

Since January 2020, the global oil and gas industry has experienced a wave of major disruptions. In January, IMO 2020 reduced the minimum level of sulfur required in shipping fuel; in March, oil prices fell in response to an oil supply war between Saudi Arabia and Russia; and then COVID-19 hit global economies. Software that helps refineries make complex decisions, creates visibility, and enables scenario modeling will be critical to supporting the response and strategies companies will need to make, especially in the face of uncertainties.

Digital Transformation in Oil and Gas amid Market Uncertainty and IMO 2020

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Introduction

The oil and gas industry is highly exposed to disruptions. As an industry, performance is tightly bound to the economic cycle and oil supply. Additionally, oil supply is very often the focus of international conflict – political or otherwise. As an industry, it has long weathered major external shocks.

2020 has highlighted how shocks can very often come one after another. In January 2020, the International Maritime Organization (IMO), the United Nations' body responsible for the safety, security, and environmental performance of international shipping, released a new regulation banning ships from using fuels with a sulfur content above 0.5%. In March 2020, as companies were responding to the new regulation, Saudi Arabia and Russia's spat over oil supply resulted in a supply flood to the market and a sharp drop in oil prices. By March 2020, implications from the global COVID-19 outbreak, which reared its head in December 2019, resulted in a sharp decline in economic activity globally as countries undertook shutdowns of their domestic economies in a bid to control the outbreak. From a short-term price peak of the Brent Crude oil price on Jan 6, 2020 of US\$68.91, oil prices had fallen to US\$24.74 by the beginning of April 2020.

Events in 2020 have highlighted how critical it is for oil and gas companies, their suppliers, and value chain partners to build capabilities that enable resilience and adaptability to support decision making and the ability to take effective, timely action in response to shocks. The ability to do this is critical for the competitive positioning and business continuity of oil and gas companies in the post-shock scenarios that materialize, and which very often result in difficult and uncertain business environments.

This IDC Vendor Spotlight addresses the impact and uncertainty of IMO 2020, in particular, on the marine fuel ecosystem in the context of the requirement for oil and gas companies, their suppliers, and partners to build capabilities that enable resilience and adaptability. It considers how AVEVA's software capabilities for oil and gas

AT A GLANCE

KEY STATS

- » Over 70% of Asia/Pacific oil and gas companies say their top business priority is focusing on resiliency and business risk.
- » 40.7% of oil and gas companies in the Asia/Pacific region say that IMO 2020 has impacted their technology investment decisions.

WHAT'S IMPORTANT

Oil and gas companies and their suppliers need to have capabilities in place to enable greater resiliency and adaptability as they face disruptive market environments.

KEY TAKEAWAYS

Software that supports the quality of decision making through visibility, simulation, and improved insight can help companies navigate market uncertainties far more effectively.

companies, petroleum refiners, shipping companies, and shipbuilders can help support improved decision making as organizations build their strategies in response to changes.

