Oil and Gas | Technology Applications

Outlook for 2030 and Beyond

Report commissioned by Rockwell Automation, research and editorial by GlobalData

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Rockwell Automation | GlobalData.

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Navigating the future for the oil and gas industry

Forward note from Rockwell Automation

In an industry historically defined by scale, capital, and complexity, the future of oil and gas is now increasingly shaped by data, connectivity, and intelligence. As geopolitical volatility, environmental pressures, and operational risks mount, companies are turning to digital transformation not just to survive—but to fundamentally reimagine how they operate. This study, commissioned by Rockwell Automation, critically examines the "Digitalization of the Oil and Gas Industry," a profound and ongoing transformation across global industrial sectors. The imperative for digitalization stems from its demonstrated capacity to enhance operational efficiencies and profitability through accelerated automation, data-driven decision-making, and enhanced real-time visibility of complex processes.

The research explores the key drivers and technologies shaping this transition—from artificial intelligence and the Internet of Things to cybersecurity, virtual reality, and electrification. It concludes that the pace of digitalization will continue, if not accelerate, driven by both innovation and necessity. Yet, the report also makes clear that successful adoption hinges on the development of a clear digital strategy, and increasingly, on collaboration with specialized technology partners.

From Rockwell Automation's vantage point, this transformation marks a critical convergence between information technology and operational technology. With deep industrial expertise and a legacy of enabling connected, intelligent operations, Rockwell helps energy companies bridge the gap between legacy infrastructure and modern digital systems. By aligning cutting-edge technologies with measurable production outcomes, Rockwell plays a strategic role in helping operators deploy scalable, secure solutions that support predictive insights, autonomous operations, and long-term resilience in a rapidly evolving energy landscape

Digitalization of the oil and gas industry

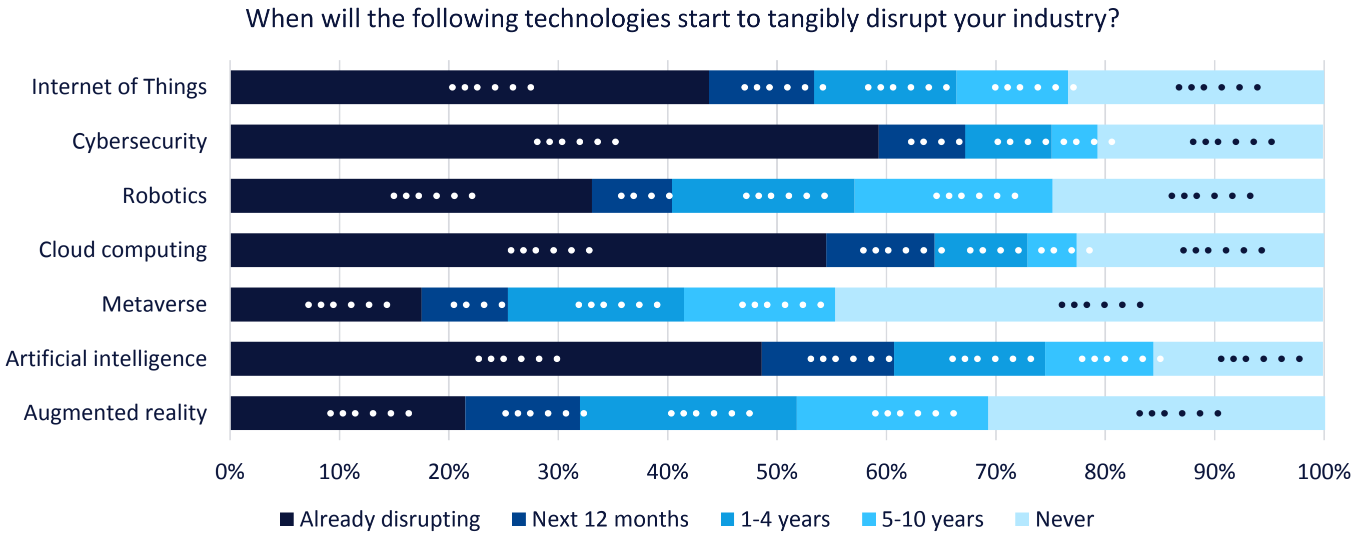
The need for digitalization

Digitalization is reshaping all industries with the move towards automation, data-driven decision-making and greater real-time visibility of operations, all with the goal of improving operating efficiencies so to drive profitability. This trend is also true of the oil and gas industry. While technological adoption has been a key feature of the oil and gas industry for decades, early applications were assessed on a case-by-case basis where a clear return on investment (ROI) could be calculated. However, this is changing as technologies improve and new use cases emerge.

Industry leaders are now adopting technologies across the board, digitalizing entire processes. In the first quarter of 2025, GlobalData's tech sentiment polls show that over 50% of respondents believe that cybersecurity and cloud computing technologies are already disrupting their industries, with artificial intelligence (AI) in close third with 49%.

49% of respondents believe that AI is already disrupting their industry

GlobalData surveyed 356 respondents



Source: GlobalData's Tech Sentiment Polls Q1 2025

Drivers on the road to digitalization

Below, we discuss the main drivers incentivizing the adoption of digital technologies in the oil and gas industry.

Technological advancements

Recent innovations in hardware equipment and software solutions have allowed the development of digital products for the oil and gas industry that were previously unimaginable. For example, the second half of 2024 saw the launch of the first AI-powered autonomous underwater vehicle (AUV). The development of autonomous submersible robots is only recently possible due to advancements in AI chips with smaller and more efficient transistors. These robots will revolutionize on-site operations, automating drilling, maintenance, and decommissioning processes and reduce the industry's reliance on human labor in dangerous and hazardous activities.

