



Decarbonizing Energy: From A to Zero

Section 3 Completing the journey stronger



A practical guide to navigating the decarbonization process. Make the move towards a more affordable, sustainable and available future.

We call it positive energy.

The end game for the Decarbonization Transition is not an energy system without fossil fuels; Accenture predicts that fossil fuels will provide close to 50 percent of the 2050 energy mix². Rather, the objective is to decarbonize the energy system.

The oil and gas industry will play a central role architecting ecosystems and enabling other sectors to manage effective transitions. It will also lead the charge in pursuing new opportunities across the energy system. A new focus on process efficiency and demand management, a growing portfolio of decarbonized and electricity-based solutions, and an ambition to extend the boundaries of today's hydrocarbon-based business models will converge to extend the license of oil and gas companies to create value for years to come.

As they navigate the Decarbonization Transition, oil and gas leaders will need to definitively choose what type of business or “archetype” they want to be. We believe that there are only three options open to today's oil and gas industry and every company will have to choose to be just one: “**Decarbonization Specialists**” that double down on operating the cleanest, highest-margin portfolio of oil and gas

assets; “**Energy Majors**” that will broaden their reach into the wider energy system of the future; or “**Low-Carbon Solutions Leaders**” that will represent a new type of energy company, providing energy solutions and services without the burden of the heavy assets that previously weighed them down. While it may be tempting to adopt a hybrid role in the transition, as some integrated oil companies have done recently, doing so will almost certainly fail. Finding and developing the investments, capabilities and business models to bring any one of these archetypes to life is a significant, complex and expensive undertaking. Success in any will require full and unwavering commitment. Many, of course, will have to outright exit the oil and gas, and potentially the energy, business. Making the right choice requires balancing the priorities of the Decarbonization Transition with returns and performance. It calls for bold decisions, if not educated leaps of faith.

The case for change

The oil and gas landscape will be radically different as decarbonization accelerates. New challenges will emerge, which will not only reset how the core business creates value, but also shape oil and gas companies' ambitions for the future. Let's consider some of these.

Volumes and value will decouple, placing assets at risk of never being produced.

The industry can take only limited comfort from the fact that hydrocarbons will continue playing a key role in supplying energy well beyond 2050. The choices oil and gas companies make today about where to play and where to invest must be geared to optimize cost structures and create free cashflow. In times of uncertainty, financial discipline translates into flexibility. Examples from other sectors, including coal, show that even while product demand is on the rise and prices are holding up, the ability to attract capital and generate returns can collapse. In the oil and gas industry, as supply abundance is no longer rewarded, there will not be an orderly and predictable set of impacts. Asset owners and operators need to build in new levels of resilience.

Not all assets and projects will make it.

In light of revised energy price forecasts, many long-cycle projects currently underway are projected to be unprofitable. Impairments totaling tens of billions have been announced just within the first half of 2020⁴⁰. Infrastructure built over the past 150 years—from pipeline networks to storage, distribution and retail assets—might be abandoned if it cannot be repurposed during the transition. Carbon will increasingly figure in portfolio and investment decisions and is increasingly used by industry leaders to prioritize their capital expenditures.

The talent shortage will stifle growth.

The perception of the oil and gas industry as damaging to the environment is limiting its ability to attract the best people. The process of shedding jobs to reset the cost base does little to help the perception of the industry. Based on data from Texas Tech, the number of students pursuing petroleum engineering degrees in the United States has dropped by 60 percent over the past three years⁴¹. That trend spells trouble. Navigating the challenges and delivering on the opportunities during the Decarbonization Transition will require new talent and innovation. Oil and gas companies must, therefore, change the narrative to rebuild trust. It is difficult to see how a cautious or incremental approach will make the industry more appealing to the future workforce.

Carbon will become priced in implicitly (by investors) and then explicitly (by markets).

Carbon taxes have long been seen as an effective Pigouvian approach to address carbon emissions. Accenture analysis suggests that, on average, carbon taxes will raise the cost of oil production across all asset classes by about \$6 per barrel⁴². In a world without alternatives to oil and gas, the primary effect would be redistribution across asset classes; in a world where oil and gas co-exist within a wider, converged energy system, even a relatively small tax could strand high-cost and high-carbon assets entirely.

The oil and gas industry relies heavily on oilfield and equipment services (OFES) companies, engineering, procurement and construction (EPC)

contractors, and a host of other equipment, chemical and logistics players. The responsibility for identifying, managing and mitigating carbon-creating processes lies, therefore, not only with operators, but across the entire ecosystem connected to the oil and gas value chain. The Scope 1, 2 and 3 emissions framework reinforces that shared accountability. Operators, however, are in the position to lead the effort by establishing expectations and incentives to drive decarbonization initiatives across the supply chain.

As investors pressure oil and gas companies to address sustainability and carbon challenges, the competition for scarce capital is already tightening. A growing number of investment funds are adopting policies that shift capital away from companies that don't meet environmental social and governance (ESG) guidelines. That is further exacerbating the underlying trend of investment moving away from oil and gas.

The IEA reports that the projected investment in the oil and gas industry in 2020 will drop by more than 30 percent over 2019 levels. By comparison, the share of global investment directed toward clean energy and energy efficiency is expected to increase by 5 percent. Consistent and auditable reporting of ESG performance can rebuild investor trust in the industry, but only if that reporting is backed up with tangible actions and operating practices that are beneficial to both the environment and the bottom line.

The three archetypes for tomorrow's oil and gas leaders

We believe there are three—and only three—archetypal roles oil and gas companies can play during the Decarbonization Transition and beyond. Within each, there are multiple approaches to value—each supported by different assets and capabilities. These roles are not necessarily mutually exclusive; a few elements from each can be combined. The three archetypes described below present the only distinct choices for oil and gas leaders committed to taking a bold new direction. Industry players must go “all in” on one.

