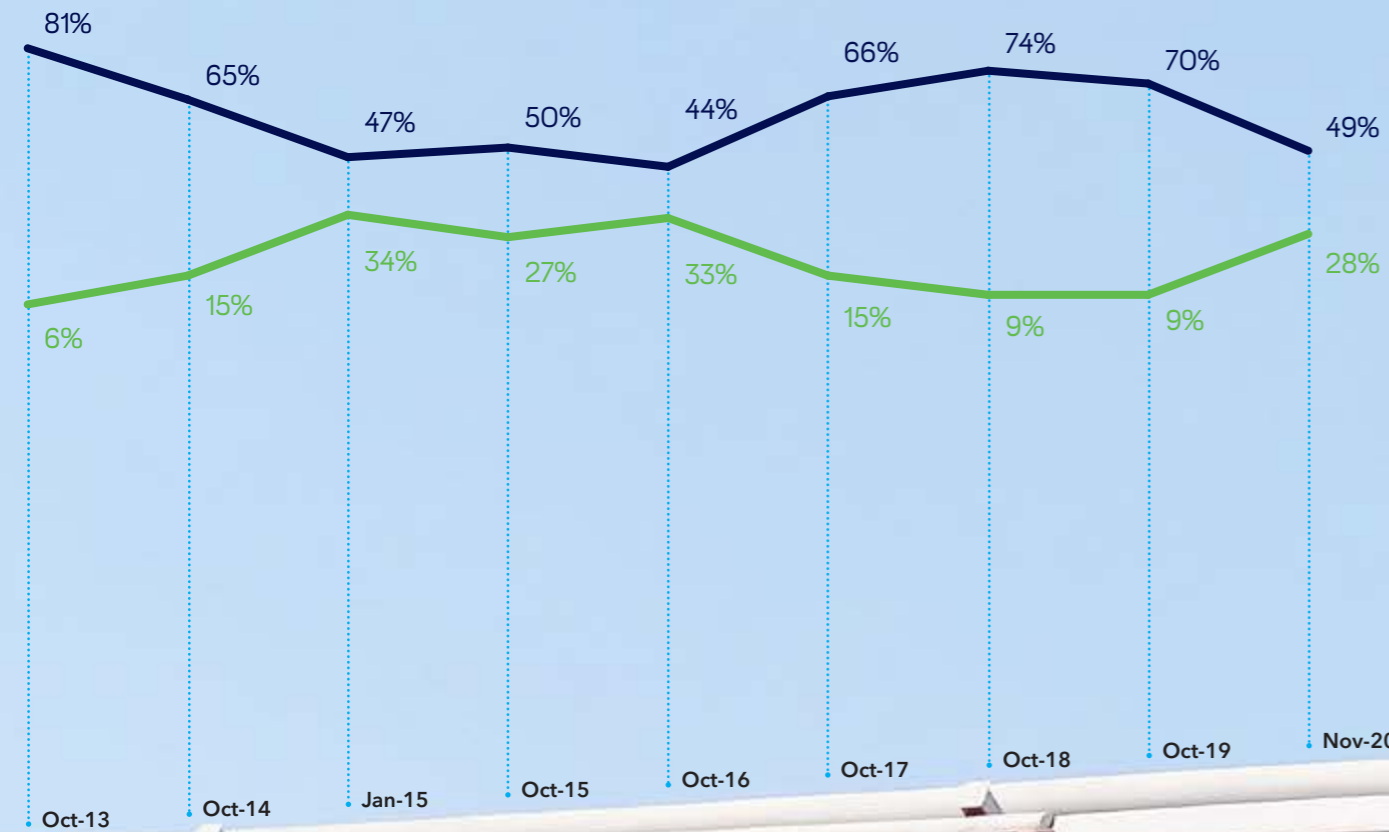
In our survey, those saying that their organization is actively adapting to a less carbon-intensive energy mix hit a record 66% for 2021 – up from just 44% for 2018.

"Much of the industry changed significantly in 2020," says Wendy Brown, environment director at the International Association of Oil & Gas Producers (IOGP), seconded from Total. "In 2020 there was an increased focus on building a lower carbon future – one that can still meet global energy demand – and so decarbonization has been pushed up the priority list for many oil and gas companies."

BP is one example of this new focus. It has pledged in 2020 to become a net-zero company by 2050, starting with several significant medium-term targets. By 2030, for instance, it aims to have 50GW of renewable generating capacity – 20 times its current level – while cutting oil and gas production by 40% over the same period.⁸

Organizations still feel significantly more confident than pessimistic about their overall prospects

- Net confident for organization's overall prospects in the year ahead
- Net pessimistic for organization's overall prospects in the year ahead



2. "We're Not Going Back," Says Fed Chair: What Investors Should Know About an Economy Forever Changed, Nasdaq
 3. The \$10 trillion rescue: How governments can deliver impact, McKinsey & Company
 4. Making the green recovery work for jobs, income and growth, OECD

5. Fed joins central bankers backing Paris climate goals, Financial Times
 6. China's net-zero ambitions: the next Five-Year Plan will be critical for an accelerated energy transition, IEA
 7. EU strategy to become climate-neutral by 2050, European Commission
 8. BP fleshes out net-zero pledge, Transition Economist



Many key drivers of confidence remain unchanged

While national commitments and company strategies appear to signal an acceleration of the energy transition, it is not clear how long it will take for these to materially impact global oil and/or gas consumption. Demand is still rising strongly in India, Africa, China and other fast-growing economies.⁹

In other words, if substantial and significant market-changing action takes a long time to materialize, there could be a continuation of typical oil and gas market cycles for longer than many currently expect.

“Some believe that current conditions have implications for long-term demand – that this time is different – but I’m not sure that’s the case,” says Eirik Wærness, senior vice president and chief economist at Norwegian energy multinational Equinor. “Chinese oil demand is back up around levels it was at towards the end of 2019.”

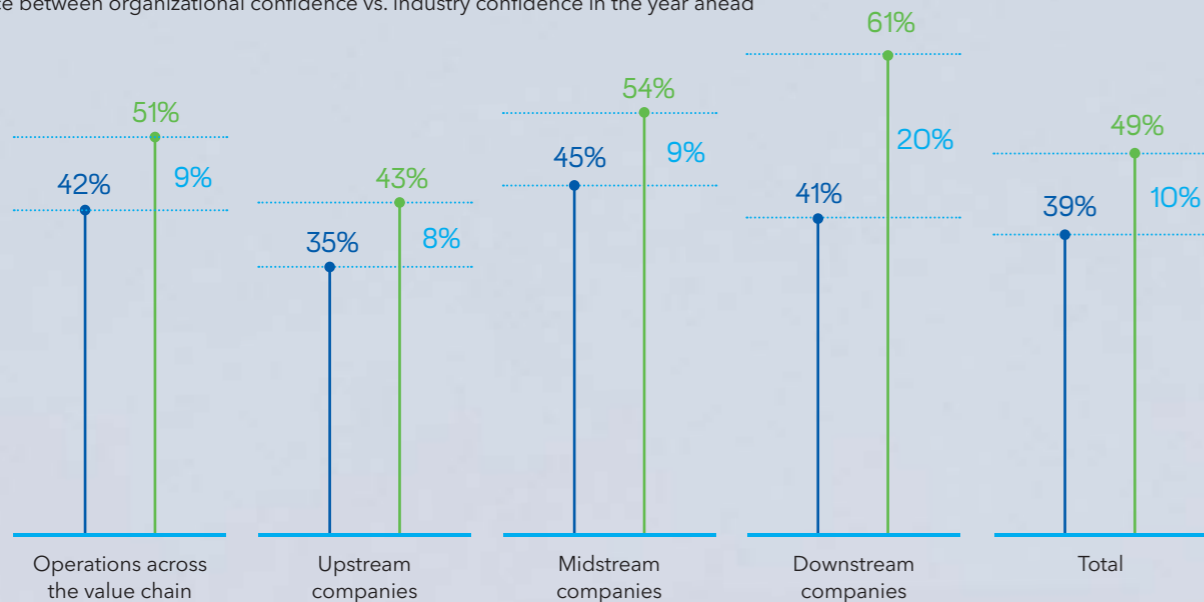
“The argument for why it is different this time is often an argument that says oil demand will fall from this point. But this is not likely for oil, and it is much, much less likely for natural gas demand.”

