

ENGINEERLIVE

MANAGING METHANE

Mike Brooks explains how the oil and gas industry can act now to avoid methane plumes and flaring

The recent global mapping of methane leaks from oil and gas fields highlights the scale of the sector's problem – and the threat that carbon release poses to the global climate. Preventing leaks requires urgent action. Oil and gas companies must focus on complete avoidance of emissions releases to tackle the challenge effectively. Most releases are sudden, often resulting from a process or mechanical failure that causes an unplanned shutdown. Not only do sudden unplanned shutdowns impact the operators' profitability, but distressing side effects can impact personnel safety and contribute to greenhouse gas emissions and environmental compliance.

From a safety perspective, forced shutdowns can cause the most dangerous conditions a plant can experience. Industry estimates suggest that an oil and gas facility typically spends less than 10% of its time in transient operations (shutdowns, start-ups or transitions) – but an astonishing 50% of all process safety incidents occur during those times. Minimising such transient operations is the key to making safety improvements persist over the long term, especially sudden, unexpected events. Secondly, providing sufficient warning and operator guidance to give the appropriate time to plan and execute a safe orderly shutdown is paramount in reducing flaring and improving safety performance.

Delivering warnings early is key in reducing flaring

SAFETY AND SUSTAINABILITY

Safety is a crucial consideration within any global oil and gas plant operation, and now sustainability has garnered attention. Often the two are united. Gas flaring is the epitome of a single plant process that most clearly expresses both the environmental and safety challenges associated with unplanned shutdowns. During an unplanned shutdown, sudden excess pressure and product flow can lift the flare valve and result in a single event that might exceed the carbon release for the entire year. Not only is flaring a significant source of greenhouse gas emissions, but the World Bank estimates flaring fuel losses amounting to 142 billion cubic metres (bcm) in 2020 – that is a lot of wasted money.

In terms of sustainability impact and public perception, excess flaring is a visual sign that current facility conditions outside of normal are occurring and could compromise safety and risk.

Today, all too frequently, a sudden unexpected failure results either in immediate flaring or in a rushed disorderly response, where hydrocarbon releases can occur. All this paints a grim picture – but there is good news from the industrial technology front.

THE ROLE OF PREDICTIVE MAINTENANCE TOOLS

Artificial intelligence (AI) systems are now coming on stream that can prevent such negative scenarios. By tapping into the power of machine learning and predictive analytics, companies can understand which pieces of equipment are likely to fail, and when. Also, with a more prescriptive analytics approach, they can even diagnose precisely what issues are causing the impending failure and prescribe action to avoid or at least mitigate the consequences. Lead times of weeks and months can give the time to carefully consider and plan the proper safe and orderly action that by design avoids the distress that can lead to flare valves opening and result in hydrocarbon releases.

Moreover, the time to plan around predicted downtime and a comprehensive view of the entire operation permits plant personnel to see how an operations of maintenance decision affects the entire organisation. They will immediately assess impacts planning and scheduling, how it determines feedstocks or delivery issues and see impacts or risk and safety. The earlier warnings the business receives provide cross-functional work opportunities to find the optimum time to take the machine offline to perform the maintenance while minimising

Smart solutions enable operators to increase safety while reducing emissions



Excess flaring is a visual sign that abnormal conditions are occurring



optimal decision considers the needs of the whole business from production to maintenance and from supply chain to engineering.

The right technology can simulate how any event will impact the system of assets, the process, and an individual asset. The technology can even be scaled to cover multiple plants to better understand their co-dependencies. So, when there is an issue in one location, the software can show how it will affect the pipeline coming in, the ships going out and whether the facility is at risk of defaulting on contracts.

Beyond all that, where leaks do occur, technology will increasingly be able to detect them, and allow the oil and gas industry to take prompt action to mitigate the consequences. We can look

forward to commercialisation of emerging sensor technologies such as acoustic, ultrasonic, AI-enabled visualisation and hyper spectral imaging that will increase our ability to detect and prevent issues much earlier.

THE TIME IS NOW

Those companies that take advantage of both existing and emerging technologies will be best placed to help slow global climate change and reduce their own environmental impact into the bargain.

We have long known that predictive and prescriptive maintenance technology allows oil and gas companies to achieve increased production, lower maintenance costs, and increased asset life. But this is about more than just the money. With better warnings and avoidance of emergency situations, organisations can realise a full sustainability 'business trifecta' of benefits - increasing safety and reducing emissions while also making key operational gains.

And it is important that businesses act now to start to access these benefits and build an edge over rivals. Companies that implement this technology first will put themselves at a distinct competitive advantage driving efficiency but also by reinforcing their 'social licence to operate' with improved sustainability performance.

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