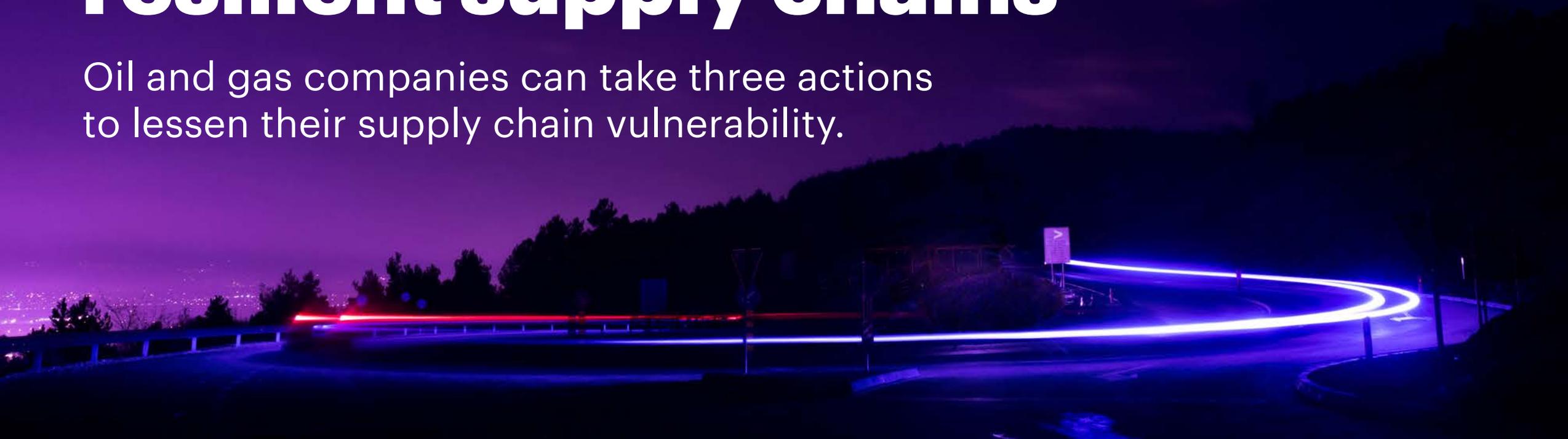




# Reliable energy requires resilient supply chains

Oil and gas companies can take three actions to lessen their supply chain vulnerability.



In 2020, the COVID-19 pandemic brought global supply chains to their collective knees. The energy sector was certainly not spared. The Russian invasion of Ukraine has now complicated matters. As markets for Russian oil and gas increasingly look for alternative sources, the energy industry is under tremendous pressure to fill the gap. Brownfield sites need to be revisited. Greenfield sites need to be developed. And the rollout of alternative energy sources and solutions must pick up their pace.

Actions in each area will require new investments. New capital projects. And a more resilient supply chain, capable of delivering reliable, sustainable and affordable energy now and in the future.

Accenture research found that **82%** of energy companies experienced moderate to severe supply chain disruptions in 2020.<sup>1</sup>

An aerial photograph of a large offshore oil and gas platform in the middle of a blue sea. Two supply ships are docked at the platform's pier. The platform is a complex of metal structures, pipes, and walkways. The water is a deep blue, and the sky is not visible. The text 'The case for supply chain resilience' is overlaid in white on the left side of the image.

# The case for supply chain resilience

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The energy industry is vulnerable to several supply chain threats, including extreme weather, cyberattacks, trade disputes, workforce instability and surges in supply or demand. The industry is even subject to health threats. The spread of COVID-19 halted the production of a range of industry supplies, from steel to sand. And more recently, the industry has been dealing with the geopolitical and economic uncertainties resulting from Russia's invasion of Ukraine.

Such disruptions, many of them unforeseen, can have a significant impact on energy supply chain networks and, therefore, the profitability and predictability of energy projects. That is because supply chain spending represents a significant portion of capital expenditures (CAPEX) and operational expenditures (OPEX) for energy companies. In fact, we've found that supplies of goods and services can account for approximately 80% of CAPEX spending for upstream businesses—particularly for resource-intensive drilling and completions activities.<sup>2</sup>

Even more telling, supply chain disruptions in the oil and gas industry could place more than 20% of the industry's CAPEX growth plans at risk this year.<sup>3</sup> For exploration and production (E&P) companies, this risk calculation is based on several factors, including the expected retirement rate for jack-ups and floaters. We believe the retirement of these assets will reduce available capacity to ~15% below demand.