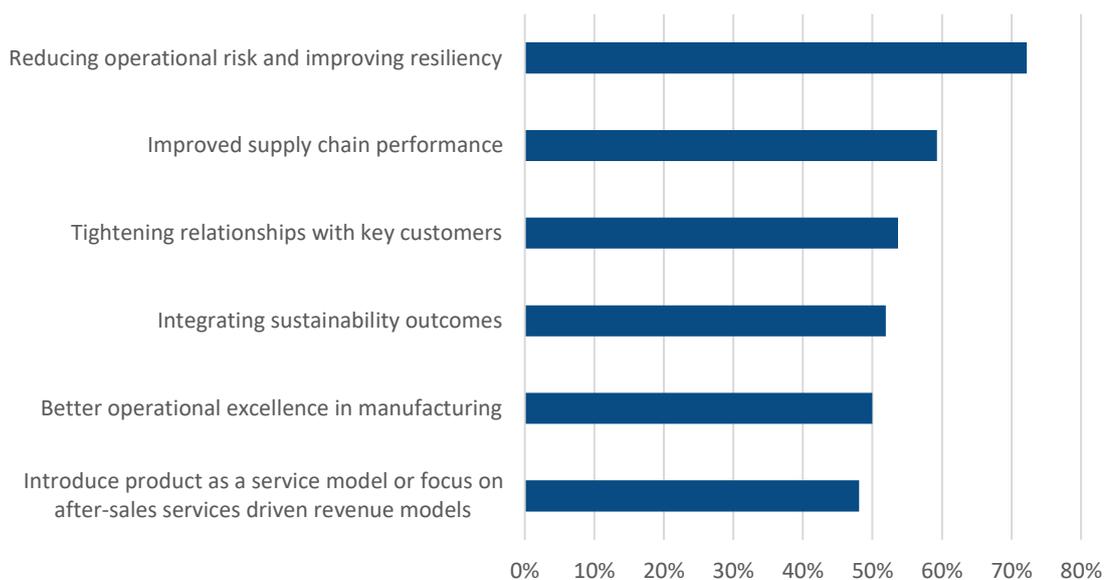
Why Is Resiliency Important?

The concept of resiliency developed through research on ecology systems means the ability to adapt to changing circumstances while maintaining the central purpose. This definition applies very well to operational responses to disruptive events, and nicely summarizes the strategic priority for industrial operational and business leaders in the ability to respond to highly dynamic demand while maintaining excellence in their operations that is the foundation of their businesses.

In an oil and gas operation, resiliency is the capability of an organization to bounce back rapidly in response to change. This might be at an organizational level, within its operations, and/or within its supply chain; and it might be bouncing back to its original state or a new improved one. Resiliency preserves business continuity and consistency of product supply in the face of both short-term operational and longer-term strategic disruptions. It ensures production meets business obligations for product delivery and service to customers, and is able to respond and calibrate in the face of market change.

Building resilience is very much on the agenda of oil and gas companies in the Asia/Pacific region. Figure 1 shows that over 70% of Asia/Pacific oil and gas companies cite resiliency and business risk as a top business priority. Resiliency is important because competitive advantage comes from being able to create capabilities for operational intelligence. This refers to the organization's ability to synthesize information, increase its capacity to learn from the data, and then to share insights out to the edge of their operations. Being able to do this better than competitors in response to disruptions will be a critical success factor for oil and gas companies facing difficult operating and market environments.

FIGURE 1: **Oil and Gas Business Priorities Show a Focus on Resilience and Visibility**
Q In the next 3 to 4 years, what will be your organization's business priorities?



