

Leveraging artificial intelligence in Oil and Gas



Upstream and downstream, the oil and gas sector is already leveraging artificial intelligence to streamline exploration, maintain assets, optimize scheduling and more.

The rise in use of generative artificial intelligence (AI), is having a profound impact on myriad sectors the world over. A recent [report by Mordor Intelligence](#) estimates the market for AI in the oil and gas sector is expected to reach \$4.21 billion by 2028. [An Ernst & Young survey](#) found 92% of oil and gas companies worldwide are investing in AI or planning to do so in the next 5 years.

In this executive summary, we examine how artificial intelligence can help the oil and gas sector operate more efficiently and sustainably, including some sector use cases already leveraging digitalization, automation, AI, machine learning and digital twins.

Exploration: turning complex Big Data into meaningful smart data

Locating new Oil and Gas fields is essential for the long-term viability of producers. But the process, especially for offshore wells, is fraught with costs, logistical challenges and extreme financial risk. Geologists must acquire, and analyze, vast amounts of seismic survey, satellite, global positioning system and remote sensor data to select potential sites of interest.

Combining artificial intelligence, machine learning and cloud compute power provides a way to cost-effectively analyze, correlate and interpret these big datasets, turning patterns and anomalies into meaningful geological insights and potential reservoir drilling opportunities. AI-based applications can rapidly unify and cross match different data sources, accelerating the ability to surface meaningful learnings and interrogate and verify predictions for new fields. Machine learning algorithms can analyze well log data, identifying patterns that would be difficult or even impossible for data scientists to spot. These technologies can help companies to better understand the geology of a region to identify potential drilling locations, minimizing the need for exploratory drilling and the risk of dry wells.



Upstream back-office processes: automating and optimizing maintenance and operations

The oil and gas industry has been struggling for years with an aging work force. Recruiting the next generation into a field crippled with complicated, legacy applications that fail to deliver immediate results is challenging. However, utilizing AI to learn from the current work force, coupled with embracing more modern enterprise applications, can help. Generative AI could help process purchase orders; it can make better decisions on when to buy critical parts and when to open a work order, offering a more reliable way to create break-fix work orders and identify the root cause of failure. These processes are still fundamentally the same across most enterprise asset management products. AI has the ability to reduce engineers' and maintenance technicians' time in front of their screens, so increasing their wrench time.

Asset maintenance and management: maximizing uptime, extending service lifetime

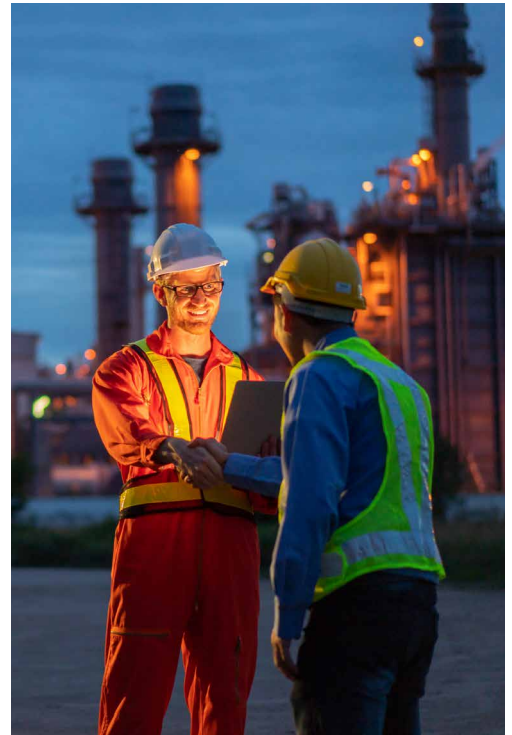
A World Economic Forum report ([Digital Transformation Initiative by Oil and Gas Industry](#)) suggests that 92% of refinery shutdowns were due to unplanned maintenance, costing companies an average of \$42 million a year and, in the worst cases, as much as to \$88 million a year. In the same vein, analysts [ARC Web](#) observe that 63% of the oil field assets are likely in the latter half of their expected lifetimes.

With an ageing asset fleet and pressure to extend asset lifetimes, oil and gas companies are faced with difficult and potentially costly decisions around maintenance. Here, AI and machine learning analysis of remote sensing data, coupled with digital twin models of complex well operations, provide a way to optimize asset maintenance efficiency by predicting equipment failures before they occur. The digital twin model simulates the operational performance and condition of equipment in real-time, allowing 'what-if' scenarios to plan preventative maintenance and to avert hugely costly unplanned production downtime.

Analysis by GlobalData ([Predictive Maintenance in Oil & Gas](#)), reveals several companies, including Shell, ExxonMobil and BP, are using digitally-enabled predictive maintenance technologies to evaluate the condition of their operational equipment and predict maintenance requirements.

Optimizing production: automating production scheduling

One of the fastest growing applications for AI in the oil and gas sector is automating production scheduling and so minimizing risk and cost. Oil and gas projects, particularly those offshore, comprise an immense number of diverse and interlinked activities that are all essential to the rig installation, drilling and ultimately production processes. Variables such as poor weather conditions, logistics challenges and resource issues can quickly threaten production schedules that are inflexible, causing costly delays.



Here, despite complex and changing interdependencies, AI-enabled cloud-based software and algorithms can automatically analyze project and production data in real-time. By dynamically orchestrating and constantly optimizing planning and scheduling, AI will automatically maximize production efficiency.

Conclusion

AI, automation, and ML are transforming the oil and gas industry. These technologies are optimizing production scheduling, reducing downtime, improving safety, increasing efficiency, preventing equipment failures, and optimizing drilling operations. Looking ahead, from 2024 on, IFS expects to start leveraging access to hourly and daily production data for over two-thirds of North America's oil and gas wells. This uptime tracking capability presents the opportunity to develop further advanced AI-powered upstream Oil and Gas best practice efficiencies into IFS Cloud.

Learn more

To find out more about the ways IFS Cloud empowers oil and gas companies to optimize operational efficiency and improve performance, [contact us](#) today.

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