

The background features a large, abstract splash of bright green and black ink or paint on a white surface. The splash originates from the left side and spreads towards the center. A faint, light-colored handprint is visible in the lower right quadrant, partially overlapping the green and black areas.

wood.

A Wood viewpoint

Carbon commitment

Reducing the carbon intensity of operations
through smarter emissions management

New era, new opportunities

For the first time since the Industrial Revolution, Britain now obtains more power from zero-carbon sources than fossil fuels. However, with demand predicted to increase at a faster rate than renewables can meet, oil and gas is likely to remain a key part of the UK's energy supply mix for the foreseeable future.

This is a positive signal for a sector that has contributed so much to the UK economy over the last 40 years, but it's also clear that the parameters in which the sector operates have materially changed. In June, the government accepted the recommendations from the Committee on Climate Change and enshrined in law a target to achieve 'net zero' greenhouse gas emissions by 2050.

For the UK oil and gas sector, this is now driving a dual focus;

1. Delivering a cleaner industry by decarbonising offshore operations
2. Achieving a net zero basin by integrating the infrastructure and networks within the UK Continental Shelf

Achieving these two goals will require the industry to pull on multiple levers including; adopting clean power generation on offshore assets, investing in carbon capture and storage infrastructure particularly around industrial clusters, and embracing circular economy principles when it comes to the decommissioning or the re-use of existing assets.

From an operator's perspective, one area that requires immediate focus is reducing emissions leakage and flaring through better management of existing pipeline infrastructure. The issue of fugitive gases has long been a blight on the industry however it's also an area that's relatively easy to address, particularly with the emergence of technology-led solutions that facilitate smarter asset design, management and modifications work.

This focus on reducing emissions leakage will grow even sharper over the coming years but it also presents operators with an opportunity to demonstrate their commitment to the environmental agenda by taking concerted steps that will help them to reduce the carbon impact of their upstream and downstream activities.

Seven steps to decarbonising offshore operations through smart design and monitoring solutions:

Across the globe, Wood is advising many operators on technology enabled solutions that can help them reduce the volume of emissions they produce across their portfolio of assets (onshore and offshore). This includes practical steps on improving the integrity of new and existing infrastructure and managing their assets in a way that ultimately keeps hydrocarbons in the pipe rather than leaking into the atmosphere.

We make seven recommendations to help customers avoid or minimise unwanted emissions:

1. Prioritise dynamic simulations and an engineering assessment on compressor design

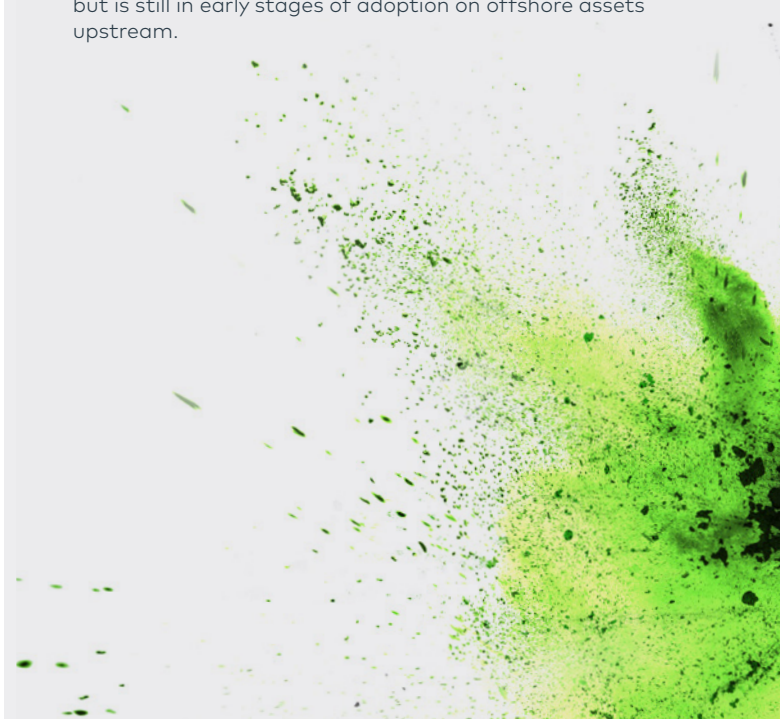
Using proprietary software and domain expertise to assess the compressor manufacturer's proposed design of a pipeline package can identify where problems will occur and offer a bespoke solution to resolve these issues. In recent years, this approach has prevented hundreds of thousands of tons of hydrocarbons leaking at high pressure.