n = 54 oil and gas organizations

Source: IDC Asia/Pacific Industry 4.0 Survey 2020

A Closer Look at How IMO 2020 Is Reshaping the Marine Fuel Ecosystem Landscape

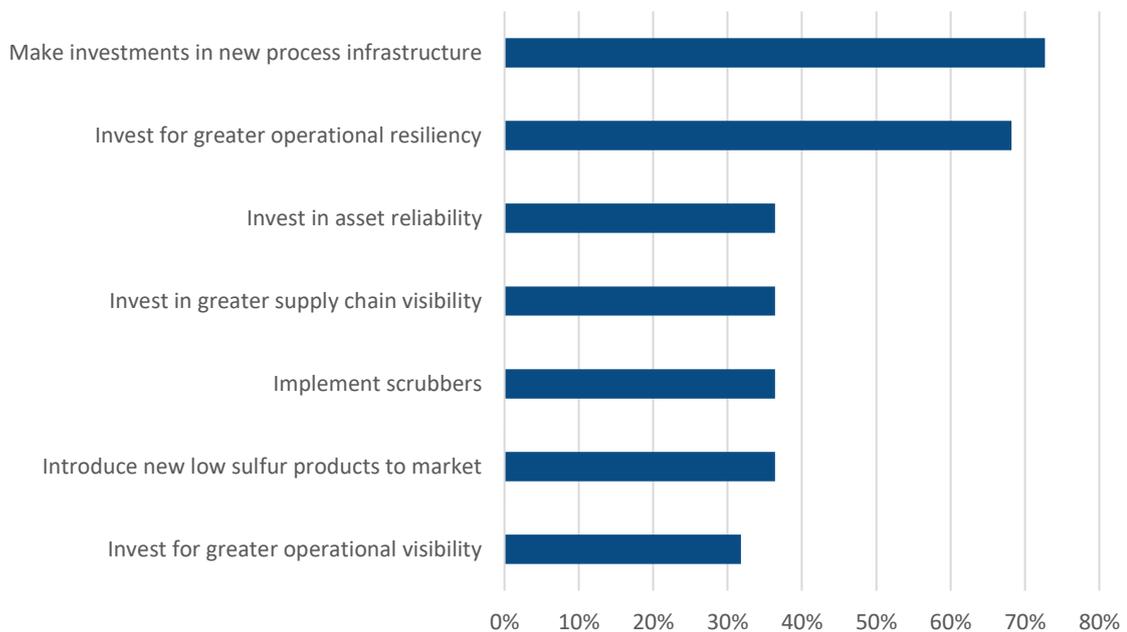
IMO 2020 mandates shipping companies use low sulfur fuel from January 2020. It brings down the allowed sulfur content in shipping fuel to 0.5% from the previously regulated level of 3.5%. From March 1, 2020, ships will also not be allowed to consume fuel oil with a sulfur content greater than 0.5% unless they have scrubbers to remove particulates and/or gases from industrial exhaust streams.

IMO 2020's impact on the fuel market will be great, particularly in 2020, as shipping companies and refineries respond to the associated changing market demand, and fuel mix requirements and opportunities. The regulation will have ripple effects across the whole marine fuel ecosystem, including fuel stock suppliers, refineries, shipping companies, trading companies, and providers of equipment such as shipping engines and scrubbers. 40.9% of Asia/Pacific oil and gas companies say that their most significant operational challenge under the new IMO 2020 regulations will be increasing input costs. There will be competitive opportunities and losses as a consequence of the introduction of the regulation, and many hard and strategic decisions will have to be made.

IDC's survey of oil and gas organizations revealed the key focus areas for investment in response to IMO 2020 (see Figure 2).

FIGURE 2: **Focus Areas for Investment within Asia/Pacific Oil and Gas Operations in Response to IMO 2020**

Q What areas of operations is your organization focusing on in the coming 18 months to enable greater competitiveness under the new IMO 2020 regulation?



n = 22 oil and gas organizations

Source: IDC Asia/Pacific Industry 4.0 Survey 2020

Impact of IMO 2020

The impact of the IMO 2020 regulation on shipping companies and oil and gas refineries include the following:

- » **Impact on fuel demand from shipowners.** To comply with IMO 2020, shipowners can ultimately choose between two actions – scrubber installation or fuel switching. Ships that do not have scrubbers installed will need to switch to very low sulfur fuel oil (VLSFO) to ensure IMO 2020 compliance. This additional demand for VLSFO will result in changes in the fuel market and for higher utilization of refineries in 2020 as shipping companies find a balance between scrubber installation decisions and low sulfur fuel decisions to run their operations.
- » **Crude changes and availabilities.** IMO 2020 will impact the whole marine fuel oil ecosystem. Refineries serving the marine fuel oil market are taking steps to manage the potential market impacts of IMO 2020, including investments into de-sulfurization at refineries for example. Significant impacts on refinery utilization have not yet been seen, but there have been changes in the product market where diesel demand has shifted to marine fuel oil because companies use it to blend down the sulfur specifications. Utilization remains stable as global capacity is still sufficient. However, demand is beginning to soften as is the case across the oil and gas industry in general.