Maintaining high-tech equipment

Oil and gas equipment faces the constant threat, especially offshore, of saltwater corrosion and high winds. These extreme conditions can seriously damage equipment, which can lead to safety hazards, operational inefficiencies, and costly downtime. Unplanned shutdowns result in indefinite delays and significant financial losses to the operator. Technologies that measure, monitor, and even predict machine function can help mitigate the safety risk and cost associated with shutdowns.

Repairing and maintaining offshore oil and gas equipment is particularly challenging because of its location. For example, some oil rigs in the Gulf of Mexico are located around 100-200 miles from land. The remote nature of the equipment makes it difficult for technicians to access it, meaning they cannot see the full extent of the damage. Connectivity and real-time data collection provide companies with valuable insights into the health and performance of their equipment. By analyzing this data, oil and gas companies can identify patterns and anomalies that may indicate potential failures before they occur. AI-powered performance evaluations of equipment are known as predictive maintenance.

Supply chain integration and management

The oil and gas industry regularly faces significant price fluctuations and supply chain disruptions from shifts in financial markets, political tensions, violent conflict outbreaks, and technological evolution. Digital tools can help companies to adapt quickly to these changing and volatile conditions. Connecting data, communication systems, and project management apps on shared cloud networks allows companies and their suppliers to access the same information simultaneously.

Improved visibility is particularly important given the industry's often extended supply chains that span land and ocean. From drilling to transporting and refining, oil and gas products pass through many suppliers before reaching their end user. Digital solutions can improve supplier monitoring and tracking, speed up correspondence, and help automate supply chain operations.

Environmental and regulatory compliance

National and corporate commitments to reduce greenhouse gas (GHG) emissions are a serious challenge to the oil and gas industry. On top of the threat of energy transition towards net zero reducing the demand for oil and gas, companies face consumer and regulatory pressure to decarbonize. Predictive analytics can track early signals of regulatory and industry standard changes across regions. This notice enables leaders to anticipate significant changes, establish new training programs, or modify corporate strategies.

Data gathered from connected devices and sensors can help companies track variables related to operational efficiency, energy demand, and environmental factors such as air and noise pollution. Not only can companies monitor and manage their emissions according to present environmental regulations, but they can also use that data to remedy unnecessary energy consumption and reduce their emissions. For instance, sensors can help detect high concentrations of methane, the most potent greenhouse gas. By continuously monitoring methane levels, these systems can alert operators to any leaks or abnormal emissions across upstream assets.

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Workforce availability and training

Shortages of skilled labor are a long-standing issue for oil and gas companies around the world. In many regions, the skills gap is being exacerbated by an aging workforce and potential reluctance of younger workers to work in challenging environments such as offshore. A survey by the UK's National Grid found that one-fifth of the UK's energy sector workforce will retire by 2030. At the same time, there is a significant skills gap between the employees exiting the industry and those beginning their careers. O&G companies face a critical challenge in training and maintaining safety compliance when replacing their frontline workforce. The geographically dispersed nature of upstream assets creates an additional hurdle for aging or retired workers who must travel for work or training.

The complexity of upstream operations requires considerable experience to meet safety standards, leading to challenges in ensuring the well-being and competence of personnel. Digital technologies are allowing companies to improve training practices and safety protocols for oilfield workers. Wearables, virtual and augmented reality, and data analytics solutions all enable workers to train and learn safety procedures in a digital environment. Personnel can gain immersive, hands-on experience in handling oilfield equipment within a virtual and controlled environment before entering the actual field.

More generally, automation is a key solution to companies struggling with skills gaps and an aging workforce. Automation allows companies to maintain operational efficiencies and productivity across their assets. However, as discussed later in this report, companies may also lack the staff capable of using new systems and advanced analytics.

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Cyberattacks

Cyberattacks are a growing threat for all sectors, with the frequency and severity of data breaches and cyber incidents growing rapidly. This trend is of particular concern in the oil and gas industry given the importance of the industry to the global economy and the hazardous nature of its products. There are numerous examples of cyberattacks over recent years, with the Colonial Pipeline attack one that received widespread publicity. This was followed by attacks in 2023 on several European refineries using malware-disrupted production processes. In 2024 a German provider of logistics for oil and gas storage, was the victim of a ransomware attack that affected its IT and operational technology (OT) systems.

The threat level has only increased as a result of geopolitical tensions, whether the ongoing war in Ukraine, renewed violence and tensions in the Middle East, as well as other hotspots across the world. State-affiliated attacks are a growing threat, and ransomware attacks are becoming increasingly sophisticated.

A further factor that increases the risk profile of the industry is the enterprise-wide adoption of digital technologies that we are seeing from many of the industry's major operators. The growing number of connected devices, as well as the use of cloud-based tools for data sharing and collaboration, can increase the attack surface and make companies more vulnerable to cybersecurity risks. These risks can be exacerbated where companies have outdated operating systems, legacy software or unsupported hardware, a particular challenge for operators with aging facilities where such issues may be commonplace.

Key technologies in the oil and gas industry

Digitalization has made significant strides over recent years, with companies moving from using digital technologies for select use cases to making entire processes digital. A range of technologies have been deployed and are used by companies and employees as part of their daily routines.