Further, our analysis suggests that the oilfield and equipment services (OFES) companies' constrained capacity for onshore drilling and well-stimulation services will fall 20%-25% short of what will be needed. Such disruptions, we believe, would decrease US onshore oil production output by ~240,000 barrels per day throughout 2022.<sup>4</sup>

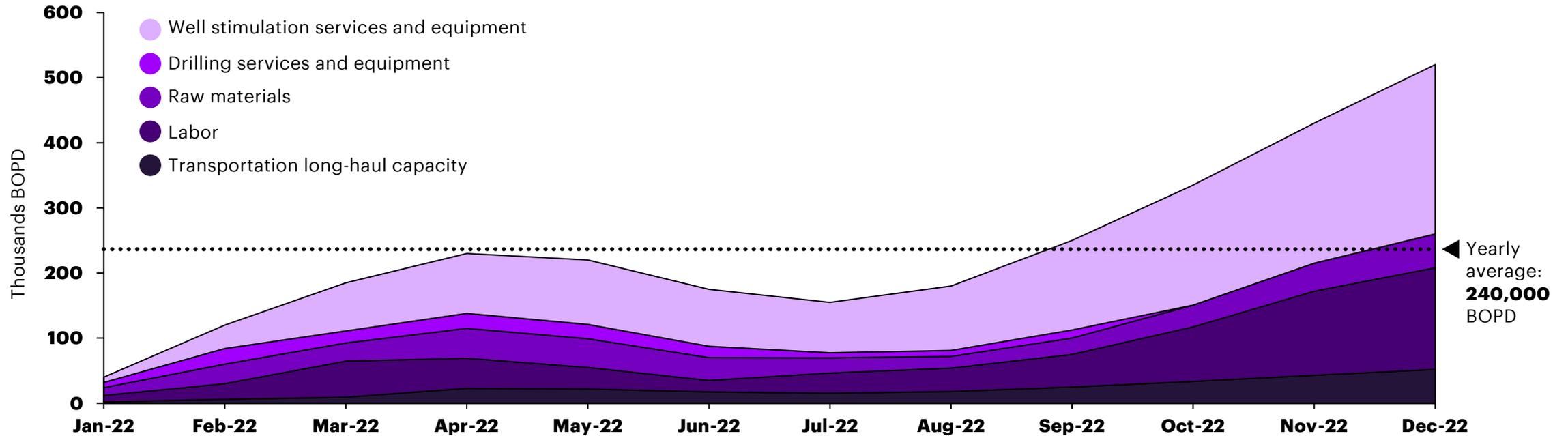
For context, such a decline in production would be approximately half the announced sale of crude oil from the Strategic Petroleum Reserve to stabilize volatile energy costs.<sup>5</sup>

Supply chain disruptions in the oil and gas industry place **>20%** of the industry's CAPEX growth plans at risk in 2022.



