METHANE

Tackling methane emissions reduction

Methane is a potent greenhouse gas (GHG) which accounts for a quarter of today's global warming, and also plays an important role in natural gas in the transition to a low carbon future. The oil and gas industry is a leading source, releasing over 75mn t/y of methane emissions.

In response to priority areas highlighted for action in the International Energy Agency (IEA)'s *World Energy Outlook 2017*, a coalition of industry players, international institutions, non-governmental organisations and academics developed the Methane Guiding Principles (MGP). Signatories including BP, Statoil (now Equinor), Shell, Eni, Total, Repsol and ExxonMobil, as well as supporting organisations like the IEA and Energy Institute (EI), committed to undertake the principles and implement a well-defined action plan to increase focus on cutting methane emissions.

So what progress is being made?

'Methane emissions are an enormous problem for the oil and gas value chain and every business who has a stake in its future,' says Ben Ratner, Senior Director at the Environmental Defense Fund (EDF). Methane is a super-potent GHG – 86 times more powerful than CO_2 at warming the planet over a 10–20-year period. And the oil and gas industry is one of the largest global emitters. 'We are in a race against time and every day or year matters,' he continues. 'Despite promising steps by some MGP signatories, the oil and gas industry overall is not doing nearly enough to limit methane emissions.'

However, there are a number of courses of action with straightforward solutions. 'Routine flaring of natural gas must be stopped. Flaring is an incredibly wasteful practice that destroys shareholder value, wastes a natural resource and is a significant contributor to methane and CO_2 emissions,' notes Ratner. Another key action is broad implementation of methane mitigation technologies and practices like leak detection and repair.

Continuous reduction of methane emissions from the oil and gas industry is essential to address global climate change. Leading authorities explain key measures that are underway to identify, monitor and mitigate leaks worldwide. *Brian Davis* reports.

Ratner emphasises the need to optimise operations in the field, to better monitor and control pressure and keep emissions in the pipe and out of the atmosphere. However, he is concerned that even companies who are taking some leading steps are generally giving themselves a 'free pass' for emissions from their non-operated joint ventures.

Companies that are serious about methane management need to bring real field data to the table, to demonstrate to investors, the public, customers and others that they are really reducing methane emissions. Ratner claims many companies rely on desktop estimates which 'grossly under-estimate' methane emissions rather than field estimates.

'The killer app for measuring methane emissions is not a calculator but a sensor. As we move to a world of satellite monitoring, there will be increasing transparency about where methane emissions are coming from,' he says. EDF affiliate MethaneSAT is being developed in partnership with Harvard University and the Smithsonian Astrophysical Observatory, as a compact new satellite resource to pinpoint the location and magnitude of methane emissions globally, for launch in 2022.

Engineer monitoring methane emissions at Shell's Appalachia gas operations, US

Photo: Shell

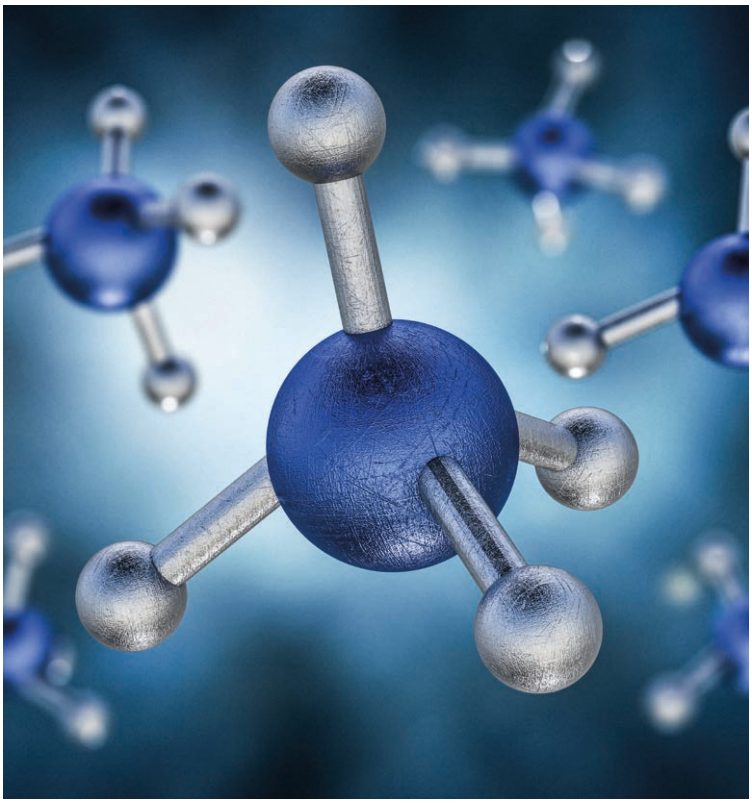
The high-profile Oil and Gas Climate Initiative (OGCI) has committed to a methane intensity target of 0.20 by 2025. However, Ratner considers the OGCI's methane mitigation efforts must demonstrate progress towards that target with science-based measurement rather than desktop estimates.