Not only are oil and gas companies increasingly digitalizing, but they are doing so in a specific way. **In the next 12 to 24 months, we can expect two key developments:**

1

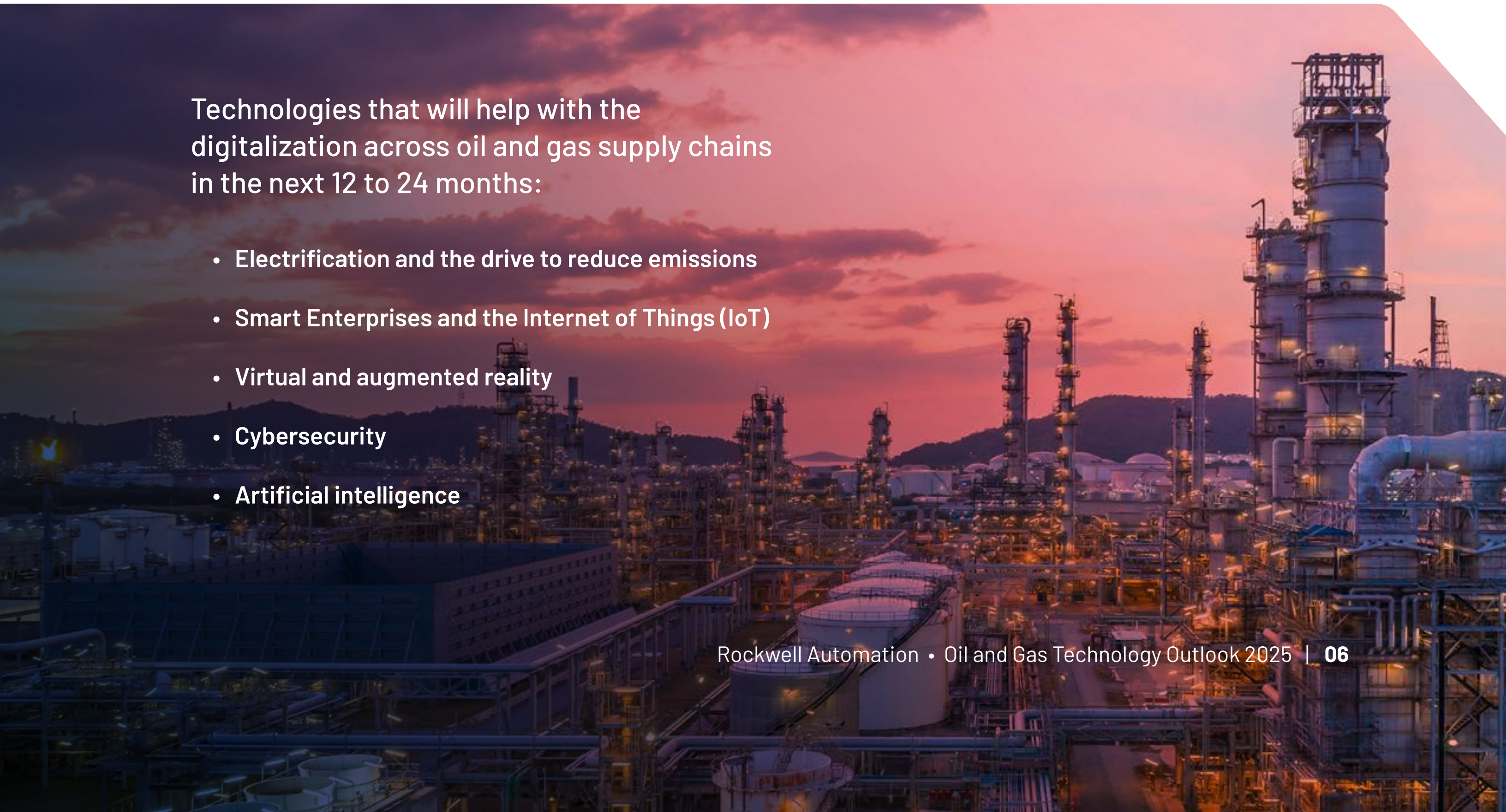
Increased integration of digital solutions

Technologies are not mutually exclusive; they complement one another and can create more holistic and impactful digital networks when used together. Companies should not think about which technology could help reduce inefficiencies across their supply chain, but instead should focus on what inefficiencies they are looking to resolve by using technology. Across industries, we are finding new packaged digital solutions incorporating multiple technologies to create a more holistic solution. For instance, robots are no longer just remotely controlled machines. Using AI and IoT sensors, robots are becoming increasingly autonomous. In another example, data analytics solutions can produce actionable insights using proprietary data, but using AI and digital twins, we can now simulate, predict, and forecast product demand or system failures before they happen.

2

Expansion of digitalization across the supply chain

The oil and gas industry has invested in digitalization for well over two decades. However, investments were initially focused on processes that could prove a clear return on investment. This is understandable in the early days of digitalization, where software systems were largely isolated. However, in an increasingly digitalized world, fragmented implementation of digital solutions can actually create supply chain inefficiencies. In the next few years, the oil and gas industry must move towards the adoption of digital solutions across the whole supply chain to help improve supply chain visibility and increase interoperability between different digital systems.



Technologies that will help with the digitalization across oil and gas supply chains in the next 12 to 24 months:

- **Electrification and the drive to reduce emissions**
- **Smart Enterprises and the Internet of Things (IoT)**
- **Virtual and augmented reality**
- **Cybersecurity**
- **Artificial intelligence**

Electrification and the drive to reduce emissions

Electrification is a major decarbonization strategy in the oil and gas industry, helping many companies reach their short-term emissions reduction targets. Electrification encompasses the adoption of renewable energy sources, battery energy storage, and electric vehicle transportation across supply chain operations. The use of renewable energy sources in upstream sites can help lower a company's direct greenhouse gas (GHG) emissions, while also reducing energy consumption. On-site power generation from fossil fuels can lose up to 60% of the energy produced to heat waste. In contrast, there are far fewer distribution losses when sourcing energy directly from the electric grid.

Upstream and midstream oil and gas companies should also invest in electrifying equipment. Replacing hydraulic systems with electric systems offers better outreach and maneuverability. Electric systems require less maintenance, as hydraulic systems require hydraulic fluid changes and are more difficult to repair due to the increased presence of potential points of failure. Many companies are choosing to take a phased approach to their electrification initiatives in order to make the project more manageable and to more readily assess the emissions and cost savings that are generated at each stage. The cost savings of using electric systems can be further enhanced when combined with smart motor solutions that provide remote monitoring and control features to optimize energy consumption.