Figure 29

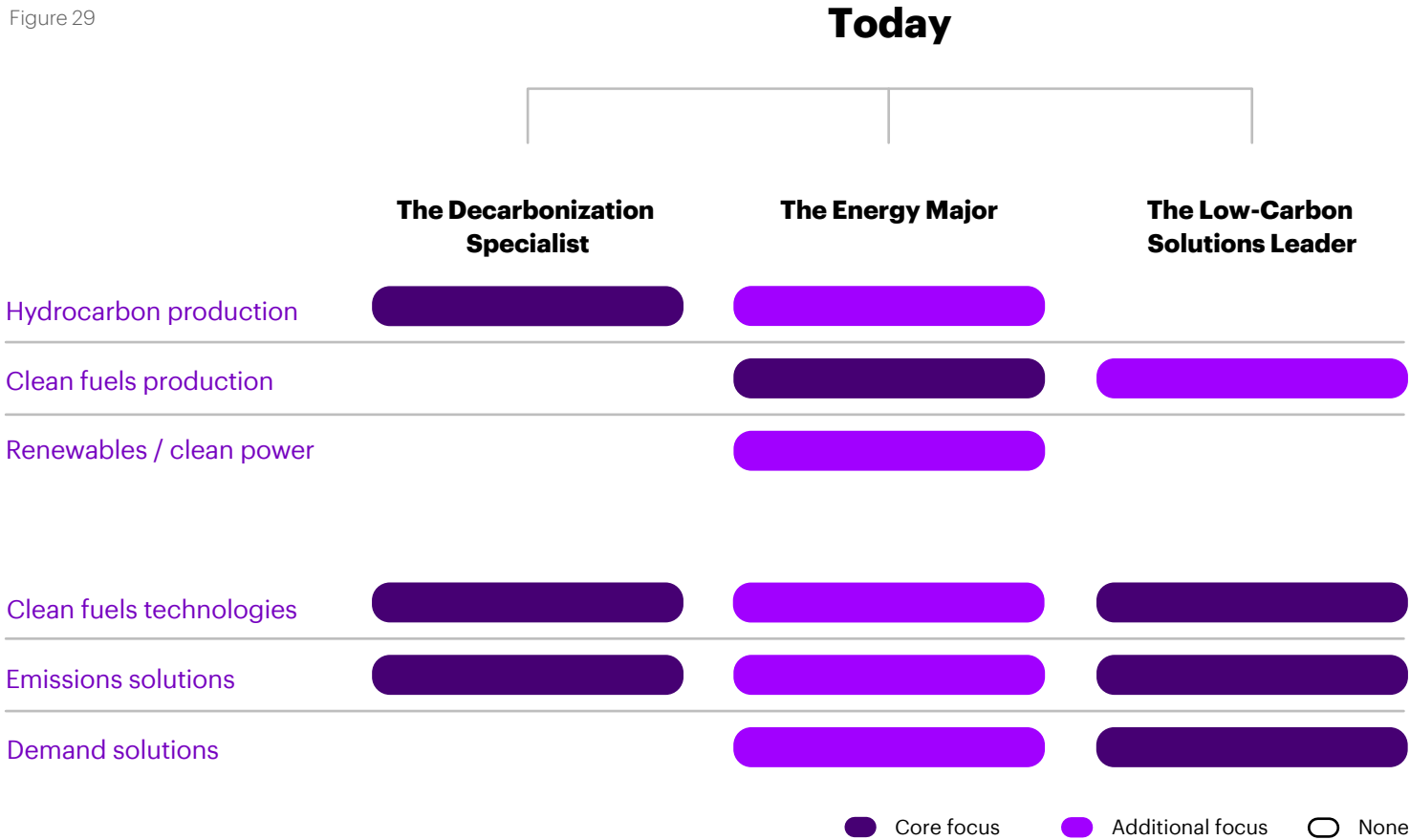


Figure 30

The dimensions of the three archetypes

Strategic archetypes		Clean the Core	Accelerate the Transition	Extend the Frontier
The Decarbonization Specialist	▶	<div><div></div>100% focus on creating a resilient, high-performing core: lowest emissions, highest value creation</div>		
The Energy Major	▶	<div><div></div>Maintain a resilient, high-performing core, enhanced by its integration with the energy value chain beyond oil and gas</div>	<div><div></div>Pivot intentionally into investable, scalable opportunities with integration value linked to the core</div>	<div><div></div>Establish future leadership positions across energy value chain over time</div>
The Low-Carbon Solutions Leader	▶	<div><div></div>Refocus on asset-light, market / trading solutions linked to low-carbon, efficiency and reduced environmental impact</div>	<div><div></div>Pivot into clean energies. Redefine role to be energy integrator and solution provider</div>	<div><div></div>Co-create new markets, platforms and positions as technology and regulation unlock new opportunities</div>

Strong focus

Secondary focus

Source: Accenture Analysis

Figure 31

The dimensions of the three archetypes

	The Decarbonization Specialist	The Energy Major	The Low-Carbon Solutions Leader
Scope	Decarbonized oil and gas production	Full energy-system	Low-carbon energies and technologies
Business model	Asset owner / operator	Assets and solutions	Solutions provider
Sources of value	Supply-side (resource)	Resource, customer and integration	Demand-side (customer)
Scale and margin	Scale: med-large Margin: low-med	Scale: large Margin: med-high	Scale: small-med Margin: high



Source: Accenture Analysis

The Decarbonization Specialist

Sustaining and growing value from the core oil and gas value chain

The Decarbonization Specialist will be one of few hyper-competitive companies that outperforms others in the core hydrocarbons value chain through the middle of the century. They will focus on Clean the Core actions while delivering differentiated returns.

What is the Decarbonization Specialist's strategy?

Demand for oil and gas volumes will continue to grow at least through 2030 before plateauing²². Until then, oil and gas companies will continue investing in new wells, pipelines and facilities. Because the annual 5-7 percent decline factor exceeds the expected reduction in demand, few of today's assets such as wells and infrastructures will still be operating by 2050.

Decarbonization Specialists will be those companies best able to operate in the oil and gas value chain—upstream, midstream and/or downstream—in a low-carbon world. They will deliver the most efficient, lowest-cost production and integrate CCUS technologies and methane emissions management capabilities. They will create value through a low-emissions operating model and high-performing ecosystem that other players can't readily emulate. Because of their distinctive capabilities, Decarbonization Specialists will build

a competitive asset portfolio, extend their assets' viable lives, and capture disproportionate value from oil and gas beyond the upcoming volume peak. Finally, to capitalize on their economies of scale and efficiency, it is likely that Decarbonization Specialists will manage larger businesses than the average oil and gas player of today.

Decarbonization Specialists will take proactive and meaningful steps to mitigate methane emissions. Each ton of methane emissions from oil and gas operations increases the climate impact of the fuels and makes a 2-degree future temperature reduction more difficult to achieve. The greenhouse gas potential of methane is 86 times more than that of CO₂ over a 20-year timeframe⁴³. Beyond the environmental impact, the economic loss associated with methane emissions is significant. Every year, methane worth an estimated US\$30 billion is released into the environment⁴⁴.

In the oil and gas industry, only a limited number of companies currently publicly recognize the reduction of methane emissions as a priority. This is short-sighted. A study conducted by the ICF revealed that, within the upstream sector, venting and pneumatic devices represent a methane reduction potential of 22 percent and 30 percent, respectively. Fugitive emissions from various sources, most notably compressors, account for the remaining 48 percent.

Circularity will feature strongly for Decarbonization Specialists. The reuse of equipment across the value chain will diminish the sector's carbon footprint. The capture and repurposing of waste will deliver additional benefits in terms of reducing the environmental impact of plastics, chemicals and other by-products of today's oil and gas operations.

Similar to some of today’s mature field specialists, Decarbonization Specialists will focus their investment on technologies and processes that minimize Scope 1 and 2 emissions and lower the breakeven cost of production. Over time, they will move to develop cleaner energy sources—but only in a way that complements the core business and provides sufficient returns on capital. Examples include blending biofuels into transportation fuels, blending blue or green hydrogen into gas networks, or potentially creating fully fledged syngas.

Decarbonization Specialists will give special consideration to the topic of Scope 3 emissions. With a concentrated role in the energy value chain, they will not have options to offset, control or reduce the intensity of the emissions created through the combustion of their product. Decarbonization Specialists will, therefore, form partnerships with their customers and other players across the energy value chain in order to bend their total emissions trajectory.

A further imperative for Decarbonization Specialists is the development and incentivization of the supply chain. Oil and gas operations are highly dependent on oilfield and equipment services companies—with their high energy needs and sizable carbon footprints—for critical processes such as drilling and fracking. The Decarbonization Specialist must ensure their suppliers remain viable, aligned and effective in their efforts to deliver lower-emission outcomes and incentivized to collaborate in reducing total emissions.

Today’s oil and gas businesses will not automatically become Decarbonization Specialists. It is a role that only the highest-performing asset and infrastructure operators can seek to play. And while it offers the perceived certainty of a continued focus on the core, it will be far from business as usual.