Refineries are taking steps to manage the reduction in sulfur content in their marine fuel products, with simple refineries being far less able to produce the highly refined VLSFO and hence are experiencing more impact. The greatest problem refineries are facing is market and supply chain uncertainty. Many refineries are upgrading bitumen to meet the marine fuel oil requirements, and this is relatively easy (at least economically speaking). IMO 2020 will likely require significant diesel blending and this could change the economics substantially, which makes decision making very uncertain for refineries. Some refiners may explore the market for different grades of crude and lower sulfur diesels to meet the standard. Bitumen and high sulfur fuel oil (HSFO) that had seamless avenues to market could be materially devalued.
- » **Decisions on using low sulfur marine fuels or installing scrubbers to reduce emissions.** Some shipping companies are still trying to decide whether to use scrubbers on their ships or not. The basis of this decision has changed over first few months of 2020 as the price spread between very cheap HSFO and much more expensive VLSFO has narrowed. Refinery owners must evaluate the level of scrubber implementation that will take place and the opportunity for new fuel blends. Other shipping companies have noted that the economics to manufacture and deploy the scrubbers have come down substantially. This creates a challenge for producers of refined products trying to understand what level of investment in reconfiguring their processes can be supported.
- » **Regional regulatory variations.** There will be regional variations on the impact of IMO 2020. Individual vessels having unique characteristics and different regions have independent regulations. For a vessel to access all routes, vessels with scrubbers must comply with highly regulated markets, such as the inland and coastal waters of Europe. In some cases, such as the Netherlands, even lower sulfur levels in shipping fuels than the IMO 2020 regulation are required. Vessels are also prone to fuel switching relative to route and geography. The vessel market must adjust to managing multiple regional compliance. Additionally, there are restrictions on discharge of polluted wash water into the sea (for open loop variants), which will restrict vessel access or require additional infrastructure onboard, taking up valuable cargo space.

Navigating Uncertainty with Digital Transformation

As IMO 2020 and the other major disruptions of 2020 impact the market – refineries, shipping companies, and their suppliers will be required to make decisions based on incomplete data about the markets they are operating in, their supply chain partners, or their operations.

Technology, particularly software capabilities that provide visibility and simulation-based insight, has an important role to play in helping companies manage this uncertainty with the right insight and data to make the decisions that will be required. Based on IDC research, 40.7% of oil and gas companies in the Asia/Pacific region say that IMO 2020 has impacted their technology investment decisions.

Refineries must work toward building more resilient operations that can adapt to changing requirements more effectively. Software capabilities that support integrated engineering and design, process optimization, predictive asset analytics, and supply chain visibility can help companies affected by IMO 2020 or any other external change to manage their refining and manufacturing processes, operations, supply chain, and retrofitting projects more effectively through improving the quality of insight and decision making. Companies will, in turn, be better placed to identify and take advantage of competitive opportunities in the market.

There are three major areas of benefits that software capabilities, including analytics and artificial intelligence (AI), bring to companies:

- » **Visibility.** Refineries will need supply chain, operations, and market visibility to help them make the right decisions as they undertake strategic analysis of the impact of IMO 2020 or any other disruption and determine what their response should be. Visibility improves their ability to manage the uncertainty they will have as they go forward.
- » **Improved decision making.** Software capabilities that help access the right insight in the context of enterprise resource management, feedstock decisions, product decisions, and process decisions, will help organizations formulate better outcomes. For example, in the context of IMO 2020, companies must decide whether to buy lower sulfur crudes (which may have a higher price) or procure diesel for blending. These decisions can be complex and impact on refinery operations. Shipyards will be able to accurately order long-lead materials and react decisively to changes in the event of evolving design criteria.
- » **Scenario modeling.** Many of the decisions the refineries must make involve feedstock choices, production choices, and market dynamics that have dependencies. Scenario modeling capabilities that allow visibility of the impact of different sets of decisions are a critical tool for supporting this kind of analysis. Many of the decisions relating to scrubbers fail to consider market size, current deployment, and regulatory restriction in the context of fuel price spreads. Scenario modeling that addresses multiple moving variables is necessary to ensure high quality outcomes. Refineries must know the market size for scrubbers and how many vessels will deploy them.