While lowering GHG emissions, electrification can also drive profitability. Leading oil and gas players are increasingly investing in renewable power generation, with wind and solar power being a particular area of focus. Offshore wind is the dominant type of renewable power project pursued by oil and gas companies, as they can leverage their operational expertise in offshore sites.

Smart Enterprises and the Internet of Things (IoT)

Internet of Things (IoT) describes the use of connected sensors and actuators to control and monitor the environment, the things that move within it, and the people that act within it. GlobalData forecasts that the global IoT market in the energy industry will reach $64 billion by 2028, up from $33 billion in 2024.

IoT is not a new technology in the oil and gas industry but has been the backbone of digital transformation in the industry for a number of years. IoT adoption was initially accelerated by the declining cost of IoT sensors, with sensors used to monitor assets and equipment across all industry segments. For example, the upstream sector faces specific challenges given that it operates in often remote and harsh environments, especially for offshore equipment. Sensors can provide real-time information on the performance of machinery and provide alerts when problems arise.

As the number of connected devices and machines has grown, the focus of oil and gas companies has shifted towards the use of other emerging technologies, such as AI, machine learning, and advanced analytics to monitor the performance of assets in the field and increasingly to use the data gathered to inform decision-making. The need for platforms that allow companies to manage their IoT projects and also to translate the data into meaningful and actionable insights has grown. Various IoT platforms have been developed that allow users to build applications that use data gathered by IoT networks to automate processes and make decisions, so improving operational efficiencies.

The term smart enterprise is increasingly used to refer to organizations that are using these various technologies, including IoT devices, data analytics and automation software to improve efficiencies and optimize resource allocations. The use of enterprise analytics that accesses both internal data provided by IoT networks, along with other relevant data from across the business, can improve decision-making and deliver real-time reporting to decision makers. Similarly, the use of production visualization tools that combine both software and operator interface hardware allow users to monitor entire processes at various stages of the industry value chain, providing a clear view of what is happening at any point in time.

Companies that are able to leverage these technologies effectively are likely to position themselves as leaders in their industry and to foster innovation. This will in turn allow these leaders to better navigate the complexities of the current environment and the various challenges that the industry faces.

Edge AI has gained momentum over 2024 and the first half of 2025 as a result of significant developments in edge computer chips and hardware that have reduced the cost of edge devices. This allows data to be processed much closer to where it is generated, reducing the latency and costs typically associated with transporting and then processing data in the cloud. This further improves decision-making and can improve the overall impact of IoT systems, for example by improving automation and predictive maintenance capabilities.

IoT systems can be integrated with machine learning algorithms to enhance predictive maintenance. By using the data from IoT sensors, AI-powered software can automatically detect deviations from normal equipment functioning, enabling timely interventions before breakdowns occur.

IoT can also enhance health and safety procedures through real-time monitoring of environmental conditions. Sensors can track variables that affect worker health, such as air quality, temperature, noise levels, and hazardous gas concentrations. IoT sensors can detect the presence of toxic gases, such as hydrogen sulfide, which can cause unconsciousness and, in severe cases, be fatal when inhaled. Upon detection, these sensors can alert workers to the gas's presence, allowing them to evacuate or take protective measures.

Virtual and augmented reality

Virtual and augmented realities (VR and AR) are becoming mainstay technologies in the oil and gas industry. VR is primarily used in staff training in onshore and offshore terrains. Industry leaders such as BP, Shell, and ExxonMobil use VR simulations to train their employees, providing a highly safe and cost-efficient approach to introduce personnel to a new facility. Immersive training can help reduce human error, as well as improve overall efficiency.

AR technology is useful for upstream applications where it can be used to facilitate the extraction of resources below the surface. For example, AR can be used to position subsea assets accurately during drilling, maintenance, and construction operations. This reduces the amount of equipment required by integrating measuring tools into AR-powered wearable tech.

AR and VR also improve communication between off-site and on-site workers. It can be used to more accurately relay important information and instructions to technicians on-site, without the need to fly out experts to that location. Companies can equip maintenance staff with VR headsets so they can access a broad range of resources while dealing with a problem, reducing the time and money spent on maintenance activities. Furthermore, during project planning, information can be shared by collaborating teams using VR to simulate various scenarios.

Cybersecurity: Addressing the growing cyber threats

As highlighted through much of this report, the current trend towards digitization is only accelerating, which is creating access points and vulnerabilities in oil and gas networks for hackers to exploit. Risks will only increase as the number of connected devices grows, whether in terms of sensors, drones, robots, or various types of autonomous vehicles. Criminals are ready to take advantage of any IT/Operational Technology (OT) vulnerabilities. In industrial systems such as those found in the oil and gas industry, there is a constant fear of a jump from IT into OT systems.

There are a number of steps that companies can use to mitigate the risks. AI offers multi-faceted defensive capabilities, such as the use of supervised machine learning models trained on large volumes of labeled attack datasets to enable them to rapidly identify a threat and respond to it.