# Impact of supply chain disruptions on US onshore oil production output

## Thousand barrels oil per day (BOPD), 2022

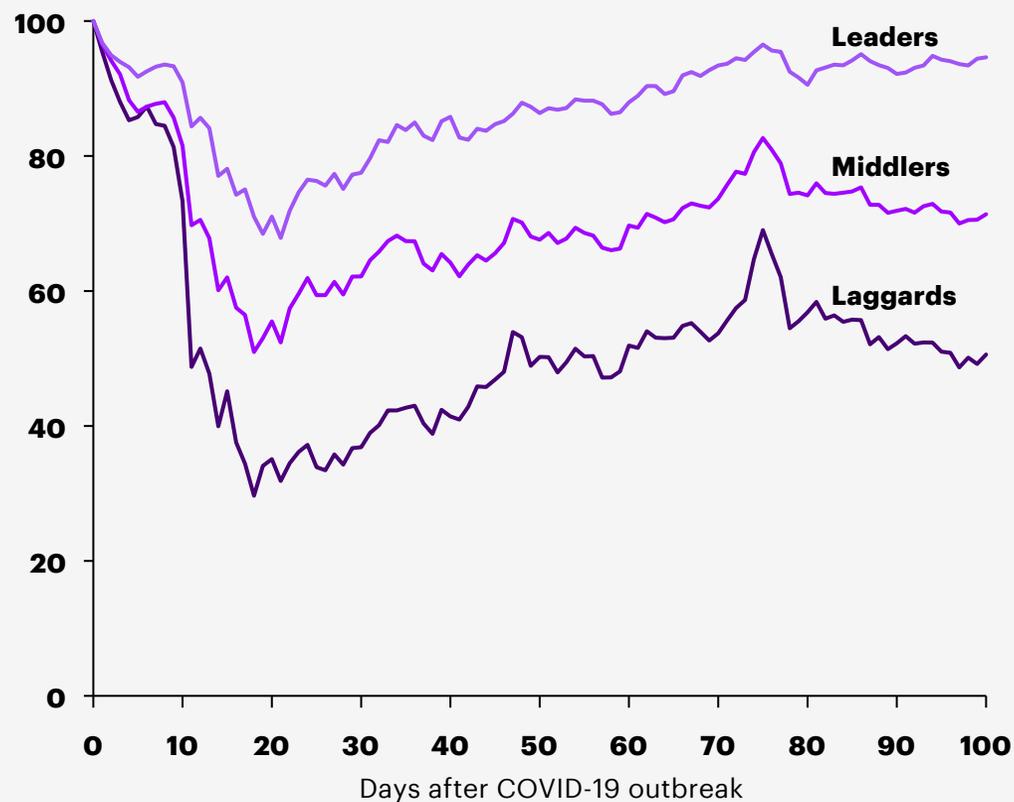


Supply chain resilience would help reduce such risks by helping improve the efficacy of capital investments, as well as the speed with which capital projects can start generating returns. Furthermore, resilience would help enable oil and gas companies to effectively address new energy demand in the short and medium term—and maintain the necessary energy supplies through the energy transition. In that regard, changes made now will yield benefits for years to come.

Source: Accenture analysis based on Rystad data and OFES companies' press releases.

## Market capitalization of 65 energy companies during 100-day period after COVID outbreak

Indexed, 100 = market capitalization at day 0



Source: Accenture analysis based on Capital IQ data.

There's another important reason for energy companies to bolster their supply chains sooner rather than later. Markets reward supply chain resilience. This is evident in our analysis, which examined the supply chain resilience and market capitalizations of 65 oil and gas companies during a 100-day period after the COVID-19 outbreak. Of this cohort, 13 (20%) exhibited the following leadership characteristics:

- High levels of visibility into performance across the supplier network
- Due diligence practices across a large share of the supplier portfolio
- Inclusion of supply chain resilience metrics in the supply chain scorecard

The market capitalization of these resilient leaders was nearly 2X higher than companies exhibiting low supply chain resilience. And they recovered 5X faster after the pandemic hit.

A long train of colorful shipping containers (red, blue, green, yellow, orange) stretches into the distance on a gravel track. The sky is a vibrant sunset of orange, red, and purple. The foreground shows the side of a red container with a door and locking mechanism.

# What disruption looks like

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The supply chain challenges facing the energy industry today peaked once oil prices started to recover in 2021. At that time, regional quarantines created shortages of vital raw materials such as steel used for well casings. The production of maintenance, repair and operations equipment ground to a halt in many regions of the world. And sand mines ramped down their operations when energy demand plummeted.

Even when materials and parts were available, logistical nightmares—from port congestions to sky-high container pricing to a shortage of last-mile drivers—made it difficult to transport them to their final destinations. Once the demand for energy surged back and oil and gas companies looked to ramp up their inventories and production capacity, their supply chain woes were that much more evident—and damaging.

Now, Russia's invasion of Ukraine has added another layer of supply chain complexity—for example, by potentially making supplies of iron ore, nickel and other materials sourced from Russia, Belarus or Ukraine harder to come by.