Nevertheless, the EDF recognises the early leadership of companies like BP, who have committed to take on methane emissions in their own operations and non-operated joint ventures. Shell has also taken a leadership role in the Methane Guiding Principles (see **Box**) and has been outspoken in calling on the US government and the European Union to tackle methane emissions. Notably, Gretchen Watkins, Shell Oil President in the US, stood up against the Trump Administration's roll-back of an Environmental Protection Agency (EPA) rule in mid-August, designed to reduce methane emissions from oilfield operations. 'The negative impacts of leaks and fugitive emissions have been widely acknowledged for years, so it's frustrating and disappointing to see the administration go in a different direction,' she said.

Shell is committed to continue reducing methane emissions. However, the oil industry remains split and many smaller companies say the requirements are too expensive for them.

Maarten Wetselaar, Director Integrated Gas and New Energies for Shell, has also made the case publicly for the European Commission to develop strict performance and procurement standards on methane emissions for all gas sold in the Europe Union.

Ratner doesn't pull his punches either. 'Donald Trump may be the most reckless anti-environmental president in the history of the US,' he says. 'It is a tremendous error for the future of natural gas, to wipe away the only remaining nationwide rule limiting methane emissions from industry.' And EDF President Fred Krupp recently announced plans to sue the Trump administration over the roll-back of methane standards.



Nevertheless, there has been a mixed reaction from the oil and gas industry to the Trump EPA roll-back. Several companies have had the courage to oppose move, including BP, Shell, Pioneer, Equinor and some electric and gas utilities. But they are not ubiquitous. 'Many companies have remained silent,' comments Ratner. 'Gone are the days when qualitative statements alone got the job done. Companies need to deliver proof of action in a more transparent way on the specific progress they are making, conducting inspections, improving operations, incentivising workers and contractors to do a better job which will ultimately reduce methane emissions.'

Government has a pivotal role to play

'The scale of methane emissions has to be put in the context of the larger problem of CO_2 emissions,' says KC Michaels, Legal Advisor at the IEA. 'From our Sustainable Development Scenario, which is part of the IEA's annual *World Energy Outlook*, we see methane abatement from oil and gas as a critical step alongside larger action across different field emission sources.' The IEA estimates that the oil and gas industry needs to reduce its emissions over 60% by 2030, which is technically possible to achieve and amounts to about 80mn t/y methane.

'This will require a smorgasbord approach, with different opportunities across the sector tailored to specific sites. Some approaches are cheaper than others, such as replacing pneumatic pumps with electric motors; electrifying sites; and improving leak detection and repair programmes', he says.

Michaels stresses the need for governments to take action in the regulatory space in line with the Methane Guiding Principles. 'So far, 23 oil company signatories have joined the MGP and committed to advocating for sound methane regulation. But we really need to get a solution across all sites, all countries and all operators.' Part of the challenge is the numerous sources of methane emissions, in different locations, with different types of gas, and the most cost-effective solutions. There are also potential regulatory options that can drive different types of abatement.

The Global Methane Alliance, which started in 2019, is a UN environment programme which brings together governments, financing institutions, international organisations (including the IEA) and non-governmental organisations, and industry to support ambitious methane reduction targets for the oil and gas industry. Countries that join the Alliance will commit to include methane reduction targets for the oil and gas sector in their Nationally Determined Contributions (NDCs) in the next COP26 round, as part of their GHG reduction targets. The reduction target is at least 45% reduction in methane emissions by 2025 and 60–75% by 2030.

For COP26 each country is expected to submit an NDC that will include climate goals for the next five years. In the past Paris Agreement, targets were largely focused on reduction of CO_2 emissions. But the current efforts of the UN Environment Programme, the IEA and MGP members is to get countries to include methane intensity under their reduction plan.

So, has the Global Methane Alliance been sabotaged by President Trump's roll-back of EPA rules on methane emissions? Michaels is diplomatic and insists there is still a role for governments across the world to take action on methane emissions reduction. 'Every country and operator has to do its part. But really the effort is focused on the low hanging fruit, where the best opportunities are.