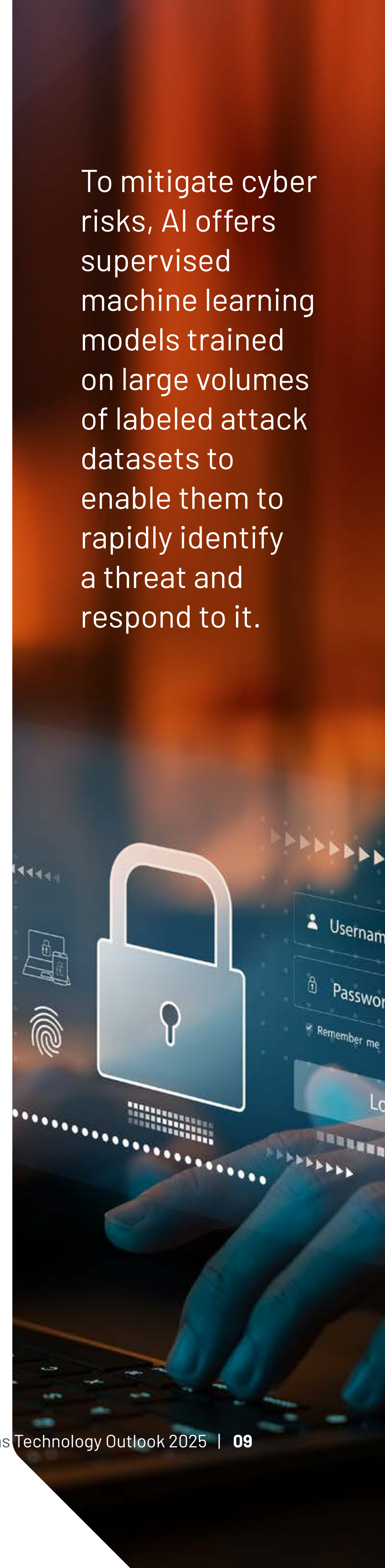
The interconnected nature of the cybersecurity value chain means that a company's cybersecurity is only as robust as its weakest element. To manage the threats posed by cyberattacks proactively, oil and gas companies should prioritize cybersecurity services such as managed security services, post-breach response services, and risk and compliance services. Threat detection and response software are vital to ensure a robust cyber defense, and oil and gas companies should place a high priority on these capabilities. Due to the complexity and skills required to address cybersecurity-related issues, cybersecurity protection is most easily achieved by outsourcing these services to specialist suppliers.

Policies such as zero-trust access, a security model that uses strict identity verification for every person or entity attempting to access an organization's network resources, can drastically improve a company's cybersecurity posture. It is important to remain aware of which companies have access to your data and internal networks. Supply chain partners should implement a defined cybersecurity strategy should be implemented across a company's supply chain and rigorous cybersecurity compliance checks should be enforced on supply chain partners. This will help to prevent attackers from exploiting vulnerable links between businesses.

The challenge is not only in preventing cyberattacks, wherever they are delivered, but being resilient enough to recover from them when they happen. No company is immune from a cyberattack, even the most well prepared. It is crucial to have good cybersecurity hygiene practices, including updating IT systems and having strong access control. This should be reinforced by conducting regular assessments of a company's cybersecurity practices, as well as its contingency plans for recovering from an attack. Being prepared for an attack with a well-rehearsed recovery plan can be crucial to minimizing downtime and hence reducing the overall financial impact of an attack.

According to the International Monetary Fund's 2024 Global Financial Stability Report, the number of malicious cyberattacks has doubled since the COVID-19 pandemic. This spike suggests that companies will always be exposed to cyberattacks, regardless of how robust their cybersecurity systems are. When digitalizing, companies must ensure that they have a cyberattack response strategy, insurance cover, -and are compliant with data protection regulations to alleviate any potential financial, operational, and reputational damage from a cyberattack. IoT systems can be integrated with machine learning algorithms to enhance predictive maintenance. By using the data from IoT sensors, AI-powered software can automatically detect deviations from normal equipment functioning, enabling timely interventions before breakdowns occur.

To mitigate cyber risks, AI offers supervised machine learning models trained on large volumes of labeled attack datasets to enable them to rapidly identify a threat and respond to it.



Artificial intelligence: the key driver of digitalization

AI is already playing a key role in the oil and gas industry. Companies are committing substantial investments to deploy AI and machine learning technologies across a wide range of use cases. GlobalData forecasts that total spending on AI (including software, hardware and services) in the broader energy sector (covering both oil and gas industry and the power industry) totaled $3.1 billion in 2024 and will increase to $18.5 billion by 2028, representing a compound annual growth rate (CAGR) of 56%.

AI models can perform the near instantaneous analysis of the large volumes of data collected during daily operations. The insights generated from the analysis can then be applied to different applications across a company's productions processes and broader supply chain.

Although AI models have many potential capabilities, currently available AI models are not all-in-one solutions. Instead, AI models are integrated within other technologies to enhance a system's overall capabilities. When building your own AI systems or working with external providers, a fundamental question to ask is: what issue would you like to solve?

For example, the risk of exploration and drilling can be reduced with the use of AI. AI can save time on exploration by performing virtual site visits within 3D renderings of sites. Analysis can be carried out quickly without having to travel to a potentially risky and non-oil-rich site. Drilling operations can also be reinforced with AI to prevent potential damage based on historical simulations.

Continuing in upstream capabilities, AI can be used for prospecting geology. Advanced algorithms and machine learning can be used to analyze geological, geophysical, and seismic data to predict potential oil and gas reservoirs, optimize drilling locations, and enhance decision-making processes throughout the exploration and drilling phases.

The energy transition towards renewable energy sources has put pressure on oil and gas companies to find their place in the future, low-carbon energy mix. In response, AI is, for example, being used to improve the carbon sequestration process. Nvidia has used AI to quickly evaluate sequestration sites and to suggest injection rates and volumes. The shift towards low-carbon investments has also faced challenges given inflationary cost pressures and more recently changes in emphasis from the new US administration. AI can help companies to align their investment levels with the medium-term energy outlook, with simulations to cover diverse demand scenarios and shifts in the regulatory environment.

Midstream companies face challenges with transportation, storage, and distribution. Pipeline maintenance is a continual threat to costs and operational continuity. Predictive maintenance is a key to reducing those costs and risks of failures, involving the integration of AI with other technologies such as IoT sensors. AI-based sensing tools can be used to collect data associated with levels of corrosion and predict when maintenance may be needed. Cloud-based solutions that include connectivity and collaboration tools allow companies to monitor their often geographically dispersed assets. AI can also aid delivery by optimizing transport routes.