The war is further amplifying the urgency with which energy companies are required to tackle their supply chain problems because countries and energy-intensive industries are now looking to quickly replace their Russian oil and gas supplies. Under the best of circumstances, non-Russian suppliers would have been hard pressed to fill the gap. With supply chain problems holding up brownfield and greenfield projects, the challenge to address the world's short-term energy requirements has grown.

On top of all this, inflation is making the products that are available much more expensive for certain operators.<sup>6</sup> According to our analysis, costs of engineering, procurement, construction and installation services, transportation, labor and equipment rentals could increase by more than 10% year-on-year until 2024. Ongoing shortages of materials and services will likely further exacerbate cost pressures for the remainder of 2022, if not longer.

Energy companies' supply chain issues can add **\$10 TO \$15** or more per barrel to the breakeven cost of a new well.



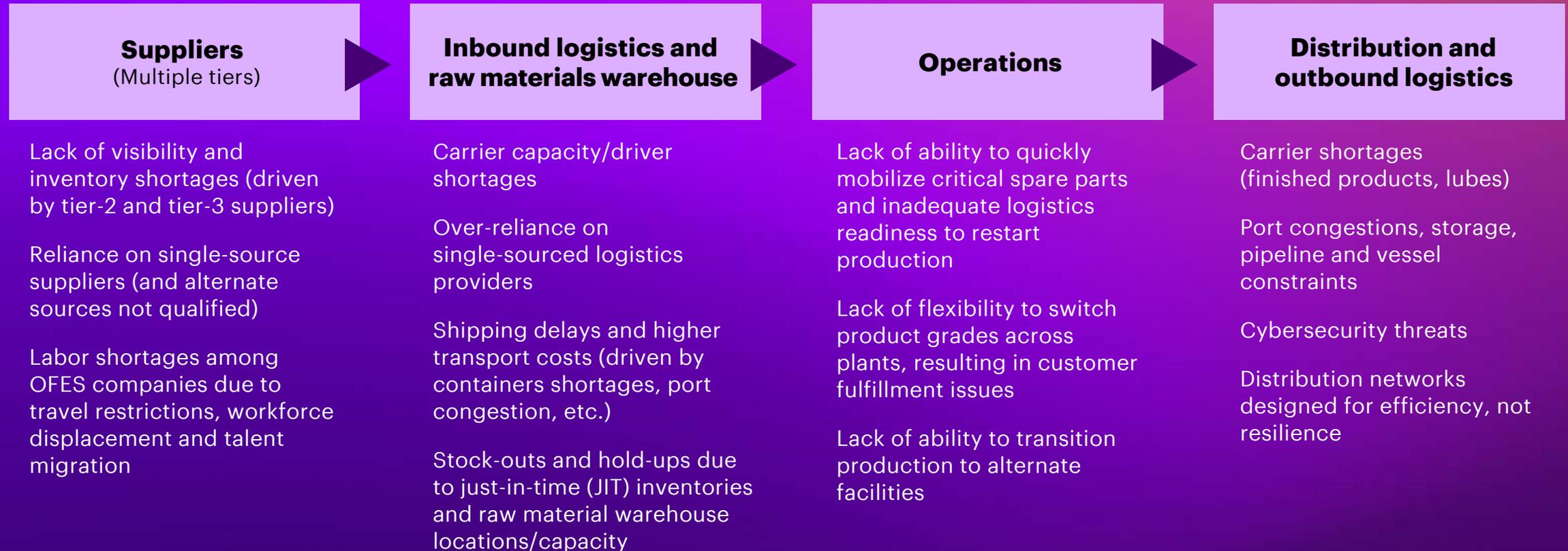
As shocking as the pandemic, inflationary pressures and the war in Ukraine have been to the energy industry's supply chain networks, they aren't the root causes of today's energy supply chain problem. They have simply revealed and exacerbated vulnerabilities that have been years in the making. These include the lack of digital operations platforms that match materials and work crews, the prevalence of spot purchasing or single-source supplier contracts and a general under-investment in building supply chain resilience.