Considering AVEVA

Company Background

AVEVA provides industrial software that enables its customers for their operational future. AVEVA's engineering and industrial software are enablers for digital transformation across engineering, operations, and maintenance in capital-intensive industries. The company's engineering, planning and

operations, asset performance, and monitoring and control solutions support over 16,000 customers across the globe. AVEVA has a large ecosystem of partners and developers, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, U.K., with over 4,400 employees at 80 locations in over 40 countries.

Product Benefits

For the energy and marine sector, AVEVA's solutions enable customers to unify engineering, operational, and maintenance data, and generate insights into integrated operations, which in turn help people make better decisions to improve efficiency, increase safety and reliability, and raise production and profitability.

AVEVA's software capabilities span exploration and production, LNG and gas processing, transportation pipelines, refining and petrochemicals, shipbuilding, and shipyard processes. AVEVA's solutions allow customers to streamline processes and bring data insights to operational decision making. This is by providing access to expert, industry, and asset-specific data drawn from customers' real-time data on industrial processes.

Below are some of the solutions AVEVA provides, helping customers and their various teams respond with improved agility to IMO 2020 and other disruptions and challenges the industry will face in the new decade.

- » **Asset Information Management.** Maintaining up-to-date critical information and historical data for operating assets is even more crucial in the IMO 2020 era to improve efficiency and asset health. AVEVA's Information Management for engineering and operations melds information from multiple sources and in multiple formats to enable users across the business to securely access, visualize, validate, and collaborate on the digital asset.
- » **Process Engineering.** AVEVA's process engineering software is designed to perform heat, material, and equilibrium balance calculations for a wide range of chemical processes, offering a wide variety of thermodynamic models across several industries. This software helps refineries evaluate alternative plant configurations offline by simulating alternative options to best meet IMO 2020 requirements. It enables optimal plant performance by improving process design and performing engineering studies.
- » **Unified Supply Chain Management.** Additional process constraints due to IMO 2020 are creating more uncertainties in terms of feedstock availability and pricing. AVEVA's Unified Supply Chain Management with real-time crude management enables modeling of refinery production planning that reduces business risks while improving organizational agility and collaboration between globally dispersed teams. The supply chain tools enable refiners to source the most profitable feedstocks based on plant models and economics in volatile markets.
- » **Real-Time Process and Blending Optimization.** AVEVA's process optimization and blending capabilities enable operations to respond to changes in feedstocks and product specifications as well as process performance and constraints based on first principles simulation techniques to maximize profits. It uses real-time process and economic data to determine set points that guarantee maximum operating profit. Blending and advanced process control ensure that all constraints and regulatory requirements are satisfied.
- » **Predictive Analytics for Equipment.** AVEVA's Predictive Analytics capabilities improve asset reliability by providing early warning notification and diagnosis of equipment issues days, weeks, or months before failure. This helps reduce equipment downtime, increase availability, and improve performance while reducing operations and maintenance expenditures.

- » **Integrated Shipbuilding.** Shipowners are required to meet the requirements of either using low sulfur marine fuels or installing scrubbers to reduce emissions. As a result, there is a greater demand for retrofitting activities at shipyards. AVEVA's Integrated Shipbuilding provides an integrated platform for planning, engineering, design, procurement, fabrication, and production. It enables shipbuilders to effectively manage the design spiral to reduce iterations and improve communications between designers and constructors. This helps reduce project risks, costs and schedule, leading to minimized downtime of any operating asset that needs a retrofit.
- » **Operator Training Simulator.** Traditional training is not only costly but also takes longer to train an operator to a proficiency level. AVEVA's Operator Training Simulator enables digitalization of knowledge and best practices to provide real-life experience classroom training for field operators. Ship crew members can also be effectively trained on any procedures that may change due to different types of fuels being used; for example, the bunkering process or a fuel tank cleaning process. This not only shortens the time-to-proficiency but also reduces the overall training costs.