This fits with our survey results, where we recorded almost no change at all in the proportion of respondents (75%) saying that their organization will maintain or increase investment in gas projects/portfolios (74% last year).

On oil, some also expect a relatively fast and smooth recovery to pre-pandemic levels, starting in 2021. Li Gang, chairman and general manager of Sinopec Yanshan Petrochemical Company, believes that global oil and gas demand will return to 2019 levels as the world emerges from the pandemic, lifting prices. “I believe crude oil prices will slowly rise in 2021,” he says. “And refined oil consumption will return to pre-epidemic levels with the global economic recovery.”

Comparing industry and organizational confidence, respondents from the downstream sector indicate the greatest divergence between these measures

■ Net confident in industry growth in the year ahead ■ Net confident in overall prospects for organization in the year ahead
■ Difference between organizational confidence vs. industry confidence in the year ahead

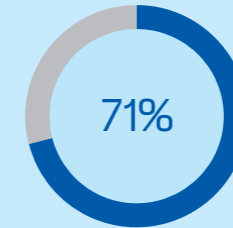


The value of agility

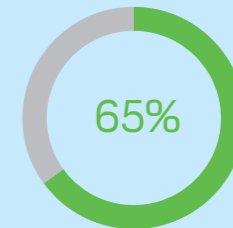
Our research suggests that overcoming the challenges of 2020 has made some oil and gas organizations stronger for the future. Nearly half (46%) of senior oil and gas professionals say that overall prospects for their organization improved in the past year. While this is down from 61% a year ago, it still seems a strong result considering the wider events of 2020.

More significant, perhaps, is the way the industry adapted in 2020. The majority (68%) of respondents say that their organization became more agile in the past year, while 64% say that their organization was more innovative than before.

“Many organizations will be less conservative, and therefore more agile, in terms of testing out new technologies and new ways of working, such as remotely operated equipment to do inspections,” says Wærness. “Because we’ve proven that we can make these things work. That could lead to a culture change to some extent.”



Extent to which respondents agree that their organization is now better prepared for future shocks and disruptions, following its response to the COVID-19 pandemic.



Extent to which respondents agree that without cost cutting since 2014, the 2020 crisis could have been a significantly greater threat to their organization’s survival.

Strategies have diversified

The oil and gas industry is going through its third major downturn in 12 years. Prior to this, there was a 22-year period that included just two oil price shocks (the first in 1986, after OPEC abandoned price-setting and raised production; the second in 1991, as oil supply recovered at the end of the first Gulf War¹⁰).

With two other crashes – following the 2008 financial crisis, and the 2014 oil price collapse – so fresh in the memory, parts of the industry are better prepared for the fallout. However, organizational strategies will depend on how much change companies perceive and expect, and how fast they believe the world will transform in 2021 and beyond.

Myriad scenarios are possible, but for simplicity we can group them into three types:

- **Rapid-shift scenarios.** It is possible that this time is different – that oil demand peaked last year and the world will now make a dramatically accelerated shift away from fossil fuels.
- **Slow-shift scenarios.** It is possible that this time is not so different – that the energy transition moves more slowly than current national and corporate ambitions and, as per a typical market cycle, the forces of supply and demand will return the industry to (one or more) periods of high oil prices and mega projects.
- **Mixed-shift scenarios.** It is possible that this time is somewhat different, but not entirely – that we may have smaller, shorter or partially normal cycles, and different parts of the world will move away from fossil fuels at different times and at different rates, making the global transition neither especially fast nor slow.

In reality, all manner of more specific, plausible possibilities exist within and between these, leading to diverse strategies and deep uncertainty across the industry.

9. Africa Energy Outlook 2019, IEA

10. Anatomy of the last four oil price crashes, World Bank

02

MORE TRANSFORMATIONAL APPROACHES TO COST REDUCTION ARE NEEDED AS TRADITIONAL METHODS HIT LIMITS

One thing that makes this market slump a lot like the others is the industry's focus on cost cutting. But even in this area we find breaks from the past.

The industry needs to become more cost-efficient across the board, and for 96% of senior oil and gas industry professionals it is a priority to some extent. More than three-quarters (77%) rate it as a high or top priority for 2021.

"Hundreds of millions were invested in new facilities across the global petrochemical industry in recent years," says Li Gang of Sinopec Yanshan Petrochemical Company, "the market decline then created serious overcapacity, and therefore a sharp decline in refining profits." As a result, in 2020, Sinopec Yanshan Petrochemical Company focused on cost reductions in 2020, cutting more than 400m yuan (USD 60m) from operating costs, and will continue to improve efficiency in the year ahead.

In our survey, 79% of senior industry professionals want greater standardization of tools and processes to reduce costs in the year ahead (up from 75% in our last survey). "The industry needs to be as smart and efficient as ever, so we are seeing far greater collaboration and standardization," says Wendy Brown of IOGP. The industry is also continuing to invest in the efficiency of assets in operation (set to increase for 60% of respondents) and in extending the lifespan of assets (set to increase for 45%). Firms are also dedicating much of their R&D budgets to reducing operating costs - our respondents' top priority area for these funds.

Headcounts will also be reduced in 2021, according to 36% of respondents. These are the highest expected reductions since our 2017 Outlook, and come despite the wave of layoffs that already swept the industry in 2020.¹¹ For example, an estimated 107,000 jobs were cut in the US crude oil, natural gas, and chemicals industry between March and August of 2020.¹²

However, based on our survey data, the last downturn saw a higher proportion of senior industry professionals expecting workforce reductions: going into each of 2015, 2016 and 2017, about half of our respondents expected headcount reductions, compared with the 36% currently expecting these for 2021.

Squeezing from a dry sponge

The trouble with the industry's available cost efficiency levers is that most of them have been pulled quite hard already. Cost efficiency has been an uninterrupted priority - for close to 80% of the industry - in each of the past seven years. For some, it is getting harder to squeeze any more water from the sponge.

The vast majority we surveyed (80%) say that cost cutting will be more challenging than ever in 2021. "The industry would like to cut costs even more to adapt to an uncertain future," says Equinor's Eirik Wærness. "But the cost level has already come down since 2014, the size of projects has come down, and contingency measures have been reduced. It is more difficult to make projects slimmer, smaller, and cheaper. We can't make the same cut twice. We can't drill a well in zero days. We used to use 40 days, now it is 15, we can't go to zero."

These limitations are likely to be the reason why 87% of respondents say that the industry needs to develop new operating models to achieve further cost efficiencies - up from 81% last year. This is a modest rise, but a high proportion in absolute terms. It shows that the industry already knew that new operating models were needed, but that the shock of 2020 means they need to happen in 2021 - ready or not.

Reshaping for the future

Many also expect more corporate actions in the oil and gas sector in 2021: 78% predict increased consolidation in the industry in the year ahead - up from 64% a year ago. Strategic reorientation may also involve asset and business sales, with 63% expecting more demergers, divestments, and spin-offs in 2021 than in 2020 - up from 46% last year. Indeed, an estimated USD 100bn in oil and gas assets are being lined up for sale by BP, Chevron, ConocoPhillips, Eni, Equinor, ExxonMobil, Shell and Total.¹³

Oil and gas companies can change their overall cost profile by purchasing high-margin-producing assets and selling off weaker-performing parts of the portfolio. Consolidation deals involving relatively equal-sized companies can also lower costs through economies of scale, new capabilities, and greater internal coordination.¹⁴

Expectations of these moves could also be driven by the availability of undervalued opportunities. "Asset prices are very low," says Ahmed Heikal, chairman and founder of Qalaa Holdings, an Egyptian

conglomerate with operations in midstream and downstream oil and gas. "But whether people want to invest in the oil and gas sphere is another question. It depends on your view on the transition to natural gas, renewables, and hydrogen. There are going to be a lot of changes in energy, and it is not clear how it will impact oil and gas transactions."