Oil and gas companies now have the chance to resolve years-long challenges and establish a more resilient posture against future threats. With commodity prices near record highs, they can develop supply chain solutions that will help enable the ongoing energy transition—and the security and reliability of an energy system upon which we all depend. But doing so requires that they balance their capital project investments with shareholders' demands for healthy returns and cash flow.

# Breakdowns and breakevens

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Accenture's review of investor presentations and recent discussions with large oil and gas companies suggest that the main supply chain hurdles typically fall into four categories:

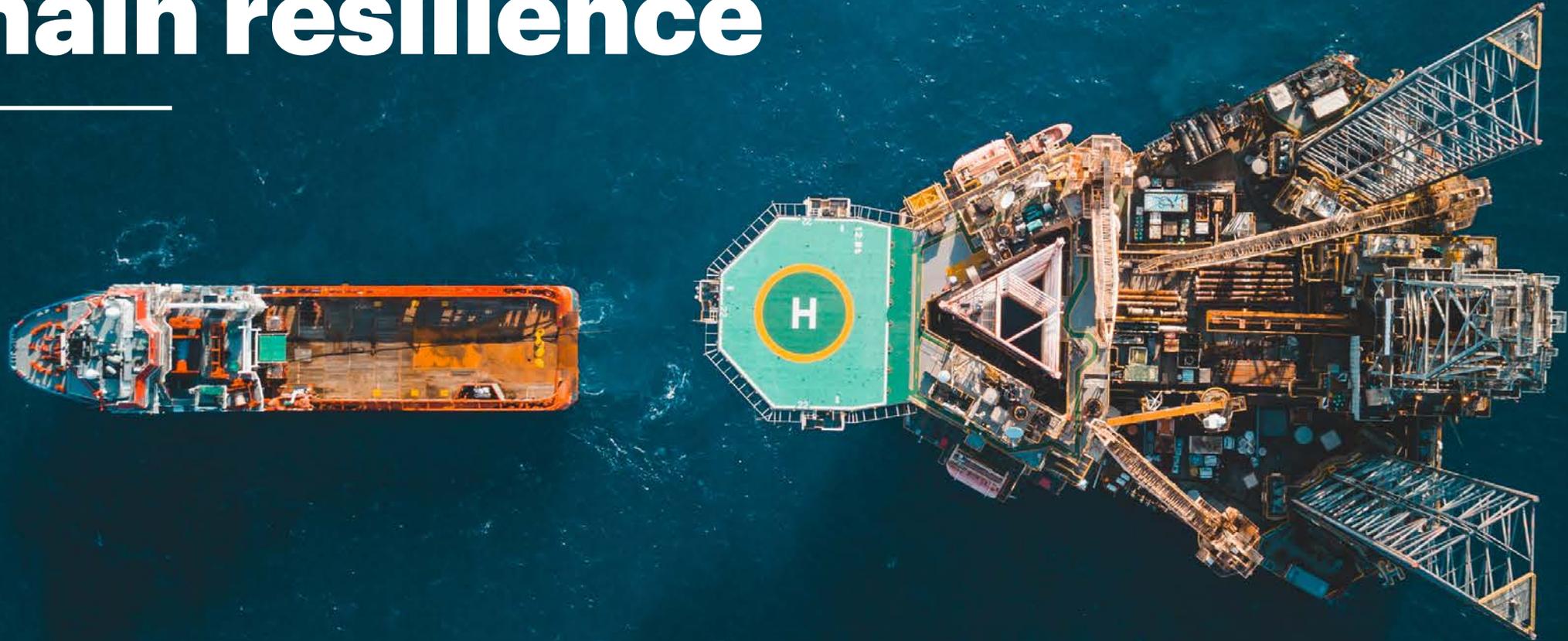


An aerial photograph of a busy port. A large cargo ship is docked at a pier, with its deck covered in stacks of colorful shipping containers. A white airplane with red accents is positioned on the tarmac in the foreground, partially overlapping the ship. The scene is brightly lit, suggesting a clear day.

Together, these supply chain breakdowns are taking a significant toll. Accenture analyses suggest that they can add **\$10 to \$15** or more per barrel to the breakeven cost of a new well.<sup>7</sup> With commodity prices near record highs, oil and gas companies can likely absorb these costs. But record high prices don't stay around forever. Every boom cycle is eventually followed by a bust. When prices plunge, an **additional \$10 or \$15** of cost per barrel of oil **will be unsustainable**.