The Energy Institute and methane emissions

Methane is a potent greenhouse gas and the EI is playing an active role in the reduction of emissions as part of its wider work to support safe, efficient and environmentally-sound operations in the energy industry.

When the EI surveyed international oil and gas professionals in 2018 it found awareness of the issue to be surprisingly low. Four in five of those asked were not fully aware of the technically and commercially viable possibilities for reducing methane emissions through the oil and gas lifecycle.

Methane emissions mitigation is now a permanent feature of EI work, in collaboration with others across the industry. EI President Steve Holliday FREng FEI told oil and gas executives gathered at IP Week in February 2020: 'It is hard to think of a more obvious place for this sector to start [acting on climate change] than fugitive methane emissions in its production and transportation facilities. I'm pleased to say a large body of operators and supporting organisations like the EI are working hard to overcome the technical issues and to raise awareness. The industry must bear down on this most potent of greenhouse gas emissions.'

As a Supporting Organisation of the Methane Guiding Principles initiative, the EI technical team is part of cross-industry work to develop reducing methane emissions best practices across both the upstream and downstream industry, including work to improve real-time monitoring of emissions and to take advantage of developing technological capabilities.

The EI is also using its channels and influence to raise awareness within the professional community. Methane emissions mitigation is high on the agenda of the EI conference programme, with dedicated sessions at IP Week. Methane is regularly featured within the EI knowledge output, including its authoritative podcast 'Energy in Conversation' and both magazines, *Petroleum Review* and *Energy World*. And the EI training team will soon be hosting Methane Masterclass training developed by Imperial College. ●

Methane is a super-potent GHG – 86 times more powerful than CO_2 at warming the planet over a 10–20-year period

Photo: Shutterstock

Methane emissions reduction in action

Shell has set a target to maintain methane emissions intensity below 0.2% by 2025, covering all oil and gas assets for which Shell is operator. Maarten Wetselaar, Director of Integrated Gas and New Energies, Shell, emphasises: 'The long-term role of gas in the global energy mix depends on good measurement, transparency on and management of methane missions. Urgent and ambitious industry action is needed to stamp out emissions to near-zero.'

The company has embarked on a comprehensive course of action. It has introduced a range of new technologies and methods to help find and stop methane emissions in its operations. At Shell's gas-to-liquids facility in Qatar, 33,000 components were scanned, 48 leaks detected and the majority repaired immediately. At its LNG facility in Oman, unintended methane emissions are now more than 99% lower than previously estimated due to improved reporting.

In 2019, Shell Canada's Groundbirch natural gas project reduced 330 tonnes of CO_2e by replacing old valves with electric valves. A new well design with zero emissions was introduced at 25 wells at the project. Meanwhile, improvements in maintenance procedures on 2,600 wells at a Shell-operated QGC site in Australia, reduced methane emissions by about 4,000 tonnes from July to December 2019. Shell's Appalachia gas operations replaced four gas-assisted pumps with electric versions in 2019, reducing methane emissions by 625 tonnes.

Shell also encourages industry-wide action on methane emissions reduction by participating in a number of initiatives, including the MGP coalition. It is a member of the OGCI, which has set a methane intensity target of 0.25% by 2025. Shell is also a member of the Climate and Clean Air Coalition (CCAC)'s Gas Methane Partnership (OGMP), whose principles provide a reporting framework that supports transparency on action and results.

In 2018, Shell announced a target to keep its methane emissions intensity, for oil and gas facilities where Shell is the operator, below 0.20% by 2025. Since 2019, Shell's senior executive pay is now linked with progress against its net carbon footprint ambition.

What's going on in one country doesn't necessarily need to roadblock others taking action.'

Michaels highlights the MGP initiatives. Resources under development include a best practices toolkit and education programme, principles for sound and effective methane policy and regulation, and a web-based information portal developed by the IEA.

The 2020 IEA Methane Tracker incorporates a comprehensive set of estimates of national level emissions and abatement opportunities within each country. 'Essentially, the problem for most countries is the lack of measurement of methane emissions,' admits Michaels. 'We are hoping that a large number of countries will take the call of the Global Methane Alliance seriously, to increase their ambition on methane emissions reduction in the next reporting period. Methane is an important source of global warming that needs to be considered alongside CO_2, and is potentially one of the most cost effective because methane is the main component of natural gas and has clear monetisation.'