With a concerted role in the energy value chain, Decarbonization Specialists will form partnerships with their customers and other players across the energy value chain in order to bend their total emissions trajectory.



What are the capabilities required to win as a Decarbonization Specialist?

One

Measure, manage and reduce CO₂ and methane emissions from existing assets.

Oil and gas companies can enhance their operating practices to, for example, reduce flaring or take advantage of digital solutions and automation. In selected cases, they can add incremental CAPEX to target specific emission reduction opportunities. Basic predictive operations solutions can be deployed to avert the need to flare gas throughout facilities. Specifically, they should focus on the imperative to manage and monetize methane through leak management, detection and repair programs, as well as adopting an asset-specific focus on capturing and monetizing methane along the value chain.

Two

Scale and deploy CCUS technologies and decarbonize the gas value chain.

Reduce the intensity of CO₂ production. New markets are developing for CO₂, and while the oil and gas sector is a large consumer of CO₂ in EOR activities, CO₂ is less likely to be captured and utilized for other purposes. Focusing on reducing the emissions from gas (and especially LNG) will enable cleaner, decarbonized gas to competitively support new electrification.

Three

Focus the portfolio.

Oil and gas companies should take a capability-driven approach to their portfolios. For some, this will mean focusing on lower-emission plays. Others with distinctive carbon-management capabilities will be able to manage more complex assets but deliver lower-carbon energy. That opens up the opportunity for them to acquire assets that others can no longer operate successfully. An agile approach to managing the portfolio will set the leaders apart and will, in itself, be a significant source of new value.

Four

Deploy energy efficiency and circular solutions.

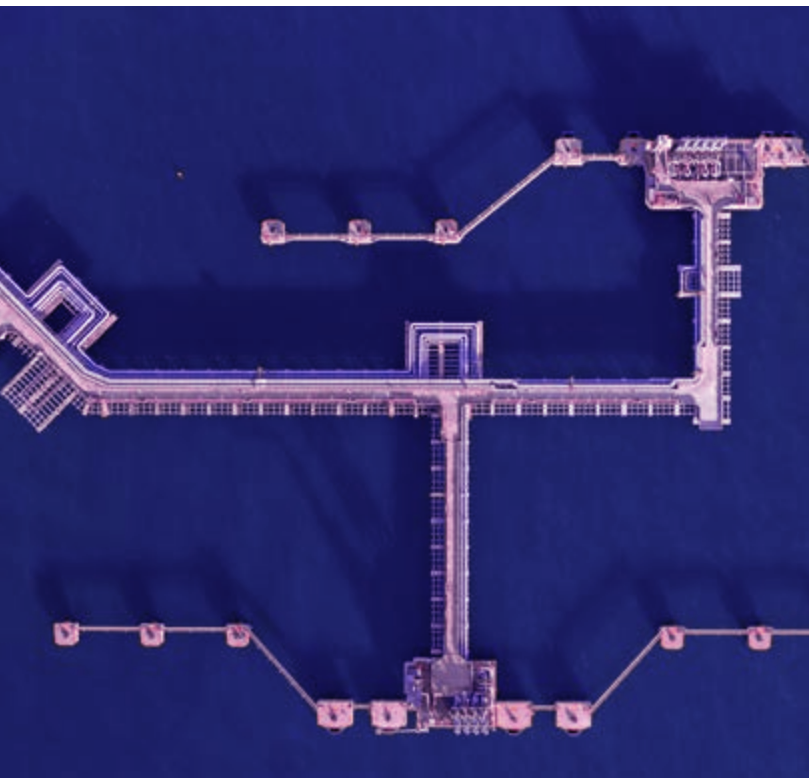
By doing this, companies can leverage less carbon-intense clean electricity, displace diesel with gas or electricity alternatives, and reduce waste energy consumption. Accenture research has found that up to 20 percent improvement in energy efficiency is possible across oil and gas assets by insulating pipelines, installing variable frequency drives or deploying permanent magnet motors⁵. Companies can also use circular solutions in the oil value chain to extend the life of critical equipment such as hydraulic fracturing pumps. This involves leveraging reconditioned equipment, increasing the recovery and redeployment of components deployed in the field, and increasing the portion of circular materials throughout the refining process. Those that play in the downstream value chain will focus their refining operations for maximum material and energy efficiency and add optionality to process recycled fuel and renewable fuels. For Decarbonization Specialists that operate a chemical business as part of their portfolios, circular feedstock solutions and crude-to-x feedstock processing will grow in importance over the upcoming decade.

Five

Engage the customer.

Decarbonization Specialists will help their oil and gas customers in industry and heavy-duty transportation, for example, leverage energy management, efficiency and CCUS solutions to reduce the end-to-end emissions associated with the oil and gas value chain.





Who should consider becoming a Decarbonization Specialist?

The Decarbonization Specialist archetype should be considered by players that have deep operational capabilities, occupy an early leadership position in carbon management and measurement, and currently operate carbon-advantaged assets.

Upstream independents, downstream players (including refiners and in petrochemicals), as well as service companies could select to be a Decarbonization Specialist. This is one of two viable archetypes; the other is Low-Carbon Solutions Leader.

A Decarbonization Specialist focuses on refining products at the lowest incremental emissions by being a leader in energy efficiency,

CCUS, synfuel manufacturing, process control and emissions management.

Similarly, a chemicals-focused Decarbonization Specialist can expect to complement advanced decarbonization capabilities with a conscious shift away from single-use plastics to degradable alternatives and lead in low-emission crude-to-x feedstock processing.

The journey to becoming an Energy Major or a Low-Carbon Solutions Leader will demand a more significant portfolio and operating model shift. While there might, in the long run, be less upside to becoming a Decarbonization Specialist, it stands out as a leading alternative in delivering near-term returns and margins.

What are the immediate priorities to establish momentum?

The journey to becoming a Decarbonization Specialist starts with a rigorous and honest, self-assessment of whether the company has what it takes to succeed, as well as an understanding of the known gaps and how to close them. Where these gaps are insurmountable, certain assets might be better owned and operated by others.

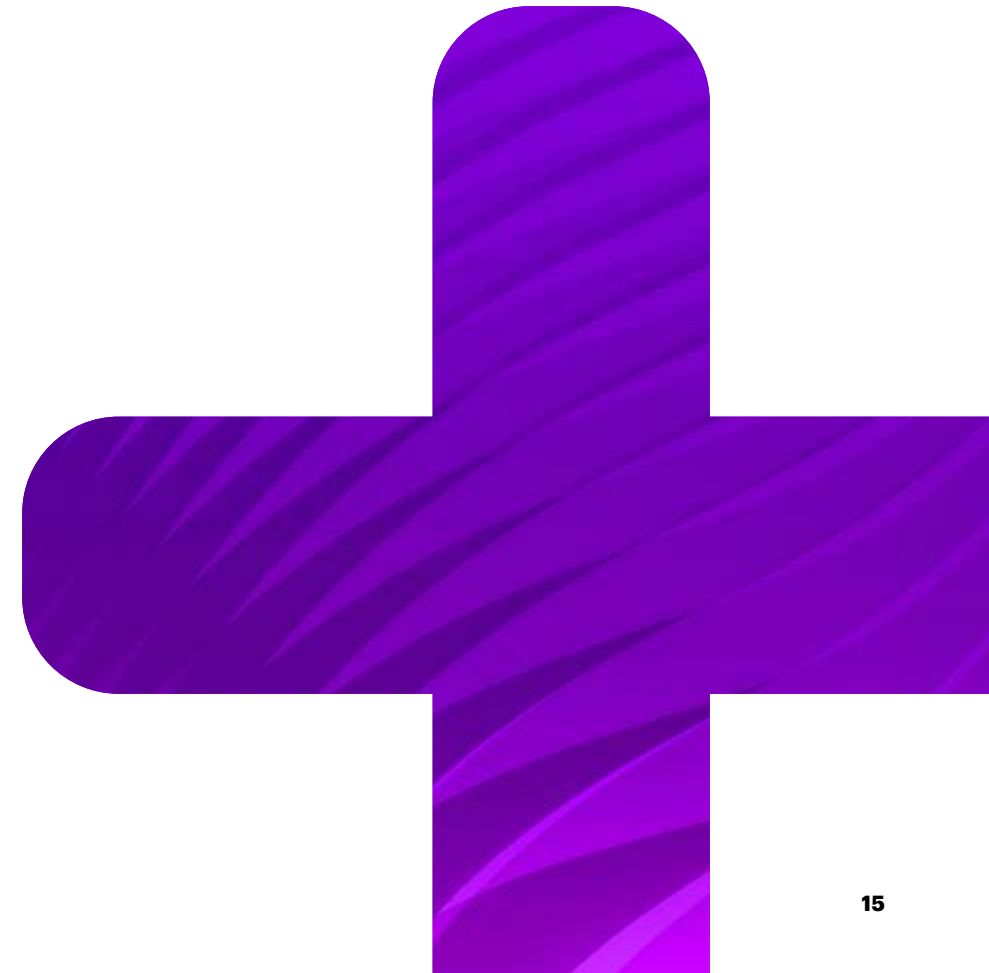
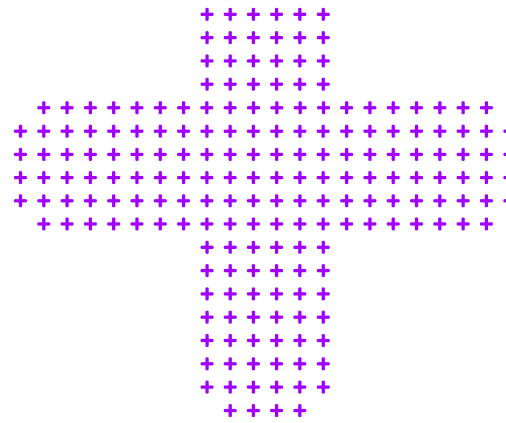
Laying out a clear journey to top-quartile or better performance in both emissions and cost across the portfolio, the Decarbonization Specialist will leverage its insights in carbon measurement and management, along with an agile approach to portfolio management, to pivot the business to lower carbon intensity energy production. Additionally, the company will share its ambition and expectations with

its supply chain partners, ensuring that a reliable and cost-efficient set of low-emission service and equipment providers are aligned and committed to achieving the joint aims of low-carbon oil and gas. The Decarbonization Specialist will likely need to establish partnerships in order to manage, or offset, Scope 3 emissions.

By intentionally timing and managing the deployment of its carbon-management capabilities, the Decarbonization Specialist will stay ahead of changing regulations, weather the consequences of carbon pricing, and be in a strong position to provide lower-emission products as commodity markets evolve to assign value to products' carbon-intensity.



Today's oil and gas businesses will not automatically become Decarbonization Specialists. It is a role that only the highest-performing asset and infrastructure operators can seek to play.



The Energy Major

There are reasons to believe that now is the time for a well-executed extension of oil and gas companies' scope of operations into a wider energy arena.

Feeling both a push from its current assets and a pull to new opportunities, the Energy Major will build or add clean energy businesses to its oil and gas existing assets. Over time, the Energy Major will increasingly rotate to low-carbon energy, while unlocking trapped value by integrating oil and gas into a portfolio of energy businesses.

What is the Energy Major's strategy?

The Energy Major will carry out a balanced set of activities across each of Clean the Core, Accelerate the Transition and Extend the Frontier dimensions, with the first two driving the majority of investment and action over the upcoming decade.

The oil and gas industry is standing up to powerful threats and opportunities. Liquid hydrocarbons will take a lower share of the growth in energy consumption into the future. Demand is shifting toward alternative energy solutions for transportation and, over the long run, gas will fall back as a direct source of energy consumption in buildings and industrial processes. Stock market valuations of oil and gas companies no longer turn on reserves or production, and the growth premium the sector earns is a fraction of that in other sectors of the economy such as technology.

Leading oil and gas businesses have value to protect. The largest are counted among the few organizations that manage truly global operations on a massive scale, sometimes spanning

more than 100 countries. Downstream and integrated players have well-established retail brands. Re-establishing trust, committing to the Decarbonization Transition, and leveraging brands many consumers already associate with “energy” all point to an opportunity to become an Energy Major.

As energy converges, there is opportunity. Mobility is being redefined, business models are evolving, and technology is enabling innovative solutions that create distinct roles that previously did not exist. The oil and gas industry's 100+ years of experience building customer relationships provides a strong starting point to anchor the future of connected, low-carbon mobility.

The global trend of growth in electricity consumption is now turning its focus to lowering the carbon intensity of the electricity being produced, ensuring its dispatchability, and solving the challenge of having more intermittent renewables in the mix. The Energy Major will focus on providing solutions to these issues.

For example, in 2022, offshore wind is expected to outstrip oil and gas for the first time to become Europe's largest area of upstream energy capital expenditure⁴⁵. Offshore wind offers several advantages, including its relative reliability as an energy source and its potential to be developed closer to major urban populations without the costs or public opposition that are often associated with on-land developments. Offshore wind also presents challenges, however. The engineering complexity associated with constructing turbine foundations in the ocean cannot be overstated. This is where the Energy Major can shine. As leaders in offshore engineering and construction, asset operators and service companies are capable of operating in almost any environment. Energy Majors will, for example, scale offshore wind, integrate wind resource with existing offshore assets, and redeploy the offshore supply chain to facilitate the development of the required infrastructure.

The Energy Major will be advantaged by working across an integrated portfolio of assets. Gas will be both a complement to and a substitute for intermittent renewables for the foreseeable future in power generation. Being able to drive value across both energy sources and manage between them enables the Energy Major to provide a complete solution to the customer. Energy Majors can also achieve greater flexibility by adding geothermal solutions to the mix, which can lower and smooth energy demand even more. With expertise in drilling and geothermal engineering, the Energy Major is perhaps the only company able to offer a range of tailored solutions to meet specific energy needs.

The Energy Major archetype will likely look quite different from one company to the next. Some will continue to have portfolios dominated by oil and gas and they will need to adopt several of the attributes of the Decarbonization Specialist to manage those assets. Others will emphasize clean power across their businesses. And still others will likely focus on new fuels like biofuels, electricity-based fuels and hydrogen.

The infrastructure, technology and customer synergies of their current business, as well as their track record in R&D and innovation, positions them well to be winners as these solutions mature.

It is important to understand what the Energy Major should not do. It is not realistic to expect oil and gas companies to succeed in areas of the value chain where they do not have an advantage or capabilities that can be reapplied. Companies across all sectors have struggled to grow or successfully acquire and integrate businesses that operate very differently to their core. Solar PV, onshore wind, power transmission and power retailing currently present few overlaps with oil and gas's core business. Furthermore, these areas have thus far exhibited high growth, but mixed profitability. The Energy Major will not succeed by making small, incremental steps. They will win by entering areas of the value chain they can disrupt at scale.