# Achieving supply chain resilience

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Accenture believes energy companies can create reliable supply chain networks that will serve them well for decades to come by taking three actions today.

## 1. Pool resources, insights and know-how.

Oil and gas companies should create a collaborative response to supply chain issues by sharing insights and resources. Without integrated planning, demand pooling and shared infrastructures among operators and OFES companies, the industry will be unable to improve utilization of assets, logistics networks or service crews. As a result, operators can't effectively mobilize capacity to address demand and their growth objectives.

Pooling demand for equipment and other supplies to help improve energy availability and energy system efficiency is critical. So is the creation of shared infrastructures that will allow the industry to help boost the performance and responsiveness of its assets and resources. Shared and centralized warehouses or staging areas within a specific basin are just two examples.

Viewing OFES companies as strategic partners is also important. Sharing demand insights is one way oil and gas companies can help create

a more strategic relationship with their OFES suppliers. But that is not enough.

Companies are required to also develop new types of relationships and contract structures that not only allow operators to understand supply shortages in real time, but also help work more closely with OFES companies to build supply chain resilience.

Collaboration across the oil and gas value chain yields a number of advantages—from improved resource utilization to supply flexibility. Environmental benefits are also possible. The World Economic Forum, in collaboration with Accenture, has estimated that shared resources can help reduce greenhouse gas emissions by 10% to 25%. Those benefits would likely grow even larger if resource sharing is used to scale hydrogen solutions and further develop carbon capture, utilization and storage (CCUS) technologies.<sup>8</sup>

### Value delivered

- Improved availability of material and services
- Reduced buffers
- Improved resource utilization
- Improved supply flexibility
- Reduced emissions

Oil and gas company Petronas spearheaded the Cost Reduction Alliance (CORAL 2.0) program, which brought together 25 industry players to adopt a cost-conscious mindset across upstream operations in Malaysia. Over a four-year period, the group achieved **\$2.8 billion** in savings. Approximately **\$250 million** in savings (and significant emissions reductions) were due to the optimization of supply chains and, specifically, the utilization of logistics vessels from less than **70% to 90%**.<sup>9,10</sup>



## 2. Bolster procurement and risk management capabilities.

Currently, most energy companies manage their procurement operations in isolation either by basin or as a company—seeking out the supplies and resources they will need to seek their unique strategic imperatives. Establishing joint procurement teams and “buy desks” to source and manage products would not only allow the industry to compete more effectively for scarce resources, but also help encourage suppliers to be more innovative in how they serve the industry.

A shared approach to asset/resource utilization and procurement would also help operators identify supplier risks that may have previously gone unnoticed. Another way to ramp up risk management capabilities would be for companies to stress test the resilience of their supply chains—and contingency plans—under various disruption scenarios. Creating digital twins of end-to-end supply chain networks (including suppliers, lines of business, products and more) allows companies to run stress test

disruption scenarios for virtually any material or service. We recommend that companies stress-test their supply chain networks at least annually.

The deployment of supply chain digital twins can also help energy companies understand their risk exposures, potential performance impacts, the time it would take for the supply chain to resume normal operations after a disruption (time-to-recover or TTR), and even the length of time a company could fulfill customer demand when a supply chain disruption occurs (time-to-survive or TTS).

To date, there is only a limited use of digital twins to model supply chain resilience—despite the high-value potential of its application.<sup>11</sup> While digital twins are being developed, companies can use their institutional knowledge to identify the most obvious points of failure and develop action plans.