Downstream companies are focused on margins, so operating efficiencies are key. AI can be used to optimize each stage of the production process, leading to higher outputs, and reduced wait. AI models are used to optimize refining processes, where the analysis of sensor data and historical records can be used to recommend optimal operating conditions for each stage of the process. This can reduce energy consumption across distillation, cracking and hydrotreating.

AI can also help to address the issue of skills shortages and an aging workforce. AI-powered training platforms can help bridge the gap between those leaving the industry and new joiners. Specialized knowledge and best practices can be stored and then easily sported and retrieved as required. By integrating with other technologies such as virtual reality (VR) or augmented reality (AR) and other wearables, companies can create immersive training practices for both new and existing staff. Information and solutions can then be passed on through the use of chatbots or integrated into virtual reality simulations that are increasingly being used for remote learning. AI can also be used to offer personalized learning pathways.

Indeed, the greater adoption of more sophisticated AI tools as part of broader automation trends will reduce the need for specialized staff in many areas, reducing the need to hire or retrain staff. AR devices support both on-the-job training as well as giving workers access to key information and data as they perform tasks in the field.

The potential of AI in the oil and gas industry has been further enhanced with the arrival of generative AI, and its application in areas such as agentic AI. Agentic AI refers to AI systems that use reasoning techniques that allow them to act autonomously and make decisions based on their programming and learning from data. This will enhance the utility of AI in a wide range of areas, including the likes of predictive maintenance, production optimization, and to improve the accuracy of identifying new sites for exploration.

AI can be incorporated into the oil and gas value chain to enhance extraction and storage

UPSTREAM

- Reduce downtime of equipment and production sites
- Optimize drilling paths
- More efficient extraction of oil & gas from wells
- Increased safety on offshore sites

MIDSTREAM

- Optimize pipeline and transport operations
- Predictive maintenance of energy storage systems
- Enhanced leak detection reducing worker list

DOWNSTREAM

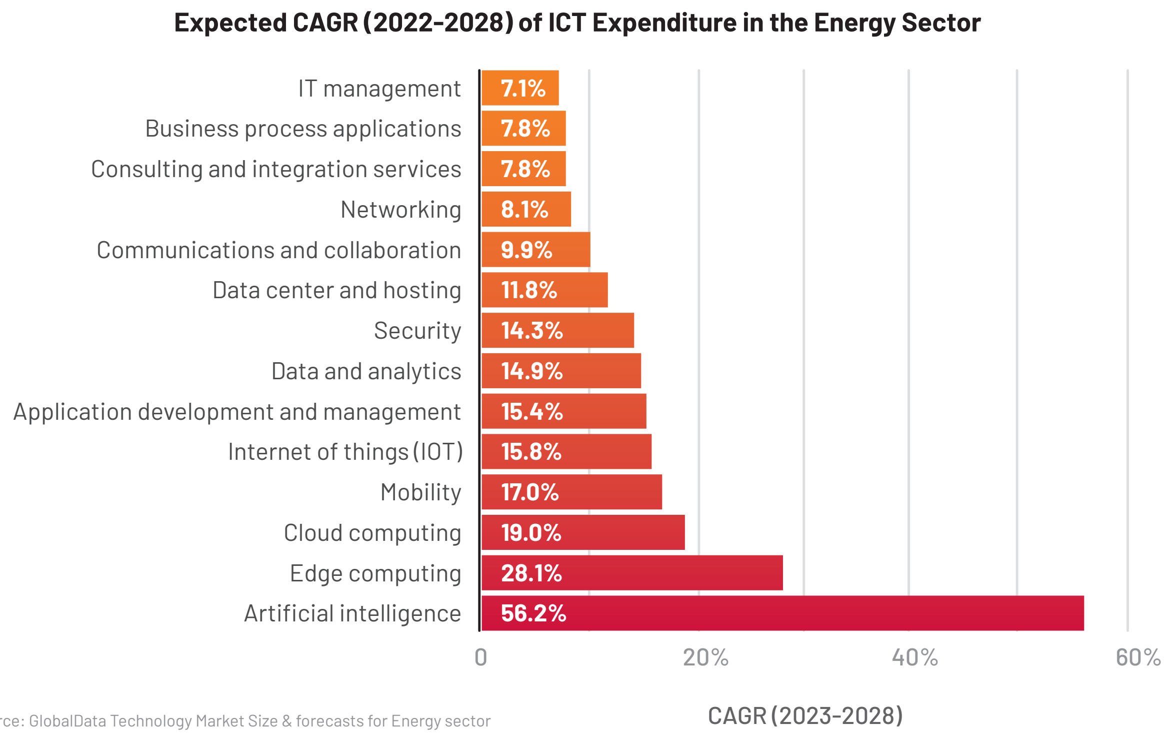
- Predictive maintenance in refining and processing
- Demand forecasting to manage inventory levels
- Competitive pricing analysis