Companies are being heavily influenced by the pressure to decarbonize the world's energy system, and are starting to take bets on their roles in the energy transition. "There is a massive strategy reorientation happening that will lead to moves in different directions," says Wærness. "Companies are not all going to do the same things in the energy transition space - some will do more solar, some will go with onshore wind, some offshore wind, others will invest in hydrogen or carbon capture and storage, and so forth. You'll see transactions firming up the basis for those types of strategy movements."



11. Layoffs, bankruptcies, and mergers: We're tracking how 22 energy giants from BP to Halliburton have responded to the historic oil price downturn, Business Insider

12. The future of work in oil, gas and chemicals: Opportunity in the time of change, Deloitte

13. A \$100 billion Big Oil divestiture plan is coming, CNBC

14. Coronavirus fallout spurs M&A across US oil and gas sector, S&P Global Platts



The biggest lever is digital

Of all the cost-efficiency levers, digitalization is the one with the most remaining potential for oil and gas companies. This became clearer than ever in 2020, when organizations were forced to accelerate their digitalization in response to the pandemic. Out of necessity, many companies fast-tracked the adoption of technologies that would normally have had to go through lengthy evaluation and testing processes.

Many of our survey respondents (71%) say that their organization increased its focus on digitalization over the past year. The pandemic has not only increased attention on how digital solutions can make organizations more adaptable and cost-efficient; it has also forced companies to discard the normal rules and become more open to change.

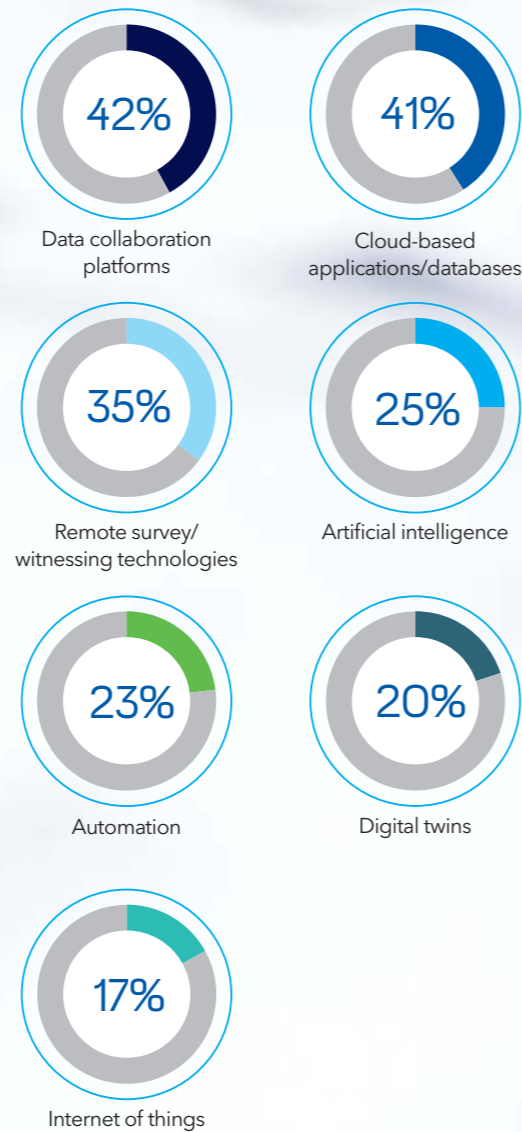
Nearly seven in 10 (68%) will increase their investment in digitalization in 2021 - the highest level ever in our research - with a further 25% maintaining current levels. Much of this is driven by a need to increase profitability (73%); 69% say that digitalization is critical for their organization's survival.

"Some of the projects we aspired to do over the next two or three years have been brought forward quickly, because we simply had to do some of these things in 2020," says John Morea of SGN. "It has really forced us to digitalize our business much more quickly than we probably would have done."

An example of this is SGN's FYLD application, which was developed over six months in 2020. FYLD uses artificial intelligence (AI) to convert audio and video gathered by workers in the field into dashboards and analytical insights.¹⁵ The application works in real time, which makes data available immediately to wider teams in the business and helps to improve the quality of risk assessments.¹⁶ "It has taken away so much paperwork," says Morea. "It has enabled us to centrally gather information on risk assessments in real time, helping us identify any issues before they develop."

15. SGN's new app improving productivity for workers in the FYLD, Tech Monitor
16. New platform claims to 'revolutionise safety and productivity' of field workers, National Technology News

Rating priorities for investment in digitization in 2021, respondents place data collaboration and cloud-based applications at the head of the queue



Data quality and availability must improve in 2021

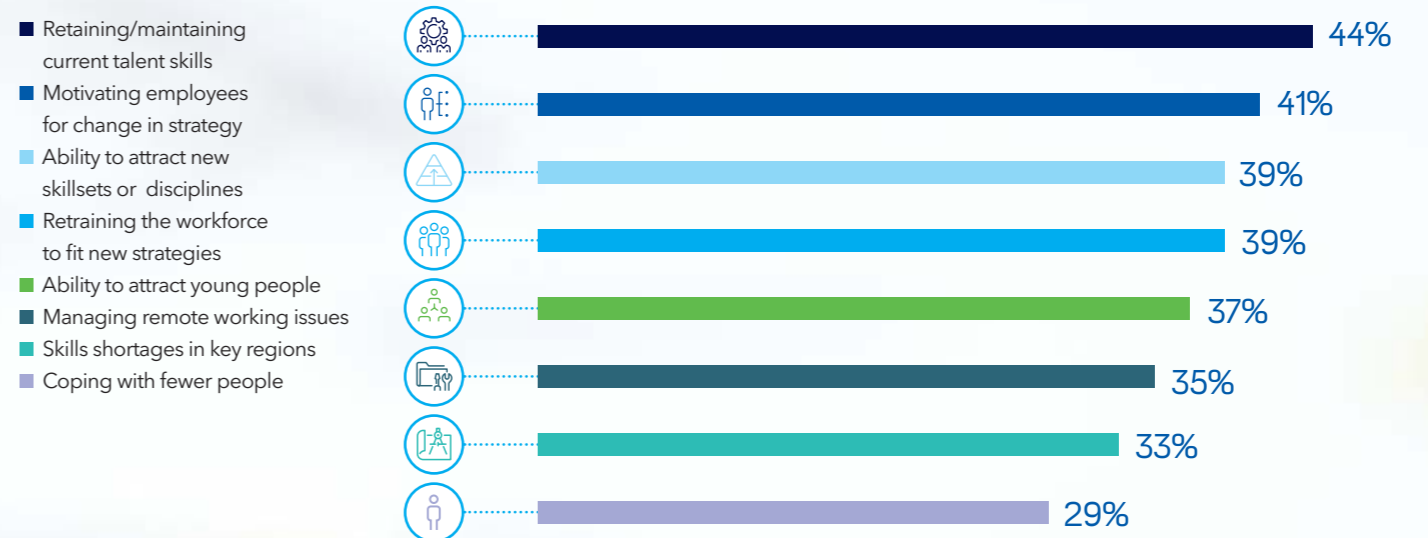
Data is at the heart of almost all digitalization projects, and our survey results suggest that the industry is focused on improving data management. Some 78% of respondents say they are going to be working to improve data quality and availability in 2021, which is an 11-percentage point increase on last year. The top two digitalization priority areas for 2021 - cloud-based applications/databases, and data collaboration platforms - are both related to this goal. In addition every one of the top six priority areas relies on integrating or producing accurate, high quality data.

It has taken a long time for the industry to prioritize data quality and availability, partly because it can seem like an intractable problem. "There are two main challenges," says TechnipFMC's Erlend Fjøsna. "One challenge is that the data currently produced may be in a system that was never designed with the idea of reusing that data, which means there are systems everywhere that have been built without thinking about future years. The other challenge is that, the way we have evolved, we have so many specialized systems and such a legacy of thinking in documents. The data produced is fragmented, when it should be one set of data that is more enriched. The challenge is to unify it."

Huge potential

While only 31% of oil and gas professionals say that their organization outperformed rivals in 2020 due to its strength

When asked to rate their top workforce-related challenges for the next two years, respondents said that retaining talent and motivating employees for change were the greatest priority



17. Study on Machine Learning in the Norwegian petroleum industry, DNV GL

in digitalization, twice as many (60%) feel that digitalization has had a transformative impact on their organization.

That is progress, but there is still a long way to go before oil and gas companies are truly harnessing the power of digital. This needs to change in 2021: organizations will have to work with fewer people and smaller budgets, while continuing remote-working protocols for much of the year.

"I think this has been the year when digital transformation has become more mainstream," says Andy Samuel, CEO of the UK's Oil and Gas Authority (OGA), a government agency. "But I don't think most people have yet been through the kind of change and integration they need to. This will not only require financial investment, but also investment in reimagining processes and organizational structures - a fundamental re-engineering of the business to put digital and technology right at the heart of the way the organization operates."

Further, several digital technologies have yet to make the jump from being conceptually impressive to delivering real business value. DNV GL's recent study on machine learning in the Norwegian petroleum industry, for example, found that only 10% of machine learning initiatives have resulted in full-scale solutions, with 30% still operating as pilot projects, and the majority (60%) only at concept stage.¹⁷

03

MUCH OF THE INDUSTRY IS PIVOTING TO A WORLD BEYOND PEAK OIL DEMAND

This downturn could end up being remembered as the crisis that capped the peak of global oil demand. From here, the oil and gas industry could be forever changed by the dynamics of declining demand.

Many outlooks indicate that the industry already needs to start grappling with the notion of peak oil. DNV GL's Energy Transition Outlook estimates that peak demand lies behind us, in 2019.¹⁸ BP's 'rapid' and 'net zero' scenarios also put the peak in the past.¹⁹

Others estimate that peak oil will arrive this decade.²⁰ These include Equinor (2027-28), Bernstein Energy (2025-30), Rystad Energy (2028) and the IEA (within 10 years). Several also have it arriving in the next decade or later. These include Total SA (2030), OPEC (2040), Goldman Sachs (after 2030), McKinsey (2033), BloombergNEF (2035) and Wood Mackenzie (2035).²¹

What is clear from the forecasts is that oil demand will decline at some point in the coming years. DNV GL estimates that oil will decline gradually and still supply 16% of world energy in 2050. The more important question is how the industry can and will respond if demand falls faster - or slower - than expected.

Almost any answer to this question will be a driver of better prospects for some organizations in the industry, and a barrier to growth for others. This is because the industry is diversified, with organizations moving in a number of different strategic directions.

This includes firms sticking with oil: 19% of respondents say that neither growth in renewables, nor decarbonization of fossil fuels and/or operations, is a priority of any significance for their organization.

We see other signs of this in our survey findings, where 26% of respondents say that the outlook for oil and gas supply and demand is the factor that most positively influenced their assessment of their own organization's prospects for 2021. And 48% say that the oil price is a top barrier to growth in 2021, alongside the global economy (49%).

The downturn write-down

One of the features of the oil and gas industry's response to COVID-19 was the tens of billions of dollars of book value that evaporated in asset write-downs.²² Much of this related to projects with high cost - expensive in operations, emissions, or both - such as Total's Canadian oil sands²³ and BP's ultra-deep-water projects off Angola.²⁴

The write-downs came as a result of both the immediate fall in the oil price and downward-shifting expectations about the oil price over the longer term. BP for example, lowered its long-term average price forecast for Brent crude from USD 70 per barrel (pb) to USD 55pb for 2021 to 2050.²⁵

The write-downs also start to price in the risk of stronger climate policies from governments. Early in 2020, the *Financial Times* estimated that USD 900bn would be wiped from the value of oil and gas companies if governments attempted to restrict global temperature rises to 1.5°C above pre-industrial levels.²⁶

"I think what COVID-19 has done is give the finance industry a view of what peak oil demand will look like, and it helped them wake up to the risks in fossil fuels," says Gerard Reid, co-founder and partner at Alexa Capital, an energy-focused corporate finance and capital solutions company. "Financial markets are very good at bringing risk forward into the present moment, and that is what you are seeing in the market. It is a reflection that people are serious about the risk in and around carbon."

Gas projects are not immune to downgrades

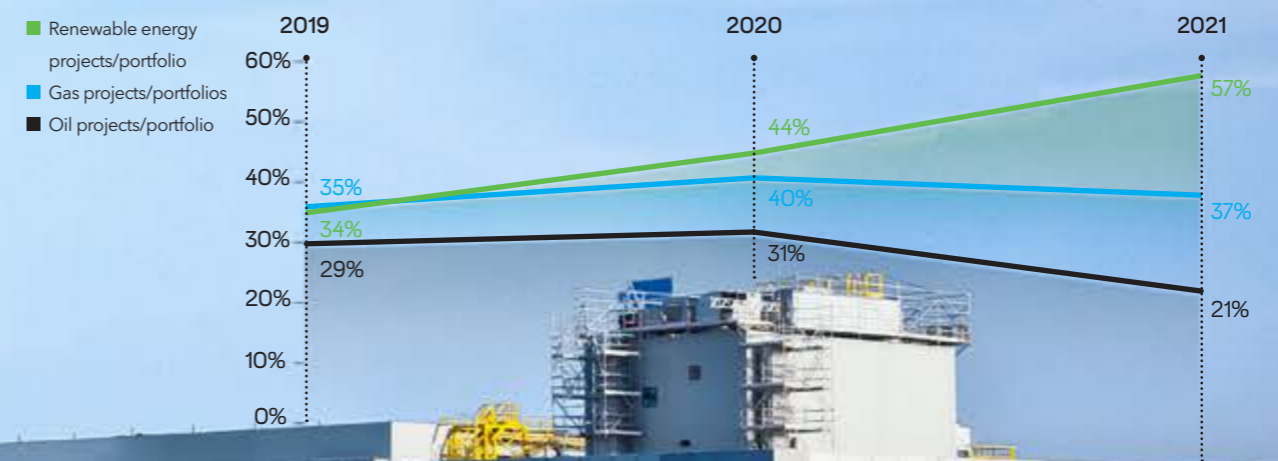
While many of these write-downs relate to oil, there have also been major revisions to gas projects - notably several liquid natural gas (LNG) projects in Australia.^{27,28} The difference between the way oil and gas projects are perceived is partly linked to how long capital is at risk.

"Oil investments generally have shorter time horizons than large-scale gas investments," says Equinor's Eirik Wærness, "because the plateau is shorter and the time to cashflow neutrality is shorter. There is more long-term uncertainty around oil than gas, but on the other hand, on the project side, you can at least potentially get out of oil investments before that uncertainty materializes."

This does something to even out the current risk of oil versus gas investments, but our forecasts still suggest an increasing pivot away from oil and towards gas.²⁹ In our survey, 20% of respondents say their organization is decreasing investments in oil projects (up from 11% in last year's survey). And the proportion increasing oil investments has fallen from 31% to 21% year-on-year.

DNV GL's modelling estimates that natural gas will grow its share of primary energy supply from 26% in 2018 to 29% in 2050 and become the largest energy carrier in 2050. Over the same period, we expect oil's share to fall from 29% to 16%.

When asked about investment in energy portfolios in the year ahead, respondents had greater expectations for their organization to increase investment in renewables than oil and gas.