What are the five capabilities required to win as an Energy Major?

The Energy Major requires a broad set of complementary capabilities, over and above those required to be a successful oil and gas major. Specifically, they need to take the following steps.

One

Maintain two distinct operating models simultaneously.

The Energy Major will operate its legacy portfolio alongside its future areas of growth in the energy value chain. These distinct lines of business call for distinct operating models, capital intensity and talent and will deliver very different cashflow and return profiles. Many businesses have failed to maintain multiple operating models within a single organization. Winners will adopt solutions and mechanisms that preserve the integrity of both models. Structural changes, such as a spin-off company or new, ring-fenced divisions, may be required during the period of scale-up.

Two

Lead with both the “molecule” and the “electron.”

The Energy Major will cultivate businesses that work across and between oil and gas products and electricity and electricity-based decarbonized fuels. The energy market has bifurcated along these lines over the past 100 years, and while there are multiple signposts for convergence, few, if any, players have emerged with leadership across both domains.

Three

Build a resilient portfolio of oil and gas assets alongside emissions-management capabilities.

The core distinction between the Energy Major and a Low-Carbon Solutions Leader is that the Energy Major will continue to be a leader in the direct development, production, processing and refining oil and gas value chain. The growth into the wider energy space reduces the imperative for the oil and gas company to fully stand on its own and creates internal optionality to reduce emissions intensity by combining low or zero-emissions businesses into the overall company picture. However, the Energy Major will need to operate and maintain the oil and gas assets it retains as a Decarbonization Specialist would. If Energy Majors fall too far behind in oil and gas performance, the integrated value they earn over and above those who only play in oil and gas is unlikely to be sufficient to justify their continued participation.

Four

Create integrated solutions combining multiple sources of energy.

The Energy Major can emerge as the complete solution provider, with an integrated offering comprising gas, offshore wind, geothermal and energy storage solutions along with the ability to manufacture decarbonized fuels and promote circularity. Such integrated solutions can be game-changers as cities of the future look to transform their energy supplies. The Energy Major will be at the forefront of developing integrated solutions of a very different structure, commercial applicability and risk profile to the provision of commodity hydrocarbons. The ability to drive a wider, partnership-oriented narrative with the customer will be differentiating.

Five

Become a clear leader to net zero.

The Energy Major will be a dominant player across the energy landscape. As such, this company will face intense scrutiny—not least because of its retained oil and gas portfolios and the negative attention the sector attracts. To operate successfully across the energy landscape and secure a wider mandate, Energy Majors must be trust-focused, purpose-driven leaders committed to net-zero energy. Targets and announcements will need to be replaced by transparent reporting, material progress and demonstrated commitment early in the journey to becoming an Energy Major.



Who should consider becoming an Energy Major?

The Energy Major will likely be the most challenging of the three archetypal models to achieve. Prerequisites include portfolios of emission and cost-advantaged upstream/midstream assets, and refining or LNG and gas processing together with downstream customer businesses. Arguably this restricts the companies that can realistically pursue this path to the current integrated oil players and selected national oil companies. Those that have already tentatively entered new areas of the energy system, even where not fully successful, have started to accumulate the knowledge, relationships and assets that can set them apart. This archetype can only be achieved by those that move decisively now.

At the same time, these businesses will need to overcome the inertia that characterizes many large and historically successful organizations. Strong and visionary leadership and a willingness to accept near-term trade-offs for long-term success will be critical. The pathway to becoming an Energy Major is not open to all. There are questions remaining around financing and access to lower cost of capital, balance sheet structures, the immense scale required to replace fossil fuel energy provision, and the ability to drive value across regulated markets. Those challenges must be balanced with the opportunities that moving into this space might afford. It is up to the oil and gas companies to demonstrate why they will outperform the incumbent on their own turf. There will be no red-carpet welcome for them.

Those oil and gas businesses that do not have access to the range of capabilities required for success as an Energy Major—but who nonetheless need to pivot into new areas of the energy system given the structural limitations of their existing portfolios—ought to consider transitioning into the third archetype, the Low-Carbon Solutions Leader.

What are the immediate priorities to establish momentum?

The journey to becoming an Energy Major starts with an objective assessment of the components of the current portfolio that will be retained, the determination of the specific areas of the extended value chain that will become the new sources of growth and, perhaps most importantly, the tangible identification of how synergy will be delivered across the old and new businesses.

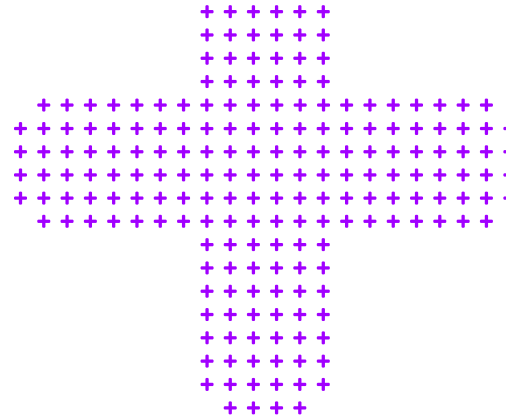
The Energy Major will need to fuel growth within new areas with either cash generated from the oil and gas core, or through asset sales. Transparently communicating this intention to internal stakeholders and investors will de-risk the tough journey ahead. At the same time, the Energy Major must remain focused on maximizing value from its existing portfolio. The window for growth in core oil and gas is already closing and action must accelerate.

The timing of the move must be carefully planned and balanced with trends in areas of the energy system outside current operations. The areas of maximum available synergy for an Energy Major (with the exception of offshore wind) are out of sync with the timing of the Decarbonization Transition. In short, the Energy Major can expect to be in the “investment period” if it enters hydrogen, biofuels, electricity-based fuels and energy storage—or if it takes any of the Extend the Frontier actions. An intention plan must be in place to avoid jumping too quickly or opening too many new fronts at the same time.

Establishing unstoppable momentum in the journey to becoming an Energy Major depends on making, and delivering on, a material commitment—equivalent to a double digit or greater share of annual CAPEX. It is about getting in shape to undertake the transformative deals required to make a fundamental shift.



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will not succeed
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The Low-Carbon Solutions Leader

The Low-Carbon Solutions Leader will exit its current direct asset-owning and production role in oil and gas.

It will refocus, instead, on leading in one or more clean areas of the energy system such as offshore wind, biofuels, hydrogen or decarbonized fuels. It may also potentially move to providing technical and decarbonization solutions back to the energy system, including to Decarbonization Specialists.

What is the Low-Carbon Solutions Leader's strategy?

The Low-Carbon Solutions Leader will take the lead across one or more Extend the Frontier opportunities, while also carrying out some Accelerate the Transition actions. Some of these companies might even selectively provide Clean the Core solutions in energy management services, CCUS technologies, emissions trading and emissions management to decarbonize other players' asset-centric portfolios.

This archetype represents the most profound strategic and operational departure from the past. It is not for the faint of heart. The companies choosing this path will monetize their core assets, then reinvest and leverage their capabilities and expertise to win in new areas across the clean energy sector. While several integrated oil and gas companies have set objectives to become leaders in low-carbon solutions (often starting by scaling a renewables-centric power portfolio, typically with a significant commitment to offshore wind),

this archetype represents a bolder, holistic shift from hydrocarbon ownership to a clean-energy-only portfolio. Only a couple of companies have planned for or executed this shift to date, with an encouraging response from investors.

