(5G Series) Fueling Efficiency: Is 5G a Potential Game-Changer in Revolutionising Oil & Gas Operations?

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The Oil & Gas (O&G) industry is globally lauded as one of the most innovative industrial fields. Typically, we might turn to the likes of Shell or Exxon Mobil for examples of adopting innovative technology in streamlining operations, but when it comes to the implementation of 5G, we needn't look very far.

PETRONAS has recently become the first in Malaysia to adopt a 5G private network for enterprise use, as part of a national initiative under the Ekonomi MADANI and the New Industrial Master Plan 2030 (NIMP 2030) framework; a blueprint which places technology at the centre of developing a prosperous industrial and economic national landscape.

In announcing PETRONAS's Private 5G initiative, Deputy Prime Minister Dato' Seri Haji Fadillah Haji Yusof highlighted the role 5G would play in this aspiration, "As we embark on this transformative journey, it's crucial to acknowledge the integral role cutting-edge technologies play. 5G's fast connectivity, low latency, and capacity to handle massive data flows will empower our industries to innovate, compete and excel on a global scale".[1]

UNDERSTANDING THE FUNDAMENTALS OF 5G

Indeed, the capabilities of 5G far outstrips its 4G predecessor[2]:

- ***5G operates on a unified platform*****,** supporting all spectrum types and bands, with a wide range of deployment models and new ways to inter-connect across the network – all of which supports new services such as Internet of Things (IoT) more efficiently

- ***5G is faster than 4G*****,** delivering peak data rates of up to 10 Gigabits per second (Gbps) compared to 4G's peak data rate of 100 Megabits per second (Mbps)

- ***5G has lower latency than 4G,*** delivering near instantaneous data transmission: less than 10ms, which is literally a blink of an eye!

5G IN THE OIL AND GAS INDUSTRY: SO, WHAT?

To the average consumer like you and me, 5G could mean that we never have to wait for an online movie to buffer ever again; but what does it mean for an industry as hugely valuable and risky as O&G?

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[1] https://www.petronas.com/media/media-releases/petronas-becomes-first-malaysia-adopt-5g-private-network-enterprise-use

[2] https://www.qualcomm.com/5g/what-is-5g

During the same event, PETRONAS' Senior Vice President of Project Delivery & Technology, Datuk Bacho Pilong shared the benefits observed from the 5G private network deployment at its Regasification Terminal Sungai Udang (RGTSU) in Melaka: "Our strategic adoption of 5G technology sets us ahead in the energy industry. By combining 5G with IoT, Artificial Intelligence (AI), and automation, we're putting Open PETRONAS as among the leaders in the global technological race, while ensuring we meet the demands of supplying safe, reliable, cost-optimised and emission abated energy solutions for Malaysia and our customers globally."

Datuk Bacho Pilong raises an excellent point: the key to reaping the full benefits of 5G lies in understanding what the technology enables. We could look at it as a series of simple combinations:

5G x (IoT+ AI) = more reliable operations

5G supports the deployment of thousands of IoT sensors on equipment, pipelines, and facilities to continuously monitor conditions such as temperature, pressure, flow rates and vibrations, enabling the real-time monitoring of equipment health and detection of possible failures. Coupled with AI, the oil and gas industry can see a new future on the horizon: a self-managing and self-maintaining facility capable of optimising its own production with connectivity as the glue holding it together.

5G x (Automation + IoT) = safer operating processes

Some tasks in the oil and gas field puts human life at risk such as manual site inspections, maintenance and construction work, or simply the uncomfortable conditions on offshore environments.

Now, imagine being able to remove workers from these dangerous environments and substituting them with high-resolution video drones relaying much more precise data, powered by highly reliable, high-bandwidth connectivity. According to Ericsson, drones can reduce health and safety incidents by reducing the human capital required in these harsh environments, and even reduce inspection times by up to 90% on top of that.[3]

Next, imagine a team of industrial frontline workers equipped with digital wearables powered by this same high-speed connectivity. Using mobile device-accessible schematics and plans, combined with features such as push-to-video, oil and gas companies stand to reduce loss from health and safety incidents by up to 48%.

5G x (IoT + AI) = slightly lower emissions

The risks inherent to the O&G industry are not merely among its workers. An arguably more serious risk is the threat it poses to the environment. While the industry's ultimate end-goal is to pivot towards renewables, 5G might still play a role in reducing the environmental hazards in the process of phasing out of fossil fuels.

5G-connected IoT sensors are able to continuously monitor environmental conditions for ensuring compliance with environmental regulations and minimising environmental

[3] https://www.ericsson.com/en/industries/offshore-and-processing#advancedoperations

impact. Similarly, by enabling AI-powered predictive maintenance strategies, 5G could greatly minimise the likelihood of equipment malfunctions and subsequent environmental disasters while also enabling rapid detections and responses to malfunctions.

5G x (IoT + AI + Automation) = cost-optimisations

Taken together, all the above benefits ultimately translate into a massive cost-efficiency exercise for oil and gas operators.

On average, O&G producers experience 32 hours per month of unplanned downtime which can cost a typical offshore facility up to USD84 million annually. Today, 70% of companies lack awareness of when assets are due for maintenance or are at risk of malfunction.

Real-time data and monitoring, enabled by enhanced connectivity, can be a total game-changer in this respect. The real-time monitoring of critical assets stands to reduce maintenance sessions by 25%, as well as reducing unplanned downtime by 32%.

Similarly, the possibility of replacing workers with drones can translate into lower downtime costs of 65% and an additional 35% reduction of cost from fewer health and safety incidents.

Furthermore, the implementation of digital wearables onsite can result in an 8% reduction in operational spend due to increased efficiency and effectiveness of a digitally enhanced worker.

As we delve deeper into the potential of 5G, we find that the equation is quite simple: **5G, when combined with IoT, AI and automation, can result in more reliable operations, safer processes, lower emissions, and ultimately, profound cost-efficiency.**

The collaboration of these technologies paints a vision of a self-managing, self-optimising industry where human capital is protected, environmental risks are minimised, and operational excellence is achieved. In an industry that faces significant challenges and ever-increasing demands, 5G serves as the glue holding together a new future for oil and gas operations.