18. Energy Transition Outlook 2020, DNV GL
 19. BP warns of oil demand peak by early 2020s, Financial Times
 20. Pandemic brings forward predictions for peak oil demand, Reuters
 21. Peak oil is suddenly upon us, Bloomberg

22. Seven top oil firms downgrade assets by \$87bn in nine months, The Guardian
 23. Total demonstrates resilience and maintains dividend, Total
 24. BP's stranded Canadian, Angolan assets expose wider industry risks, Reuters
 25. Progressing strategy development, bp revises long-term price assumptions, BP

26. Lex in depth: the \$900bn cost of 'stranded energy assets', Financial Times
 27. Shell to cut asset values by up to \$22 billion after coronavirus hit, Reuters
 28. Inpex adds to pile of LNG write-downs, Financial Review
 29. Energy Transition Outlook 2020, DNV GL

Is LNG the new oil?

The stronger investment outlook for gas goes beyond upticks in demand: there is also transformation at work. Gas will increasingly be traded across the world's oceans in the form of LNG, driving a surge in capex, which DNV GL expects to peak at around USD 250bn for both 2024 and 2025. This comes as new sources of gas supply, particularly in North America, establish the infrastructure needed to sell gas to new centres of demand in China, India, and South East Asia, where investments are being made in terminals to receive the gas. The result? LNG may become - or already be - the fuel driving the most capital-intensive projects in the industry, taking the place of oil.

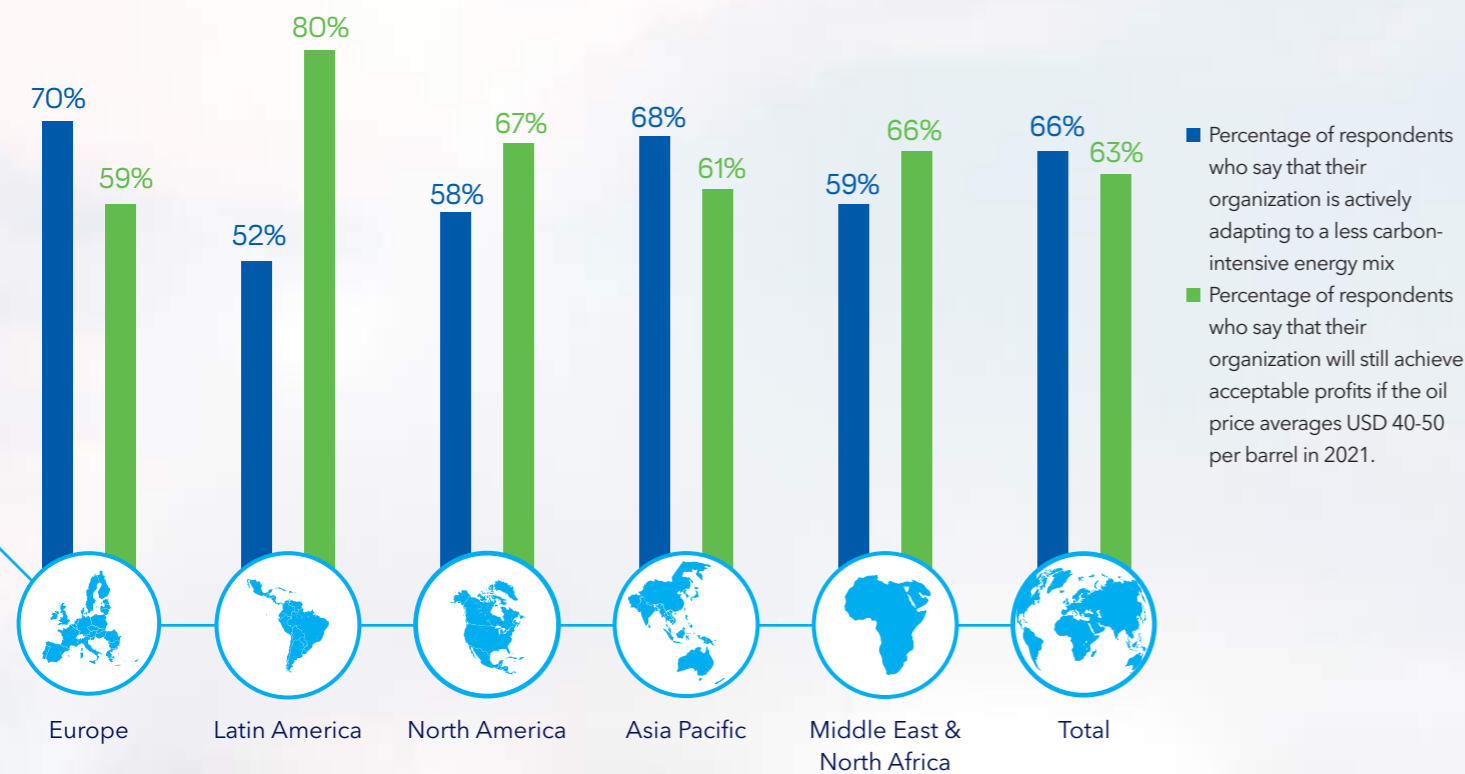
However, the pullback on investment in new upstream oil and gas projects has many concerned about future supply shortfalls. "The industry needs to be careful regarding upstream oil and gas," says Ahmed Heikal of Qalaa Holdings. "The lack of long-term investments could see shortages that can cause a lot of spikes in oil prices." As a result, Heikal does not rule out the possibility of a return, for a brief volatile period, to USD 100pb oil: "I don't think that is farfetched," he says.

Many would agree with him. Energy research company Rystad, for instance, has estimated that unless the transition to new energy sources is dramatically accelerated, the upstream industry will need to double its conventional exploration efforts to meet oil demand through to 2050.³⁰

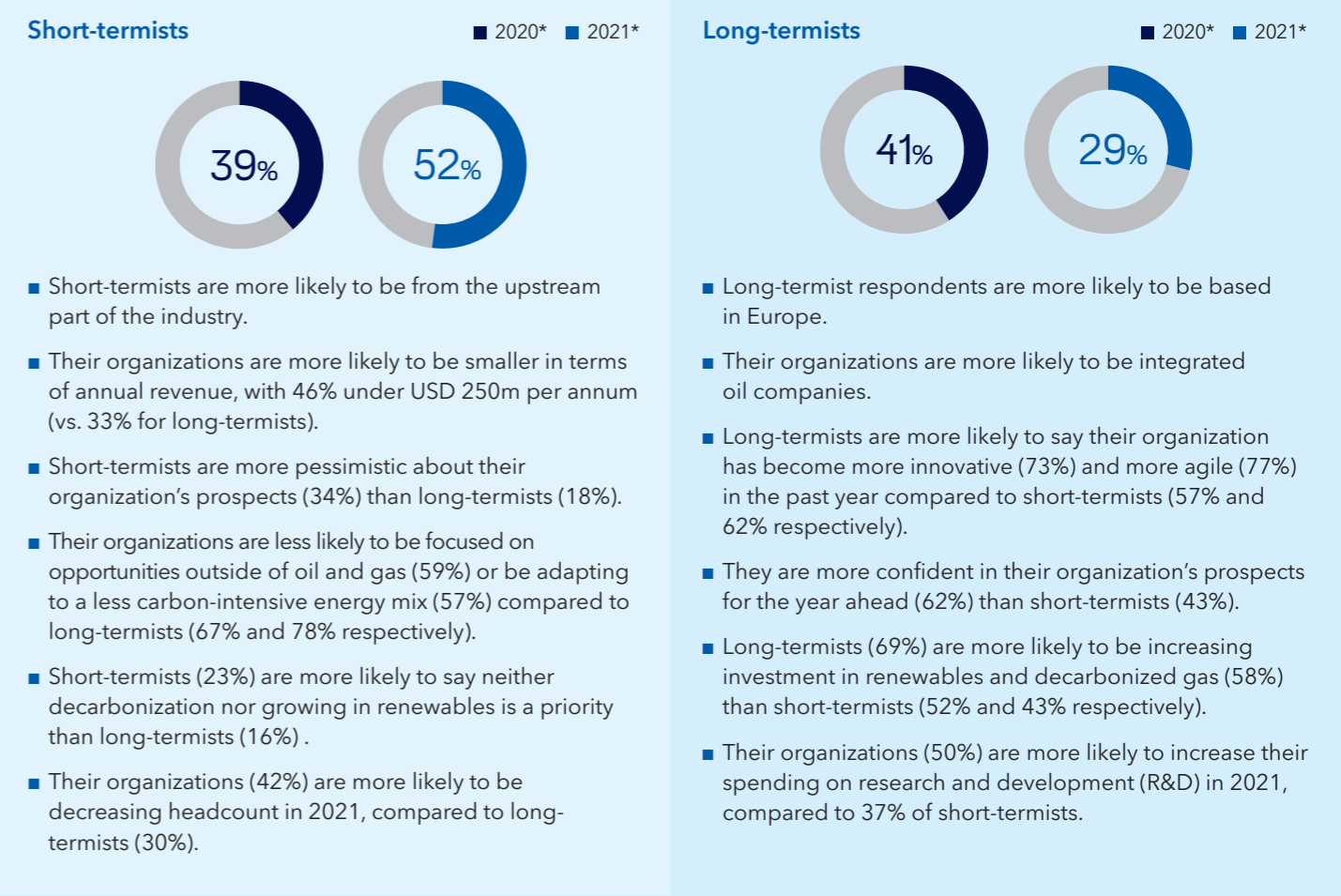
Gas could also be in short supply unless investment picks up soon, but much depends on how the world bounces back from COVID-19. "Everyone is looking for the timing, but it's so unpredictable," says Jane Liao, vice president at CPC Corporation, Taiwan's largest energy group. "The oil price depends on the success of the vaccines and when the global economy can recover. Meanwhile, if too few projects come on stream over the next year or two, then when things pick up we might face a long-term supply issue."

Weighing up these factors will make oil and gas investment decisions challenging in 2021, especially as investments beyond those fuels are taking up an increasing share of available capex. At the same time, whatever the nature of the recovery, it seems clear that too much has changed for the global economy simply return to the status quo of late 2019.

When asked whether their organization was actively adapting to a less carbon-intensive energy mix, respondents from Europe and Asia Pacific were much more likely to agree.



When asked about their organization's strategy, significantly more respondents said their organization is focused on short-term rather than long-term strategies.



Over the past 12 months, we've recorded a large rise in the proportion of respondents saying their organization is more focused on the short-term. This is likely because the pandemic and oil price crash created so many urgent and critical issues. As the crisis subsides, it may well revert to the relatively more even balance we reported last year.

Nevertheless, it seems likely that we will - for several years - continue to see two broad groups in the industry, defined by their leaning towards two very different strategies. While long-termists will continue to transform for the future, and short-termists look to thrive (or just survive) on more traditional opportunities, some will switch from one to the other, while others will try to balance their strategies for all time-horizons.

*The remainder up to 100% are neutral or unsure

04

MULTIPLE ENERGY AND DECARBONIZATION TRANSFORMATIONS WILL DOMINATE THE INDUSTRY AGENDA IN 2021

During 2018 and 2019 there was renewed momentum building around policies and technologies to support decarbonization of fossil fuels, renewable energy, energy storage and energy efficiency.

Without the turmoil in 2020, it may still have been a year when that momentum increased. However, the pandemic appears to have – directly and/or indirectly – turbo-charged the level of interest and intent in these areas.³¹ In fact, commitments to net-zero targets doubled among cities, regions, and companies in 2020.³²

This backdrop of widespread, multifaceted shifts away from oil and coal, and towards renewable energy and decarbonized gas, is another respect in which this downturn is markedly different from any before it.

A green tide

It is not just shifting mindsets and new pledges; there is now more funding than ever. Governments around the world are pouring billions into ‘green recovery’ strategies – many of which involve renewable energy and decarbonization initiatives.

The EU has set the example, announcing the biggest ever financial commitment to climate-friendly projects: close to EUR 550bn over the next seven years.³³ Less than a month later, in August 2020,

then-presidential-candidate Joe Biden announced even bigger plans: promising USD 2trn over four years to advance clean energy in the US.³⁴

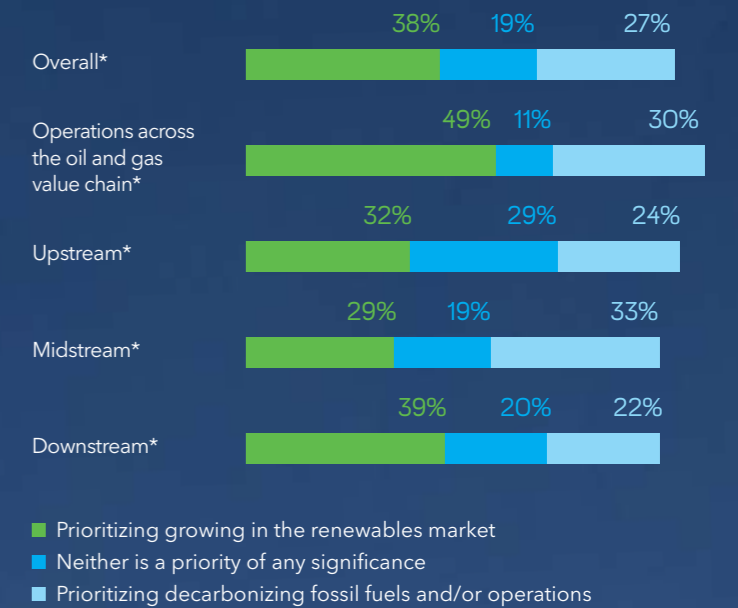
To meet the targets of the Paris Agreement, the world – and the oil and gas industry – needs to do more than improve energy efficiency and drive renewables. For instance, we estimate that in 2020 there was an 8% fall in energy demand (including a 13% fall in oil demand), and an 8% reduction in global energy related emissions, as a result of COVID-19. But this reduction would be needed every year to 2050 to achieve the primary goals of the Paris Agreement.³⁵ In addition, according to DNV GL’s Energy Transition Outlook, fossil fuels will still be needed to supply half of the world’s energy in 2050, with natural gas the world’s largest energy source.³⁶

This means that the oil and gas industry must work to decarbonize the production, processing, distribution and consumption of fossil fuels. This requires dramatic scaling-up of hydrogen and carbon capture and storage CCS.³⁷ Among those we surveyed, 46% say that their organization has committed to reducing emissions by at least half by 2050. As policies and public sentiment become greener, we expect this proportion to rise quickly over the next few years.

Growing in the renewables market is a significantly bigger priority for organizations in the oil and gas industry than decarbonizing fossil fuels and/or operations. However, this is not the case for midstream organizations, where there is greater emphasis on decarbonizing fossil fuels and/or operations. Integrated oil companies, with operations across the value chain, place greater priority on renewables and decarbonizing fossil fuels/operations than the sub-sectors. With 79% focused on one priority or the other, and only 11% prioritizing neither.

There is not much regional variation among the proportion prioritizing the growth of renewables businesses: all are close to the overall average of 38%. But about a quarter of those in each of Latin America, North America, and the Middle East and North Africa prioritize neither strategy. The corresponding proportions are smaller in Asia Pacific (14%) and Europe (18%), where there is a higher priority placed on decarbonizing fossil fuels and/or operations, compared to the other three regions.

When asked where their organization will place greater priority in the next five years, more respondents pointed to renewables than decarbonizing fossil fuels/operations



*The remainder up to 100% answered that this question was not applicable or they did not know



31. Coronavirus prompts a shift to Net Zero carbon projects, Association for Project Management
 32. Navigating the nuances of net-zero targets, NewClimate Institute & Data-Driven EnviroLab
 33. EU makes world’s biggest ‘green recovery’ pledge - but will it hit the mark?, Reuters
 34. Biden Announces \$2 Trillion Climate Plan, New York Times

35. Energy Transition Outlook 2020, DNV GL
 36. Energy Transition Outlook 2020, DNV GL
 37. Ibid

Betting on different horses

Our research reveals an industry that is increasingly shifting towards decarbonization and the energy transition. Some 80% of respondents say they now plan to increase or maintain investments in renewable energy projects and portfolios in 2021 - up from 71% one year ago. Within that, the proportion that are planning increases (57%) is much higher than last year (44%), and is also far higher than those planning increases in either oil (21%) or gas (37%) in 2021.