Potentially, some oil and gas companies will consider opportunities in negative emissions businesses. Climeworks is pioneering a filter-based technology that combines direct air capture with underground carbon sequestration. The company believes that within five years it can be competitive with other natural climate solutions such as reforestation. Bioenergy with carbon capture and sequestration (BECCS) has also been highlighted as a critical component of achieving net-zero emissions. However, success in BECCS projects requires capabilities that companies focused on oil and gas likely don't have. Energy Majors, therefore, may find it challenging to pursue BECCS opportunities. Low-Carbon Solutions Leaders would be in a better position.

The Low-Carbon Solutions Leader archetype offers oil and gas companies the opportunity to reinvent themselves into clean energy companies. It not only removes the burden of running existing oil and gas assets, but also opens up the potential for new, asset-light positions linked to the energy value chain. Differentiated margins, leverage and growth trajectories can replace the scale and capital of the former businesses.

Companies considering the Low-Carbon Solutions Leader archetype must articulate what they bring to the future energy services table (beyond funding) and identify "why they will win." Furthermore, while this archetype can be appealing for an individual company, there's no guarantee that new owners of divested assets will successfully lower those assets' emissions intensity.

What are the capabilities required to win as a Low-Carbon Solutions Leader?

The Low-Carbon Solutions Leader that shifts fully into a new area of focus in clean energy will develop and deploy distinctive technical, project or operational leadership capabilities in the priority areas of the clean energy system in which it is focused. It won't necessarily be the technology leader, but rather a leader in delivering technical solutions to its customers through, among other things, access to the right ecosystem partners.

The Low-Carbon Solutions Leader that offers decarbonization solutions to energy asset owners and operators will require technical excellence and execution excellence in order to win. These companies will draw on both digital and operational technologies to stitch together new solutions and innovations. In addition to maintaining and developing its portfolio of

solutions, the Low-Carbon Solutions Leader will focus on managing and retaining its people. They also recognize the importance of intellectual capital and relationships with customers.

The move is certainly not without risk. The Low-Carbon Solutions Leader will create value in new markets across the energy value chain. This will require establishing commercial structures and value propositions that might not yet be tested. Strengthening operational and financial risk management capabilities will be critical. Equally important, the financial structure of the new business—everything from its balance sheet requirements to cashflow and returns—will need to be fundamentally changed. Careful management will be needed to effectively manage financial liabilities and exposure.

Who should consider becoming a Low-Carbon Solutions Leader?

The Low-Carbon Solutions Leader archetype can appear the most accessible. Integrated players are best positioned to make the move. Their exposure to the full oil and gas value chain typically enables them to bring the most capabilities to the table. However, integrated oil and gas companies might prioritize becoming an Energy Major, since the operating model disruption and requirements for change are likely lower. Furthermore, the Low-Carbon Solutions Leader will initially be a smaller business, with significant need for capital for the first few years. The need for boldness and a willingness to shrink will be a tough pill for some integrated players to swallow.

The burning platform, however, can be a great motivator. For many, it can be the significant financial pressure across the oil and gas business that will reduce the opportunity cost of divesting hydrocarbon assets and doubling down on clean energy such as offshore wind.

Businesses with strong technical, project and R&D capabilities will be most likely to create a sustainable advantage outside of their current core businesses. They are the ones that can set the ambition of becoming tomorrow's Low-Carbon Solution leaders.



What are the immediate priorities to establish momentum?

The pathway to becoming a Low-Carbon Solutions Leader starts with selecting and embracing the new areas of focus along the value chain. This is a make-or-break choice, which means companies need to carefully consider the growth potential, competitiveness, barriers to entry, and expected returns of the opportunity areas.

The Low-Carbon Solutions Leader must honestly assess whether it will truly be able to lead in, and reinvent, the sectors into which it's moving. Does it have the right technology expertise? Partners and customers? Business model? Innovation capacity?

The transition to becoming a Low-Carbon Solutions Leader can occur quickly or via a phased, asset-by-asset approach. The second option is likely smoother. But it requires more

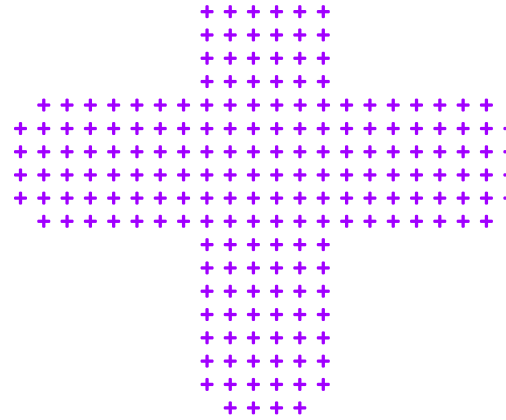
time to implement and might be more challenging to manage in terms of funding and operating multiple businesses at the same time.

Pure-play downstream oil and gas companies face a particularly challenging choice. But one that must be made. Some are best positioned to become Decarbonization Specialists, reducing operational emissions to a minimum, collaborating with customers to offset emissions, and running the most competitive crude-product slate combinations in high-growth markets, doubling down on their core market, and creating value even if volumes diminish. Others must prioritize the Low-Carbon Solutions Leader and extend their capabilities and assets into new energy solutions; refineries can be repositioned for blending biofuels, hydrogen and synfuel manufacturing

and retail businesses augmented with electric vehicle charging infrastructures and energy storage.

A similar opportunity exists for today's oilfield and equipment services companies. Operators are asking themselves whether they need to develop expertise or if they should leverage their supply chain partners. Service companies have already started to redefine their value propositions to the industry and as they go further will increasingly need to select their specialty—be it the decarbonization partner to the oilfield, or as the one to enter boldly into new energy solutions.

**The Low-Carbon
Solutions Leader
archetype represents
the most profound
strategic and
operational departure
from the past. It is not
for the faint of heart.**



The imperative for action cuts across all archetypes

Common to the winners emerging across all three archetypes is a commitment to pursue a low-carbon (or net-zero) ambition and account for it in all business decisions. They will each work to reform / rebalance their portfolios, rethink their operating models and capabilities, redefine customer value propositions and build customer intimacy, ramp up their innovation engines, and act to create true ecosystems that will support the complex transition.

Every oil and gas company must now prepare for the profound change that lies ahead. All will be affected. Many already are. A company deciding not to act decisively today is implicitly deciding to become a Decarbonization Specialist. That's a risky journey even for those that intentionally set out on the path. A frank conversation is required.



The path forward

Emerging safely from the storm requires that oil and gas companies take the right paths to their decarbonized futures. Those paths will rarely follow a straight line. Obstacles must be overcome. Threats must be continually assessed. Routes recalibrated. Destinations reconsidered.

The window of opportunity to pursue new value is open. But it could close quickly. Leaders who are effectively starting their journey, as well as others who are ramping up or assessing their alternatives, need to consider seven factors. And then take corresponding actions to ensure their path forward is the right one.

Factor One

Reset decarbonization commitment

It's clear that oil and gas companies need a social and financial license to operate. That license is bestowed by customers and investors in exchange for authentic actions to address environmental, social and governance imperatives and, specifically, to fight climate change. A public commitment for achieving net-zero carbon targets across Scope 1, 2 and 3 emissions in a practical, yet balanced timeframe must be a foundational element of any archetype transition.