EQUIPMENT & SERVICES

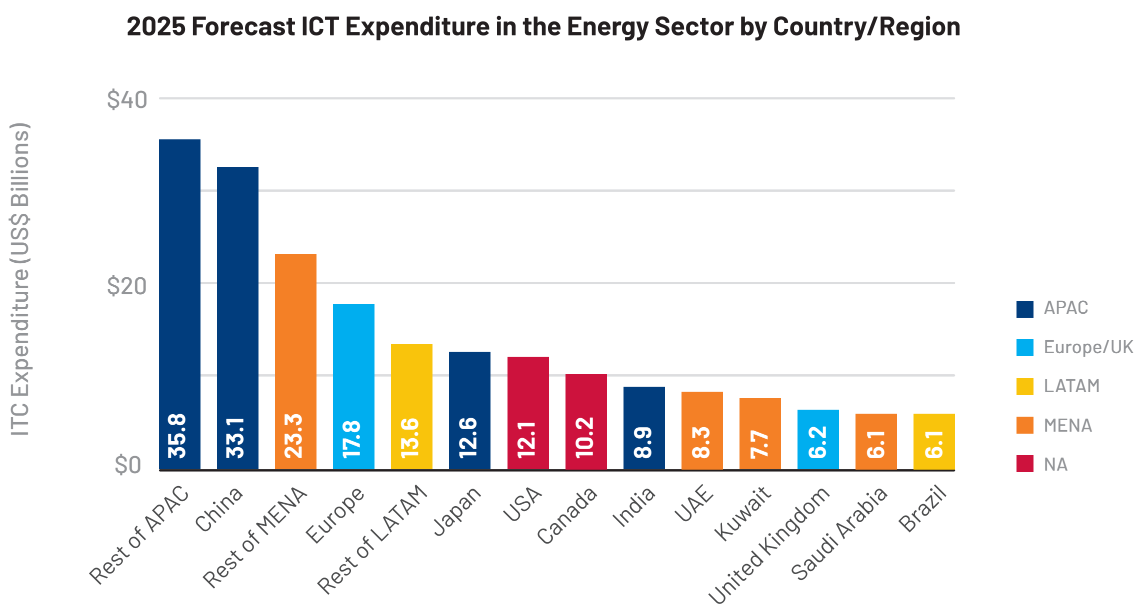
- Improved quality control in production and installation
- Improved safety through hazard and risk detection
- Fitting equipment with AI enabling hardware
- Digital twins to better design and plan facilities and machinery
- Monitoring performance of aging assets

ICT market size in the energy industry

GlobalData's Sectoral Technology Market Size platform provides revenue opportunity forecasts for ICT (Information and Communication Technology) products and services in the Energy sector, spanning 18 IT Solutions, 134 Products/Services, 6 regions, and 52 geographies. As technologies, AI, Edge and Cloud Computing, Mobility and IoT are top 5 growth areas in Energy. Geographically, tech spend is concentrated in Asia Pacific, the Middle East and North America.



Source: GlobalData Technology Market Size & forecasts for Energy sector



Source: GlobalData Technology Market Size & forecasts for Energy sector

Conclusion and recommendations

The pace of digitization in the oil and gas industry will continue if not accelerate over coming years. The industry remains a hotbed of innovation as companies look to improve productivity, reduce downtime, and enhance safety. In the last three years alone, according to GlobalData, there have been over half a million patents covering a range of technologies filed and granted in the industry.

The pace of digitalization also reflects the recent developments in the field of AI, which is seeing widespread application across multiple technology domains. Its integration with a range of other technologies is driving advancements and new capabilities that will further enhance innovation, performance and efficiency within the oil and gas industry.

However, digital technologies are not a core area of expertise among oil and gas companies. Considering the variety of digital solutions available in the market and the challenges that can arise when adopting these solutions, oil and gas companies need a clear digital strategy before embarking on, or widening, their digitalization journey.

Step 1 | Build a digital strategy and understand business needs

In building a digital strategy, oil and gas companies must first assess their business needs. A digital strategy should outline the specific goal of the digitalization project, the budget, the personnel, and operational resources needed to execute it. These factors are harder to define when a project entails digital solutions that span multiple parts of the business. As the complexity of the project increases, the necessity for clear and concise goals and guidelines becomes increasingly necessary. Technology stack analyses and ROI projections can help judge the interoperability of new digital solutions with older legacy systems and form expected project outcomes.

Step 2 | Choose a delivery model

Once a company has a digital strategy and clear project objectives, it must then decide on the project's delivery model. When deciding, a company must consider the organizational cost of tech deployment. This not only includes the financial cost of the project, such as the cloud computing costs to run large-scale workloads, but whether it has the available IT expertise to execute the project, the cost of in-housing certain tech expertise, and whether there is any security concerns regarding the type of data used in the digitalization project. Maintenance costs and other ongoing operational costs should also be considered.

In-housing tech development is most appropriate when the data collected and processed is sensitive. But it requires high upfront costs, as well as significant investment in a company's IT personnel. As technology is not the core area of expertise of most oil and gas companies, the majority of digital transformation efforts should not be in-house. Collaboration with tech vendors is crucial to successful tech deployment. In the oil and gas industry, we expect the preferred choice to be a hosted software-as-a-service (SaaS) models where the digital solution is fully run and paid for by the tech vendor. The vendor is responsible for the infrastructure, security, and updates to the software. The digital solution is only licensed to the oil and gas company on a subscription basis. SaaS is the cheapest and easiest way to deploy digital solutions for companies that have little tech expertise.

For the large oil and gas companies, a hybrid partnership model is also a feasible option. Here, companies partner with large tech vendors to help improve their internal tech infrastructure and use the tech vendors' expertise and resources to build digital solutions. Here, the oil and gas company can be more involved in the development and deployment of digital solutions and may choose to host the solutions on private cloud servers.