Overall, 62% are now actively looking for opportunities outside of oil and gas - up from 51% a year ago. "I think it's clear that the cost of capital has fallen for low carbon energy," says Michael Cohen of BP, "and it's clear that it has changed in the opposite direction for certain hydrocarbon energy developments."

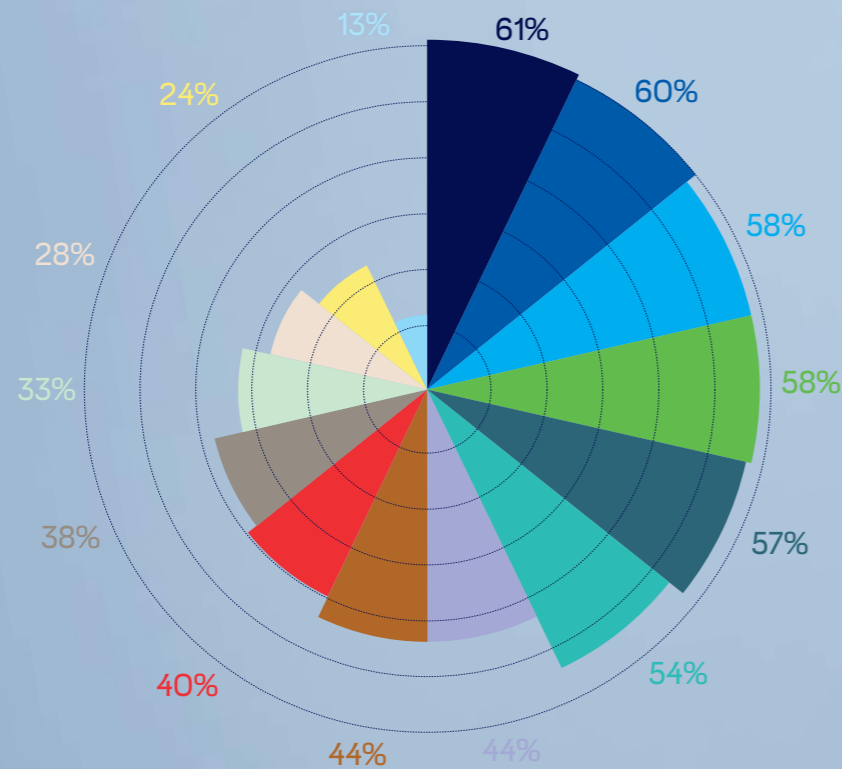
Each year we ask oil and gas professionals to elaborate on their indication that their organization is investing outside of the

traditional oil and gas value chain. As you can see in the chart below, between 50 and 70% of these respondents expect to invest in CCS, wind, hydrogen and solar in 2021. This range highlights the diversity of transitions in motion.

Many organizations are already showing that their expertise in oil and gas is transferable to new domains. Singapore rig-builder Keppel Offshore & Marine, for instance, is turning its expertise in offshore engineering, design, and procurement towards the renewables sector. "Over the past two years, we have secured projects to support the offshore wind industry, such as building offshore converter stations and substations for offshore wind farms in Germany and Taiwan, and building a wind turbine installation vessel," says Chris Ong, the company's CEO. "With the accelerated development of the offshore wind industry, we expect further opportunities as wind farms and turbines get larger and are built further offshore."

Some 62% of respondents expect to invest outside of oil and gas in 2021. Here are the areas they are targeting.

- Carbon capture and storage
- Floating offshore wind
- Opportunities not related to energy value chains or petrochemical
- Green hydrogen
- Fixed offshore wind
- Blue hydrogen
- Solar PV
- Onshore wind
- Biomass/biogas
- Synthetic fuels
- Solar thermal
- Hydropower
- Geothermal
- Nuclear

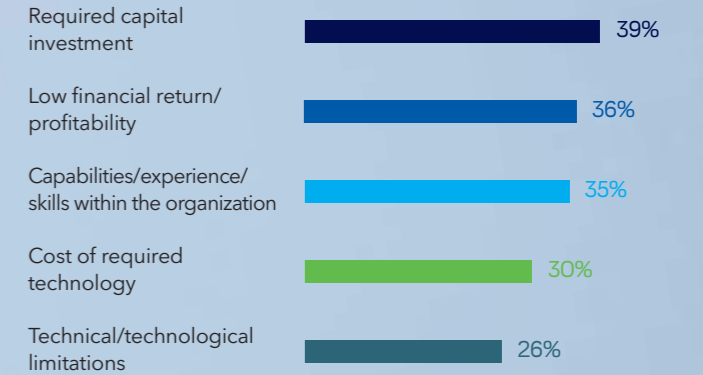


Top drivers and barriers to investment in renewables

Drivers



Barriers



Capital, costs, returns - financial factors are the primary barriers to both investing in renewables and to decarbonizing fossil fuels and/or operations. However, the drivers are different. Oil and gas companies are investing in renewables because they have shifted their long-term strategy and see current business opportunities. Meanwhile, climate targets, government policy and regulations drive companies to decarbonize fossil fuels and/or operations.

Multiple transitions in motion

For some, the energy transition is the biggest challenge their organization has ever faced. For others, it is an opportunity to improve the planet and profit at the same time. It can also be both of those things.

It is tempting to describe the energy transition in unified, global terms, but this is not what is happening on the ground. Instead, dozens of different kinds of energy transitions are unfolding in parallel with the evolution of decarbonization and energy

efficiency measures. For the industry, this makes identifying the right opportunities - and the right time to take them, a key test.

Across the spectrum of renewable energy sources, energy storage, decarbonized gas and energy efficiency, the supporting organizations, technologies and infrastructure are all now at different levels, moving in different directions and at different rates of progress. All of this shapes and is shaped by national and regional energy and environmental policies, which are also moving at different rates, in different directions, and from different starting points.

As Cohen puts it: "Companies all over the world are struggling to understand how to make capital allocation decisions when we don't know what the policy landscape will look like, and we don't know what the technology landscape will look like."

Top drivers and barriers to investment in decarbonizing fossil fuels/operations

Drivers



Barriers



The broad strategy universe

These multiple transitions, timings, and transformations have led to widening strategy diversification among oil and gas organizations, including at the most general level:

- 1. Out of energy.** Shifting out of all kinds of energy value chains into new industries where their capabilities are transferable, e.g. engineering water/wastewater infrastructure.
- 2. Out of fossil fuels.** Breaking from their fossil fuel roots entirely, but remaining within the broader energy and/or decarbonization sectors, e.g. wind, solar, hydrogen, CCS, decarbonized gas.
- 3. Gas and green.** Maintaining a natural gas or LNG business, but divesting oil assets, and moving to decarbonize products/operations and/or invest in renewables and/or decarbonized gas.
- 4. All in gas.** Maintaining a natural gas or LNG business, but divesting oil assets, and doing little or nothing to decarbonize products/operations or invest in renewables and/or decarbonized gas.
- 5. Full house.** Maintaining oil assets and/or natural gas and LNG business, and moving to decarbonize products/operations and/or invest in renewables and/or decarbonized gas.
- 6. Last century.** Maintaining oil assets and/or natural gas and LNG business, and doing little or nothing to decarbonize products/operations or invest in renewables and/or decarbonized gas.

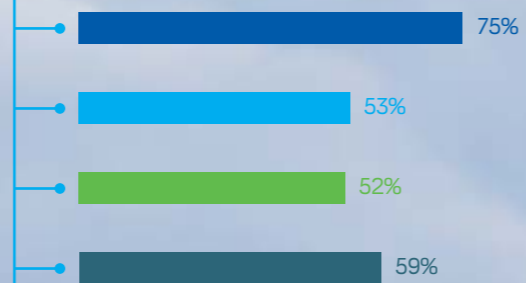
Most executives in the oil and gas industry (and those who have recently shifted to other industries) will be able to place their organization into one of these categories. In 2021, many companies stand in each of these – that, on its own, makes this downturn unique.