Action: Leaders will need to bring their decarbonization commitment to life with investments, risk assessments, and transparency around the impact of their future operations. They will also need to have an internal carbon price built into their financial decisions and rewards.

Factor Two

Refresh risk

Transitioning to any of the archetype models comes with a certain amount of risk. A lot of that risk is based on the uncertainty of how the Decarbonization Transition will play out in the oil and gas industry, and in other industries, as well. What industry changes are coming in the next five years? The next ten? What new regulatory pressures might emerge? How will society's reliance on (and trust in) energy companies evolve—and how might that affect a company's license to operate? How will a move into areas outside of hydrocarbons affect a company's way of working? Its value? Its culture?

Action: Leaders need to honestly assess the amount of risk (and uncertainty) they are willing to take on—and the type of risk investors will tolerate. They will also need dynamic portfolio management capabilities to constantly assess the risk and reward tradeoffs of their decisions and executed actions.

Factor Three

Rethink the business model

Companies need to identify where the greatest value potential lies. Will it stem from making operations as lean as possible, perhaps by jettisoning costly assets or businesses? Will profitability come from delivering new services and experiences for customers or business partners? Will it come from carving out a winning competitive position in new lines of business or via integration across existing value pools? Or will it come about as a combination of factors?

Action: Leaders need to assess value propositions for customers, optimize their portfolios for a net-zero carbon world, improve their capital allocations, and explore non-traditional growth opportunities, including partnerships with customers or adjacent industry players. They need to determine how much of a business model revamp—incremental or fundamental—the transition path they’ve selected will require in the near and long terms.

Factor Four

Revamp the operating model

The transition to any of the archetypal roles will require entirely new sets of capabilities, partnerships and organizational structures. Many oil and gas companies have built their success (and their balance sheets) largely on the basis of their expertise in asset management and large-scale project execution. Others have global reach, strong brand recognition, and a long history of working with governments and regulators. Still others have infrastructures that can be modified to accommodate new sources of energy. Oil and gas companies should review their existing assets and capabilities for portability and the risk and cost of upending so much of their existing models.

Will the rewards potentially outweigh the risk of so much change?

Similarly, those revamping their operating model from the ground up to capture new value pools and/or transition into other industries will need to assess the compatibility of the new assets, capabilities and investor value proposition with those of their existing, or traditional, operating model built for oil and gas.

For example, an Energy Major will need to determine how to manage two business models concurrently.

Action: In making their strategic decisions about how to compete in the decarbonized future, leaders should determine which assets and capabilities are potentially transferable to new business models and new areas of the energy system—and whether that portability would deliver a meaningful cost or competitive advantage. Transferability of assets will be primarily a consideration for those companies looking to become Decarbonization Specialists or Energy Majors. Also, they need to determine the effort (and cost) associated with either revamping their capabilities, structures, and even culture or developing specialty capabilities within a specific value chain section or as a new kind of service provider.

Factor Five

Reimagine the customer experience

The target customer is changing, as can be seen in the shift from B2B customers to emerging B2C end-consumer customers. With these changes come tremendous opportunities for oil and gas companies to develop a new range of low-carbon sustainable offerings, from distributed generation services for prosumers to biodegradable packaging.

At a minimum, companies will need to reassess their customer value propositions and ability to compete in the direct-to-consumer markets. Some can take advantage of existing capabilities such as retail experience and infrastructure, to meet new customers' demands in new ways. And some—often for the first time—will need to develop customer-centric products, services, experiences and

interfaces. Access to end-customer data and insights into changing behavior patterns will be critical to creating compelling customer experiences. New digital platforms and tools will also be necessary to not only analyze consumer data, but also drive new forms of marketing and facilitate non-traditional partnerships. This becomes particularly important in the context of the sharing economy and emergence of new B2B, B2C and C2C channels.

Action: Reassess the customer value proposition and develop customer-centric products, services, experiences and interfaces. Identify what it will take to access the data and build the relationships that customer-centric business models will require.

Factor Six

Recharge innovation

Technology-driven disruption and innovation within and across industries are changing everything from value propositions, business boundaries and new decarbonization opportunities to operating models and the economics of running a new or existing business. Companies that can't keep up with the increasing pace of change won't just fall behind. They'll disappear.

Oil and gas companies that excel during and after the Decarbonization Transition will invest in building a strong innovation DNA. According to Accenture's *Technology Vision 2020*, that means they not only make optimal use of new digital technologies such as artificial intelligence, but also build new partnerships to share ideas and solutions and, together, create ground-breaking change. Innovation ecosystems should include suppliers,

customers, academics and even governmental or non-governmental organizations. They may also welcome unlikely collaborators such as competitors. And of course, they will use their innovation muscle to architect cross-sectoral transitions that will ultimately determine the pace and success of the overall Decarbonization Transition.

Action: Establish a culture of ongoing innovation to develop future-proof business models and ways of working. Continuously reassess R&D capabilities, refine them and bolster them with innovative partnerships. Continue moving forward with digital transformation programs. Aim to become a digital pioneer that leverages technology advancements to drive operational efficiencies, new customer products and business models.

Factor Seven

Reboot the ecosystem

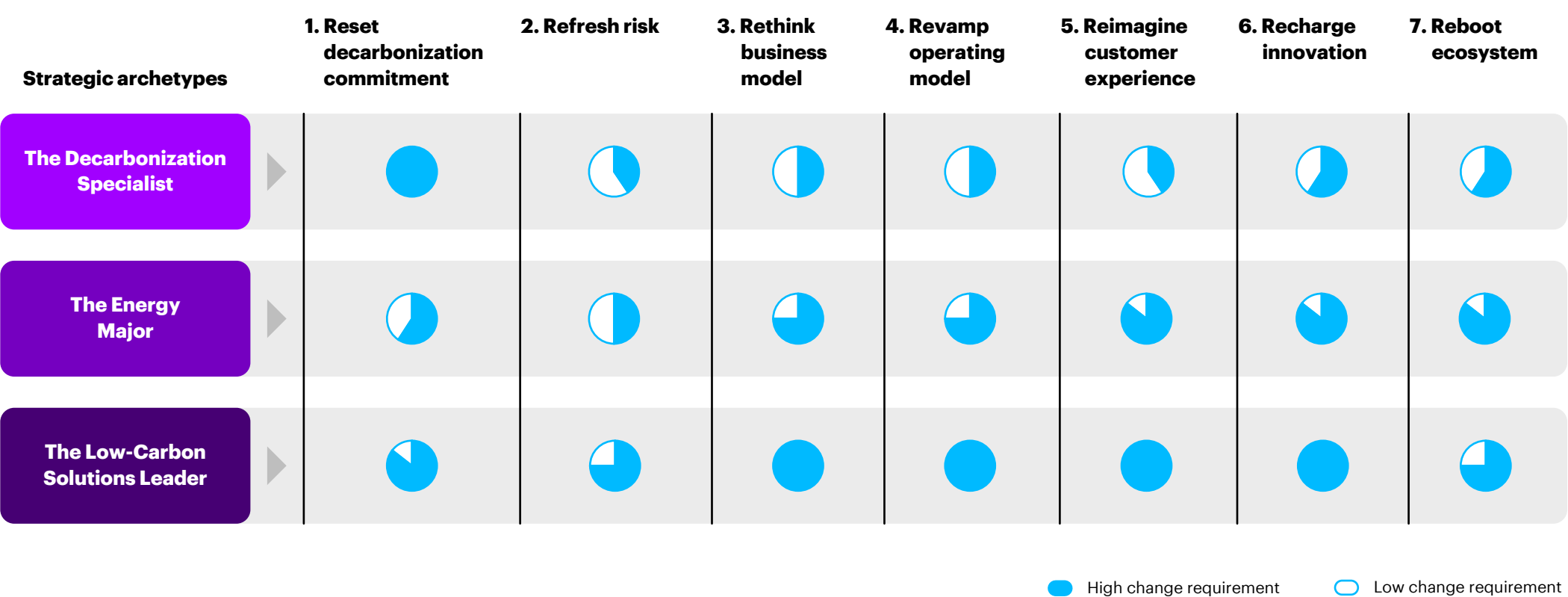
The transition to new business models and archetypes will require oil and gas companies to pursue new opportunities within the traditional oil and gas business (Decarbonization Specialists and Energy Majors) and far beyond (Energy Majors and Low-Carbon Solutions Leaders). And the risk of that uncertainty will typically be too great for one company to bear. Oil and gas companies will, therefore, need to reimagine their ecosystem partnerships—within the sector, across sectors, and with technology companies. For example, transitions within the harder-to-abate sectors such as heavy industries and aviation will only happen if an ecosystem of cross-sectoral and technology partners come together to reengineer the current system. Proactively orchestrating ecosystem partners to bring a united vision of the energy future to life is one of the most important roles oil and gas companies will play.