Opportunities and Challenges

AVEVA's software capabilities enable industrial companies to extract the value of their industrial data in the context of the decisions that need to be made. AVEVA invests more than 12% of its revenue in research and development across its extensive and expanding software portfolio. These solutions include asset performance, monitoring and control, planning and scheduling, optimizing operations, and engineering design. These industrial systems are operationally critical and for many companies are a focus of their transformation agenda reflecting the value of improved data-led decision making with operations and supply chains. But there are challenges too – refineries and shipping companies, for example, very often have legacy systems in place which means that integration and interoperability are required. Additionally, as the amount of operational data created by equipment and systems across physical operations increases dramatically, so too do the choices that customers have for the approach they can take in enabling their data insight. This means that for AVEVA, it is critical that customers understand the value that software brings to their operations.

IMO 2020 highlights how crucial capabilities that support decision making can be. It can be the critical enabler for companies to be supported by the right insight to make decisions that are competitively differentiating. Going forward, disruptions like IMO 2020 will continue to create challenges for industrial companies, so building out data-led decision making is critical for making decisions to support leadership in the market.

Conclusion

2020 has highlighted the requirement of oil and gas companies, their suppliers, and partners to build capabilities that enable resiliency and adaptability in the face of disruption. IMO 2020 is having a big impact on the players across the shipping fuel ecosystem, especially marine shipbuilders, shipping companies, and refineries. The IMO 2020 regulation and COVID-19 economic impacts are bringing uncertainty to the market. Disruptions like this will continue to be felt and be a major part of maintaining leadership in the market for oil and gas companies. For example, IMO is planning the introduction of a new regulation, IMO 2050, focusing on reducing greenhouse gas emissions. IMO 2050 will seek to reduce total greenhouse gas (GHG) emissions of at least 50% by 2050 compared with 2008.

Companies that are able to access the right information to make high-quality decisions will weather these stormy seas far better. Software capabilities across operational optimization, supply chain visibility, data management, and predictive asset management will be critical for companies to manage the decisions they need to make in the most

time effective manner that delivers profitable outcomes. IDC believes that companies that have the capabilities in place to make resilient decisions will fare best, and to the extent that AVEVA can address the challenges described in this paper, the company has a significant opportunity for success.

About the Analysts



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Emilie Ditton is AVP for IDC Energy Insights and Manufacturing Insights and is the Head of IDC's Asia/Pacific Energy and Worldwide Mining practices. She has been leading IDC's mining sector research for the last five years and her core research coverage focuses on the evolution of technology strategies of mining and energy companies as they respond to changing marketplaces, the requirement to create operational excellence, and changing customer expectations. Her research has a particular focus on the interplay among technology, people, and processes within the operations of mining and energy companies. She supports clients by looking at maturity, best practices, and technology ecosystem trends.



Stephanie Krishnan, Research Director, IDC Manufacturing Insights, Asia/Pacific

Stephanie Krishnan is Research Director for IDC Manufacturing Insights, responsible for Industry 4.0 research. In this role, she is responsible for the production, development, and growth of the IDC Manufacturing Insights program in the Asia/Pacific region. In this role, Stephanie will be delivering a research agenda that will appeal to technology buyers and vendors both in terms of subscription products and custom research in Industry 4.0 looking across ecosystems, value chains, and supply chains of industrial industries.

MESSAGE FROM THE SPONSOR

AVEVA helps customers achieve superior performance by driving value, agility, and sustainability throughout their asset and operations lifecycles. With more than 50 years of industrial software innovation and 23 years of experience in digital transformation, AVEVA empowers customers to save up to \$320M/year. We enable 19 of the top 20 petroleum companies, over 300 refineries, most of the world's petrochemical crackers, and 900K miles of pipeline with the most comprehensive integrated and unified operations. [Learn how we can help enable your digital journey today.](#)

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