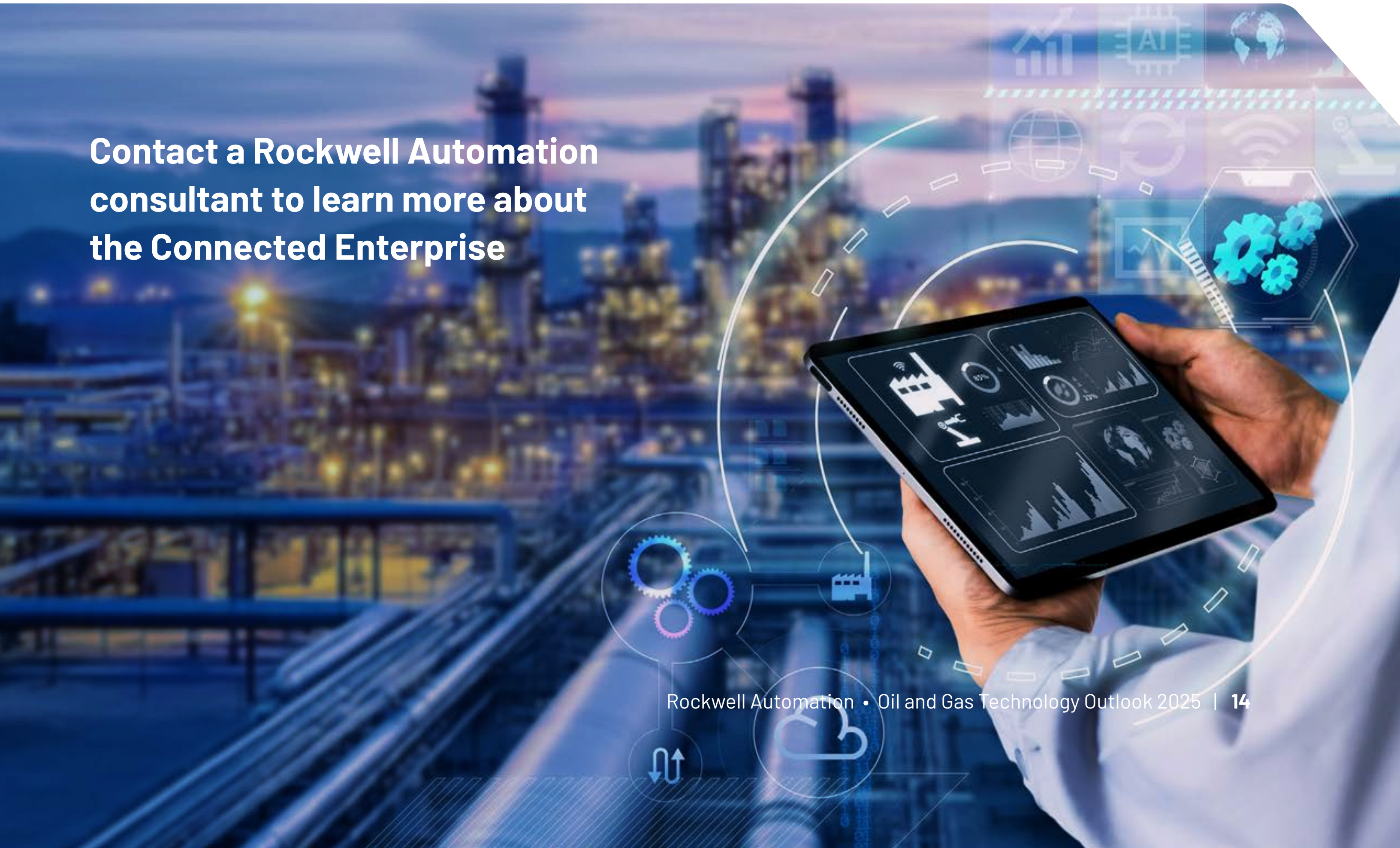
Step 3 | Evaluate and comply with tech and data regulations

When dealing with vast amounts of data, companies must be aware of ongoing developments in tech and data protection regulation. Tech regulation is still very much in its infancy, with much of it yet to be implemented. Data protection regulation is more advanced, but varies significantly by region, with the US, EU, and China taking different approaches to how a company should collect, store, and process data. Companies must stay alert to changes in regulatory approaches to tech adoption.

Compliance with tech and data regulations is important when entering long-term partnerships with tech suppliers. Depending on whether a company is the supplier, deployer, or user of a digital solution, the liability and regulatory scrutiny for potential failures or data breaches differ.

Step 4 | Foster a digital-first workforce

Any company that succeeds with digital transformation shares one characteristic: they cultivate a digital culture among their workforce. A digital culture is critical for the successful adoption of any technology across company operations. It is not enough to train staff on new digital solutions, it is necessary to accompany their use of these solutions, explain how technology can benefit their daily tasks, and inquire about how the digital solutions can be improved. In the oil and gas industry, the staff will be the ones most exposed to the digital solutions. As a result, they will be the most equipped to provide constructive feedback on how a technology is helping or hindering daily operations and what could be done to improve it. Digital transformation is not a one-and-done project, it is a long journey. Only when a digital culture is cultivated across company operations can oil and gas companies see the true economy of scale that can be achieved with increased digital adoption.



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About GlobalData

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In an increasingly fast-moving, complex, and uncertain world, it has never been harder for organizations and decision makers to predict and navigate the future. This is why GlobalData's mission is to help our clients to decode the future and profit from faster, more informed decisions. As a leading information services company, thousands of clients rely on GlobalData for trusted, timely, and actionable intelligence. Our solutions are designed to provide a daily edge to professionals within corporations, financial institutions, professional services, and government agencies. We help you work smarter and faster by giving you access to powerful analytics and customizable workflow tools tailored to your role, alongside direct access to our expert community of analysts.

Unique Data

We continuously update and enrich 50+ terabytes of unique data to provide an unbiased, authoritative view of the sectors, markets, and companies offering growth opportunities across the world's largest industries.

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We leverage the collective expertise of over 2,000 in-house industry analysts, data scientists, and journalists, as well as a global community of industry professionals, to provide decision-makers with timely, actionable insight.

Innovative Solutions

We help you work smarter and faster by giving you access to powerful analytics and customizable workflow tools tailored to your role, alongside direct access to our expert community of analysts.

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We have a single taxonomy across all of our data assets and integrate our capabilities into a single platform – giving you easy access to a complete, dynamic, and comparable view of the world's largest industries.

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