It also makes the oil and gas industry truly fascinating, because this list describes a huge range of strategies, where organizations are moving in different directions, picking different times to make transformations, with long-term survival on the line.

Percentage of respondents who say that their organization is actively adapting to a less-carbon intensive energy mix



Percentage of respondents who say that their organization will be increasingly focused on opportunities outside oil and gas in 2021



- Operations across the value chain
- Upstream companies
- Midstream companies
- Downstream companies

Implementing decarbonization

For our respondents, these investments are driven by two top drivers: current business opportunities and shifts in long-term strategy. In 2020, in both these respects, hydrogen appears to have consolidated its position as a mainstream opportunity and strategic lever for oil and gas companies.

This is a rapid development, considering that just two or three years ago hydrogen was a fringe interest in the industry. Today, 67% of oil and gas professionals believe hydrogen will be a significant part of the energy mix by 2030, and 33% are actively entering the hydrogen market.

There are numerous signs of growing maturity here. Australia and Japan’s joint hydrogen supply chain will see the development of the world’s first liquid hydrogen transport ship.³⁸ The government of the Netherlands and a consortium of companies have begun work on the world’s first hydrogen trading platform designed to support an efficient, liquid marketplace.³⁹ Electrolyzers, which separate out hydrogen from water, are becoming more effective, with Siemens Energy claiming to have grown output tenfold every few years.⁴⁰ Meanwhile, the EU expects to spend EUR 470bn (USD 550bn) on green hydrogen by 2050,⁴¹ and numerous giant-sized hydrogen projects were approved in 2020, including in California,⁴² Saudi Arabia,⁴³ and north-western Australia.⁴⁴

CCS will become a significant commercial opportunity for the oil and gas industry by 2030, according to 68% of our survey respondents. Like hydrogen, CCS has quite quickly solidified as an opportunity in some parts of the world. “The Longship carbon capture and storage project that is moving forward in Norway is very important,” says Erlend Fjøsna of TechnipFMC. “It will trigger the launch of CCS-based projects, which we believe will extend the gas markets.”

Hydrogen and CCS can play a key role in decarbonizing natural gas – before or after combustion – to help green the world’s energy system. However, more needs to be done to shift the timeline on scaling these technologies: DNV GL’s Energy Transition Outlook 2020 forecasts that these technologies will not scale until the mid-2030s.⁴⁵

Apart from commercial opportunities, CCS will also be important to oil and gas organizations for maintaining their licence to operate. “My sense is that companies recognize this, and they are not looking for normal oil and gas rates of return in investments like CCS,” says Andy Samuel of the Oil and Gas Authority. “The way a CCS business model might work may be more like a regulated rate of return, and once companies see that kind of framework, we understand they will be comfortable with it.”

Energy system integration

What is clear from our research is that decarbonization faces major challenges. Notably, securing the capital investment required and making the investments profitable, which are our respondents’ top two barriers to growing in the renewables market. Overcoming these challenges will often demand a longer-term, integrated view, particularly around infrastructure development, licence to operate, and long-term impacts.

“We are not developing hydrogen for today or tomorrow, but for the days thereafter,” says René Schutte, program manager hydrogen at Gasunie, a European gas infrastructure company. “So we should not be too focused on the competition between hydrogen and other energy carriers or energy sources today, but we should be focused on the fact that this is an energy carrier and a value chain that we need to develop. We have the conviction that we need to scale up in the next years to make sure we decarbonize quickly enough.”

38. Australia ‘hydrogen road’ to Japan set to cut emissions, Financial Review
 39. Netherlands wants to create hydrogen trade platform, pv magazine
 40. ‘Hydrogen wars’ pit Europe against China for \$700 billion business, Japan Times
 41. State of Play: Hydrogen in 2020, White & Case

42. World’s largest green hydrogen project to launch in California, Business Wire
 43. World’s largest green hydrogen project will convert renewable energy..., Renewable Energy World
 44. Huge \$50bn Pilbara green hydrogen hub granted major project status, Renew Economy
 45. Energy Transition Outlook 2020, DNV GL

CONCLUSION: HOW DIFFERENT IS THE MARKET DOWNTURN THIS TIME?

During previous oil and gas industry downturns, the conventional wisdom held that price crashes are part of the normal cycle of oil and gas markets. Without revolution or reinvention, harsh droughts gave way to rich harvests.

For many, this downturn is different and signals the need for more fundamental change. These organizations will see 2021 as a year for revolution and reinvention.

But not all need to change their course. The past year has accelerated but not created several megatrends, such as digitalization, decarbonization, and the declining demand for oil. Organizations that were adapting to these megatrends prior to 2020 will not need to take drastic action.

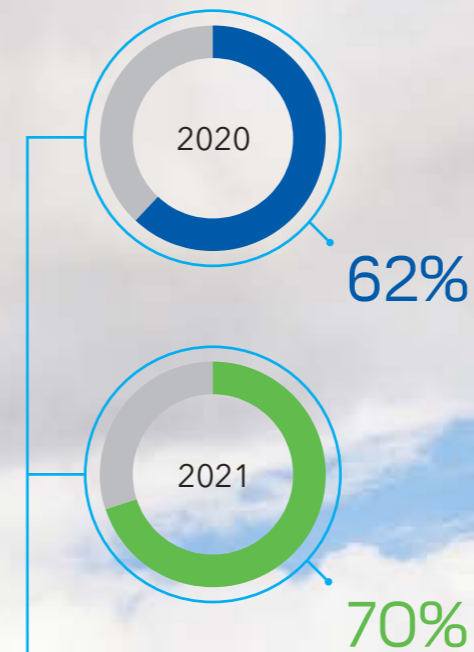
Then there are the parts of the industry that have not been hit so hard by the pandemic and its after-effects, at least in the short term. For example, CPC Corporation's Jane Liao says LNG demand in Taiwan has seen no negative impact from COVID-19. "On the contrary, demand is growing," she says. "The main reason for this is consumption in power generation. The government wants to move away from coal, so the gas-fired

power plants are all fully utilized, and the coal-fired plants may only be needed for part of the winter."

It will be interesting to see how these two groups - the prepared and the spared - make use of their advantages in 2021 and in the longer term. More than ever, the industry will be looking to reduce emissions and invest in clean energy. As Chris Ong, CEO of Keppel Offshore & Marine says: "We are seeing customers - including both oil majors and field operators - venturing into renewables while also adopting greener solutions in their operations, such as using cleaner fuels."

Many of these opportunities rely on industry collaboration. For example, hydrogen adoption will require investments in system integration and sector coupling that look at the whole value chain. "This can help to level the costs between the various elements we need in the future energy system," says René Schutte, "because the cost is not only any more about the electron or the molecule, it's also about the systems that you need to build for either. We need to make sure that all public and private stakeholders work together because none can do it alone."

Percentage of respondents who say that their organization will increase collaboration with other organizations in the year ahead



The future of the industry is cleaner, more collaborative, and more digital, but it is still quite far off. For many, getting there will only be possible on the back of traditional oil and gas successes, which need to be attained during volatile conditions and over an uncertain period of time.

DNV GL estimates that fossil fuels will still supply about half of the world's energy by 2050,⁴⁶ so there is certainly a long-term future for oil and gas. But nobody expects a uniform decline over the decades. There is now so much change in motion across the industry that we are likely to see more price spikes and crashes, more disruptive innovations, and ever-bigger existential challenges. All of which increases the importance of any agility and resilience gained in 2020.

As the industry evolves, leaders must pick their moments to make specific changes and investments. That is a massive challenge, and one that could determine the very survival of their organizations. But, in 2021, as the world hopefully emerges from the pandemic, the timing, urgency, and certainty of the energy transition should become clearer, and the industry will be able to pursue new success through turmoil and transformation.



ABOUT DNV GL

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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.

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Design: www.wildfirelondon.com

DNV AS

NO-1322 Hovik,
Norway

Tel 47 67 57 00

www.dnvgl.com