### Value delivered

- Supply assurance (through scale of purchasing)
- More effective risk-mitigation strategies (through use of supply chain digital twins)

# Stress testing helped the lubricants business of one energy company understand its supply chain risks—and the potential impact

## Test to uncover weak points in the supply chain

- **Pre-defined scenarios**  
Apply nine scenarios covering demand and supply risks (supplier, geographical, customer, disruptions and natural disaster events)
  - **Various scenario options**  
Variants based on severity and/or duration of the disruption translated in a node capacity impact
  - **Multiple calculations**  
Run thousands of variables to calculate the resilience score
  - **Customize**  
Add additional company-specific disruption scenarios
- ➔ **Data-driven resilience assessment**  
Calculate resilience score and identify points of failure

### Stress test scenarios (non-exhaustive)

			Scope					Severity	Duration
			Node	City	Country/ State	Program	Customer		
Demand	1	Sudden spike in demand				●	●		
	2	Sudden drop in demand				●	●		
Supply	3	Tier 1 supplier plant shutdown	●	●	●				
	4	Subcontractor/Tier N facility shutdown	●	●	●				
	5	Scarcity in critical raw material	●	●	●				
	6	Disruption of a port/hub	●	●	●				
Manufacturing and logistics	7	Manufacturing capacity shutdown	●	●	●				
	8	Distribution location shutdown	●	●	●				
	9	Transportation capacity shortage	●	●	●				

**Ability to run dynamic severity and duration for each selected scenario**



## Stress testing the supply chain.

An integrated oil and gas company adopted [the supply chain resilience stress test approach](#) to assess (and quantify) the resilience of its downstream segment's supply chain and uncover risks or potential failure points under different disruption scenarios. The approach revealed risks hidden within low-value, low-volume suppliers, whose materials are crucial to the overall manufacturing process. Importantly, the approach also identified a number of targeted mitigation actions, including: alternative supplier identification and supplier development programs, inventory policy reviews, actions to increase overall equipment effectiveness for product lines experiencing bottlenecks and identification of alternative plants to meet demand requirements.

By implementing these mitigation actions, the company was able to improve product availability and on-time delivery of finished retail products **by 20%**, resulting in an increase of top line revenue **by 3% within 12 months**.<sup>12</sup>

### 3. Gain control with control towers.

Operators tend to have little visibility into their supply chain networks, which means it takes them longer to respond to disruptions. They also typically lack an operations platform that matches materials with work crews. When materials such as well casings and drilling crews don't show up on site at the same time, the results include system inefficiencies and longer wait times, which impacts everything from emissions to costs to free cash flow.

[Supply chain control towers](#) or incident command centers can help alleviate these problems. Setting up basin-wide, cross-functional control towers can help improve supply chain visibility and enable operators to sense and respond to supply chain disruptions more quickly. Additionally, the visibility afforded by control towers helps companies improve the execution of daily drilling, completion and production activities.