Action: Identify partners with complementary skills across industries that could be inspired to develop joint offerings and go-to-market strategies. At the same time, look to existing partnerships and ecosystems across sectors into which your business may infuse needed skills, assets and expertise. Establish consortiums to share funding and ideas.



Figure 32

Factors to consider in assessing the change journey required for success in the different archetypes



Source: Accenture Analysis



Shelter in the storm

When a storm is raging, it's often hard to think about more than staying safe. But for oil and gas companies, there are no longer any safe bets.

Investors, consumers, regulators and new entrants are no longer supporting a business-as-usual approach. And market dynamics have revealed that old ways of working are no longer rewarded. Growth today means pursuing higher-value opportunities.

Oil and gas companies need to look beyond the here-and-now and envision a time when the storm has passed. When they are no longer struggling to navigate the disruption swirling around them and, rather, leading others on the journey to a secure, robust and decarbonized energy future. That journey will almost certainly extend beyond 2050.

While the industry's net-zero emissions targets by the middle of the century will likely be missed, that's no reason to end the journey prematurely. Indeed, it's why oil and gas companies should redouble their efforts to lead in the energy transition. The value they will ultimately deliver when their transitions are complete will be worth waiting for.

For generations, oil and gas companies have fueled the world's potential. There's no reason to think they will or should stop now.

Accenture Decarbonization Scenarios

The Accenture global decarbonization model was constructed using a four-step approach.

- 1.** We first established the emissions base case (emissions today) for each demand sector using accredited governmental and NGO sources.
- 2.** We then projected BAU emissions to 2050 by combining the expected increase in sector demand with the expected emissions abatement on current trajectories.
- 3.** As a next step, we identified, by demand sector, the emissions reduction levers and their potential if fully implemented.
- 4.** Finally we projected a percentage reduction achieved by lever according to the remaining business-as-usual emissions it would impact (near-term levers will have a larger percentage impact than those that come later and have a reduced base to impact) and the extent to which we will be successful in fully implementing each lever by 2050.

Glossary

Term	Definition
2DC guideline	One of the key guidelines formulated during the Paris Agreement, which called for an assessment of the impact on a company's portfolio and business strategy of policies and restrictions consistent with achieving the globally agreed upon target to limit global average temperature rise to no more than 2°C above preindustrial levels.
5G	Refers to the 5th generation mobile network. It is a new global wireless standard that is designed to connect everyone and everything, including machines, objects and devices. Advantages of 5G include higher peak data speeds, ultra low latency, massive network capacity and increased availability.
Asset-light business model	A business model where the company owns relatively fewer capital assets than is required to run its operations. This is achieved by outsourcing the capital requirements by way of operating leases or other pay-per-use service models.
BAU	Business-as-usual
Bio-energy with carbon capture & sequestration (BECCS)	A carbon removal technique that includes two technologies. First, biomass is converted into heat, electricity or liquid / gas fuel and, subsequently, the carbon emissions from this conversion are captured and stored or utilized in other long-lasting products. BECCS can thus serve to reduce the overall CO ₂ concentration in the atmosphere.

Term	Definition
Biodiesel	Biodiesel is a form of diesel fuel derived from plants or animals and consists of long-chain fatty acid esters. It is a renewable, biodegradable fuel produced from vegetable oils, animal fats, etc.
Biofuel	A type of renewable energy source derived from microbial, plant or animal materials. Examples include ethanol (derived from corn or sugarcane), biodiesel (derived from vegetable oils, animal fats, etc.), green diesel (derived from algae, etc.) and biogas (methane derived from animal excretions, etc.).
Biomethane	Also known as "renewable natural gas," it refers to methane produced either by "upgrading" biogas (a process that removes any CO ₂ and other contaminants present in the biogas) or through the gasification of solid biomass followed by methanation.
Biomethanol	Biomethanol is typically generated through a thermochemical reaction. The feedstocks for the process can be any type of concentrated carbonaceous materials (i.e. biomass, solid waste, coal, etc.). The process entails converting feedstock into biogas through gasification and the synthesis of methanol.
Black start service applications	Black start is the procedure used to restore power in the event of a total or partial shutdown of the electricity transmission system without relying on any external electric power source.
Blue hydrogen	Hydrogen produced by steam methane reformation, where the emissions are curtailed using carbon capture and storage.
Carbon budget	The overall quantity of CO ₂ and other greenhouse gases that the world, country or company can emit without risking an average global temperature increase beyond 2°C. It can also refer to the quantity of CO ₂ or greenhouse gases that a country, company or organization has agreed is the maximum it will produce in a given time period.

Term	Definition
Carbon net neutrality	Carbon neutrality means every ton of CO ₂ that is emitted is compensated with an equivalent amount of CO ₂ which is removed.
Carbon offsets	A reduction in emissions of CO ₂ or other greenhouse gases made in order to compensate for emissions made elsewhere.
CCUS	Carbon capture, utilization and storage (or CCUS) is a critical emissions reduction technology that can be applied across the value chain. CCUS systems capture CO ₂ from power plants or industrial processes and either use it as a raw material in the production of other fuels or permanently store it in deep underground geological formations.
Circular economy	An industrial system that hinges on a shift towards renewable energy, eliminates the usage of toxic chemicals, and eliminates waste through enhanced design of materials, products, systems and processes.
CNG	Compressed natural gas (or CNG) is gas compressed to a pressure of 200+ bars. It is used in cars and other light commercial vehicles as a fuel and produces lower emissions compared to diesel- or petrol-fired internal combustion engines.
Connected Autonomous Shared Electric (CASE)	CASE refers to new areas of "connected" cars, "autonomous / automated" driving, "shared" and "electric." Technological advances in these areas are disrupting the automotive industry.
Crowd shipping	A novel shipping concept where logistics operations are carried out by crowd sourcing and existing resources such as vehicle capacity and drivers, thereby offering potential for economic, social and environmental benefits.

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