2. Address small-bore pipework potential failures

This has been identified as the source of circa 20% of all hydrocarbon leaks in the North Sea, and yet it can be anticipated and engineered out using relatively simple software. If all operators followed this screening, and acted on what it told them, there would be 20% less hydrocarbon emissions from pipework failures. This would be a significant step on the journey towards creating a 'net zero' basin.

3. Invest in volatile fugitive emissions screening

By combining the screening and analysis methodology developed for vibration testing with camera monitoring technologies deployed in the implementation phase, it's possible to identify, quantify and then minimise the leaks associated with items including valve stem packing, mechanical bolted joints and mechanical seals. This technique has been proven to work in the refinery space but is still in early stages of adoption on offshore assets upstream.



New target zero

4. Embrace machine-learning augmented condition monitoring

This is an evolution of the standard machinery health monitoring, whereby machine augmented decision-making reviews and anticipates problems, allowing the specialist engineers to focus on the biggest challenges. With one customer, this approach delivered a US\$2m direct saving in monitoring costs and prevented over US\$15m per annum in unnecessary maintenance spend. This takes condition monitoring from being a passive reporting process to an active intervention process, adding significant value to the operations.

5. Leverage machine learning for corrosion classification

By assessing sample images of varying qualitative damage levels and grouping them into repeatable results, we've built a highly effective neural network that can classify the level of corrosion on any pipe span image in seconds. This enabled our team to significantly reduce the length of time needed to classify the thousands of photos supplied after an inspection from weeks to just days. By identifying the areas with the most significant corrosion and where emissions leakage was most likely, we were able to take steps to address in a much quicker timeframe.

6. Embrace computational pipeline monitoring

Continuous monitoring of pressure, temperature and other key data from thousands of points along the system can enable operators to quickly identify any anomalies that could indicate possible leaks and allows them to respond to these changes quickly.

7. Complement standard monitoring with acoustic emission inline inspections

On many pipelines, state-of-the-art monitoring technology also includes sensitive acoustic devices that can "listen" for leaks. This is a smart approach that fortifies existing monitoring solutions.

Building credibility and securing a future licence to operate:

Setting an ambitious target to try and deliver a 'net zero basin' is not just the right thing to do, but will also enable operators to showcase their commitment to building a lower-carbon future and highlight why they should be viewed as part of the solution to the climate change challenge.

Focusing on reducing the carbon intensity of their operations isn't a short-term commitment or a PR exercise, but a philosophy that operators need to embed within every aspect of their operations including how they design, build, manage and maintain their portfolio. On existing assets, we find there are typically multiple opportunities, and that relatively small changes can help to drive significant improvements.

As well as environmental benefits, a stronger level of governance around emissions also makes compelling commercial sense. It can help to safeguard an operator's future license to operate, reduce risk if a carbon tax is subsequently introduced, and starts to build credibility and trust with the general public that providing a product that enables the UK to meet its primary energy security needs is not incongruent with the climate change agenda.

There's no doubt that achieving a 'net zero basin' will require a huge step change. However, the sector can and should take confidence from the past – the oil and gas industry has a distinguished track record of developing technically challenging solutions in areas that many would not have dared thought possible. That same vision and entrepreneurial spirit will serve operators well as they begin to chart their future course in a lower-carbon world.

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Contact us:

If you would like to discuss any of the points raised in this paper in more detail, then please get in touch.



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About Wood:

Providing services across the life cycle of energy projects.

Our market-leading services and technologies provide engineering knowhow to energy projects worldwide.

We are a trusted partner for renewable energy developers, lenders, investors and operators worldwide. Carbon capture offers huge potential to neutralise the impact of fossil fuel production and we are well placed to help you realise your ideas. Our dedication and experience, combined with innovative product developments, have positioned us as one of the leading organisations within the renewables industry today.

Our capabilities include:

- Asset management and operations
- Due diligence
- Feasibility
- Measurement and analysis
- Optimisation services
- Project development, engineering and construction

Wood is a global leader providing engineering, technical and project services for energy, industry, and the built environment. We provide performance-driven solutions throughout the asset life cycle, from concept to decommissioning.

For further information please go to: