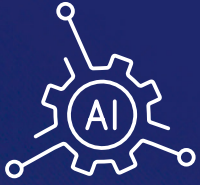


AI-DRIVEN OPERATIONS FOR THE ENERGY SECTOR





AI-driven Operations for the Energy Sector

The global energy market, which was primarily driven by fossil fuels, has seen big leaps in innovation over the past few decades. Terms such as clean energy, renewables, energy efficiency, energy transition, and energy-as-a-service are gaining traction across governments, enterprises, and consumers. For oil and gas (O&G) companies, this is a new world – one they must find ways to decarbonize supply chains and leverage renewable energy sources to offset carbon emissions and secure future business – all while navigating price fluctuations, geopolitical changes, and climate risk.

The three key imperatives for O&G enterprises in this era are to reduce:

- **Cost**

This involves various approaches such as determining the most profitable oil fields, leveraging technology that maximizes yield from existing and new wells, and the use of autonomous drilling⁽¹⁾, improving asset performance with predictive and prescriptive maintenance techniques, and supply chain optimization.

- **Emissions**

There is an urgent need to cut methane emissions from oil and gas operations. According to the International Energy Agency, around 60% of oil and gas methane emissions can be reduced through strong policies of zero tolerance as well as leveraging technology for real-time monitoring and action⁽²⁾. Production surveillance systems allow for continuous monitoring and production optimization in oil and gas.

- **Risk**

Every facet of the O&G industry is riddled with risk, be it capital intensive upstream operations, restrictive regulations for midstream companies, or safety and environmental risk within downstream companies. Mitigating the technical risk in each stage calls for granular visibility, accurate predictions, intelligent tools, and smarter decisions.





The Way Forward with AI-first operations

Innovations in AI, ML, deep learning, and advanced analytics have led to myriad applications within the oil and gas sector. As a technology, AI can help leverage historical data and existing datasets to automate tedious tasks, detect patterns, predict outcomes, and discover new opportunities to grow revenue, mitigate risk, and reduce carbon emissions.

Downstream oil companies can leverage AI for process optimization, demand forecasting, and predictive maintenance of critical equipment. Such AI-driven decisions can have a significant impact on lowering the cost and ensuring a secure and steady supply of inventory⁽³⁾.

In upstream operations, the use of deep learning in seismic data interpretation can accelerate the speed and accuracy of discovering new wells, improve the rate of crude oil extraction, and optimize operations cost to enhance overall oilfield performance. These measures will help oil and gas companies save time and money during discovery and production operations. Petrotechnical data management and engineering data management support these advanced operations.

AI's ability to support advanced data analytics and intelligent automation can simplify tasks such as invoicing, supply chain management, and demand forecasting. The industry is replete with partners involved in the supply chain, and AI can fast-track how data is gathered, shared, and used between different parties. This in turn allows for faster and smarter procurement decisions and optimized stock to ensure better profitability. It can also slash infrastructure cost, yielding significant savings⁽⁴⁾. Many oil and gas industry case studies provide insights into these best practices.

Further, it can help upstream as well as downstream players establish unmanned oil and gas facilities driven by automation, predictive maintenance, and intelligent sensors. By gathering equipment performance data, AI can help preempt equipment downtime, minimize safety risk to personnel, and lower operational costs. Pipeline integrity management services are crucial in these operations.

Another critical area for O&G players is vigilance. The oil and gas industry must guard against potential accidents and minimize damage as much as possible. This includes steps that reduce methane emissions during drilling to plugging pipeline leaks and identifying oil spills. AI can facilitate early detection of pipeline failures, monitor the surrounding environment for negative consequences due to oil operations, and identify the urgency of flares and venting for emissions⁽²⁾. Pipeline scheduling systems and transportation logistics for the oil and gas industry are essential in this context.

Clearly, the future of the O&G sector hinges on its ability to transform its operations and business model to support climate change goals and carbon neutrality. AI is a powerful technology that can assist companies across the oil and gas value chain – in upstream, midstream, and downstream operations – to lower risk, emissions, and costs. Digital oilfield solutions, oil and gas GIS services, and reservoir engineering services all play a role in this transformation.



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Author:

Makarand Nargund
Associate Vice President - Oil & Gas

For more information, contact askus@infosys.com



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