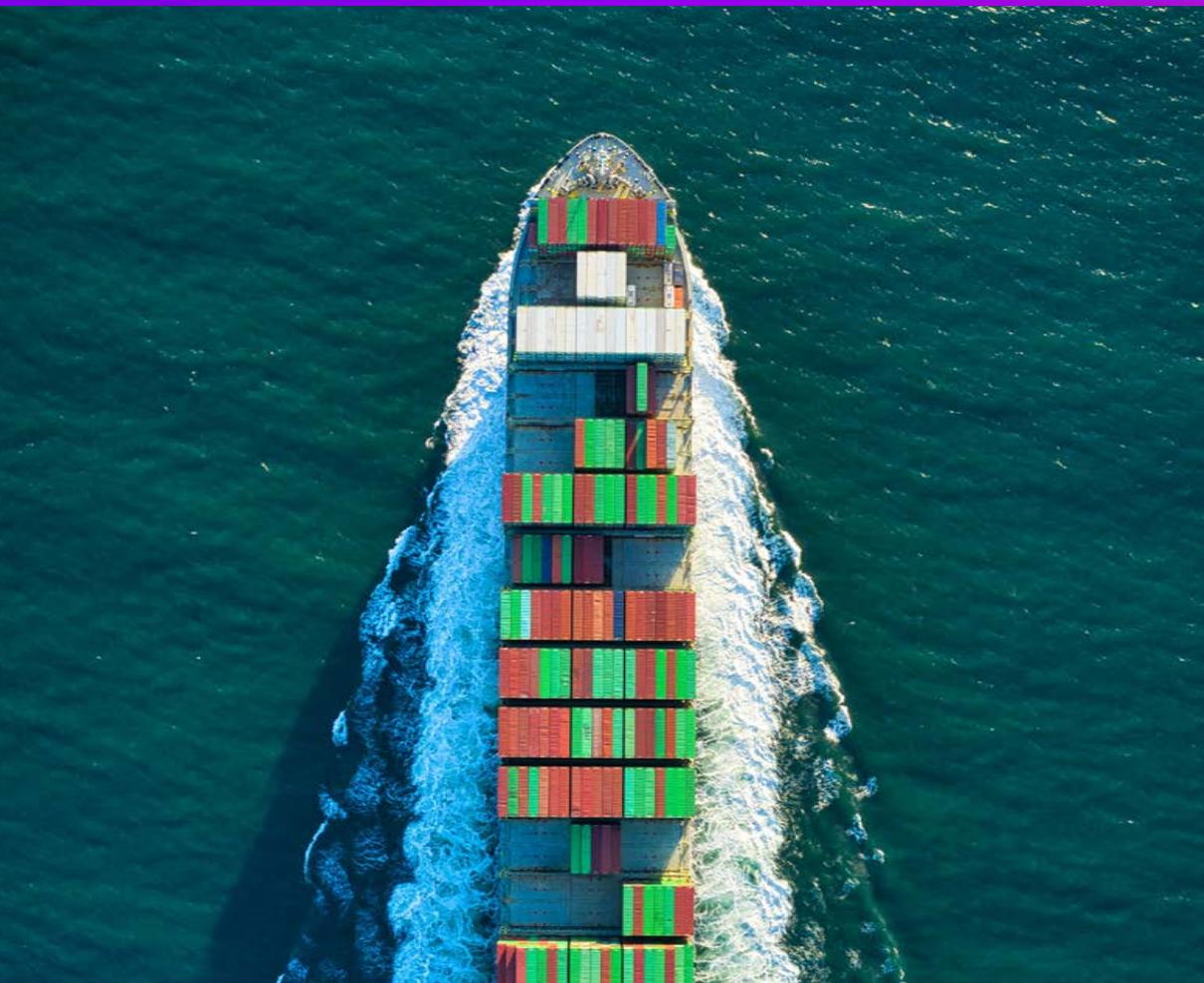
#### Value delivered

- Ontime deliveries and service mobilization
- Better visibility—and management of supply exceptions
- Reduced costs and emissions

## Seizing control.

A leading US-based exploration and production company historically managed its supply chains via multiple, disconnected systems and manual processes. To achieve greater transparency and accelerate its decision-making capabilities, the company transformed its offshore supply chain operations, including supply chain planning, scheduling and execution.

It also established an upstream supply chain control tower, covering dozens of production platforms, drilling rigs, data systems and air/shipping fleets. Since launching its supply chain transformation and control tower capability, the company has lowered its logistics costs, inventory levels, and supply chain-related production deferment. The improvements reduced supply chain operating costs by **approximately 20%**, while increasing asset uptime and production **by 2% to 5%**.<sup>13</sup>



## **Collective action against collective risk**

The pandemic and war in Ukraine have amplified the need for supply chain resilience in the oil and gas industry. They have taught the energy sector a valuable lesson: isolated and short-term fixes won't withstand the next, inevitable supply chain shock.

Oil and gas companies will never be able to predict or avoid all the risks to their supply chain networks. But they can deploy new technologies and operating models today that will allow them to better see disruptions as they emerge. Most importantly, they can take collective actions today to strengthen their supply chain networks and help mitigate the negative consequences of disruptions in the future. The time to act is now.

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## Endnotes

1. Accenture Tech Trends 2021 survey
2. Accenture client experience
3. Accenture analysis based on Rystad Energy data
4. Accenture analysis based on Rystad Energy data, US E&P and OFES companies guidance
5. <https://www.energy.gov/articles/doe-announces-additional-notice-sale-crude-oil-strategic-petroleum-reserve>
6. Accenture client experience
7. Accenture analysis
8. World Economic Forum in collaboration with Accenture, “[How the sharing economy can transform asset-heavy industries](#),” May 26, 2021
9. Ibid
10. Petronas, [CORAL 2.0 FAQ](#)
11. Accenture Technology Vision 2019, Oil and Gas Survey Results
12. Accenture client experience
13. Ibid

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