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Old assets, new tricks: the challenge and promise of brownfield assets

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Brownfield offshore energy developments have an image problem. The term itself doesn't help – greenfield sounds much nicer and far cleaner. Perhaps we can say 'legacy assets' instead, but legacy is a pretty worn euphemism for old at this point.

So, I won't try and burnish the language, I'll just make my case plainly: offshore brownfield projects will be some of the most important engineering projects of the decade.

The world is awash with assets reaching their stated end of life – from the North Sea to the Gulf of Mexico, the Middle East and South East Asia. And we probably haven't reached the peak – the steadily climbing oil price of the early 2000s will have prompted a wave of projects which will turn 25 years old over the next ten years.

Some of these will need to be retired and decommissioned, yet for many others there is life in them yet, but for want of some intelligent engineering.

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1. Sustained demand

According to the IEA's 2021 World Energy Outlook, under the stated policies scenario, global oil demand is set to grow from 28 billion barrels to 32 billion barrels through to 2050. Even under the net zero scenario, in which demand decreases, 7 billion barrels of demand remain.

These figures show that oil demand is not about to disappear anytime soon, and may in fact increase, given that fact, the question then becomes the best way to meet that demand. There are parts of the world – such as West Africa – that are investing heavily in new greenfield projects, but brownfield assets will have a part to play too, especially in more mature fields such as those in the North Sea and Gulf of Mexico.

2. The price is right

At the time of writing, the oil price has passed $100/bbl. once again, but under the exceptional and tragic circumstances of the war in Ukraine and its geopolitical fallout. This follows more exceptional circumstances in the global markets as the wheels of the global economy had begun to turn again following the Covid-19 pandemic.

However, we must hope these tragedies pass swiftly, and when they do, oil and gas prices may again subside. Before the pandemic, our industry talked in terms of 'lower for longer' and the general consensus was that the energy transition would exert downward pressure on demand and prices over time. Investment activity had evolved to be more concerned with asset-life extension and 'less permanent' installations such as FPSOs.

Given that greenfield projects may have multi-decade life cycles, investment decisions must factor in a lower price than today's high. This favours brownfield projects, which require lower capital expenditure and a shorter commitment.

3. The energy transition

Even putting price aside, there are compelling environmental reasons to look to brownfield developments to sate the world's oil and gas demand.

First, consider materials. The volumes of steel, concrete and other carbon-intensive materials that are involved in offshore infrastructure are phenomenal – especially in deeper waters. For example: every ton of steel produced in 2018 emitted on average 1.85 tons of carbon dioxide, equating to about 8 percent of global carbon dioxide emissions.

Brownfield engineering projects do often require the use of new material. A platform may have been designed with a certain thickness of steel and need to be reinforced to take the weight of a new piece of equipment, for example. However, even for the most extensive of brownfield (re)developments, the material requirements are likely to be orders of magnitude less than for greenfield alternatives – especially when the emissions for transporting those materials are factored in.

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To a lesser extent, transportation of people also factors into this equation. Marine or helicopter transport to offshore sites both have high emissions costs (as well as an unavoidable degree of safety risk), so minimising the human trips needed to complete a project is also the environmentally responsible option. Again, brownfield developments typically require less total time.

Brownfield developments can also feed into an asset owners' energy transition strategies in more conspicuous ways. For example, for typically unmanned platforms with low-electricity loads, it is now possible to convert them to run on renewable energy. This has an immediate benefit for operational emissions vs alternatives such as diesel, as well as reducing emissions and risk associated with refuelling trips.

In future, brownfield projects may even be at the forefront of the energy transition. Much has been made of the potential for CCS projects, using depleted reserves to store sequestered carbon dioxide, upgrading existing infrastructure already in situ to do so. We have even begun work on a concept combining oil and gas infrastructure with co-located wind resources to produce green hydrogen.

4. Aging assets meet intelligent engineering

However, brownfield developments are not always straightforward, for a variety of reasons.

First, there is often a documentation gap. Technical drawings and specifications can be lost, updates and retrofit engineering works are not always properly captured, and documentation has a habit of going missing when assets change hands, which can happen many times over the course of an asset's lifecycle. Regions such as the Middle East where national oil companies (NOCs) tend to keep hold of assets for longer can suffer less in this regard, but it's a universal problem.

Then, even if all documentation is present and correct, there is the matter of the accumulated wear and tear that comes with decades of operation in an offshore environment. Sometimes, there is no alternative other than for engineering teams to make site visits offshore to inspect asset condition and take samples to test for material integrity.

Once documentation is compiled and asset health is established, then the real engineering work starts. Bearing in mind that any deviation from an asset's original intended purpose can introduce risk, its vital that this is done with precision. For example, say an operator wants to drill a new well and tieback to an existing platform – does it have capacity for the riser? Space top-side for additional processing equipment? Any miscalculations here can have expensive consequences.

Fortunately for today's engineers, their forbears' lack of computer analysis meant that they often erred on the side of caution when specifying, for example, steel thicknesses. This translates into wriggle room for engineers today. However, there's no escaping the fact that brownfield development requires real, rigorous, investigative, problem-solving engineering work. It's a different challenge to greenfield, and one that many of the engineers I have worked with relish.

After all, the only real certainty in our industry is change. So, the ability to adapt and upgrade our offshore infrastructure to meet our needs as they evolve is arguably one of the most important tools for the sector, underpinned by intelligent offshore engineering.

Contact our expert team if you'd like to know more about our brownfield capabilities

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