Space race to cut emissions

Cutting greenhouse gas emissions is key to a low carbon future, says Jean-François Gauthier, VP, Sales and Marketing, GHGSat, an EI Company Member. This vital topic will be addressed at IP Week 2021.*

Jean-François Gauthier, Vice President, Sales and Marketing, GHGSat

How big a problem are methane emissions in terms of climate change? Methane is the primary component of natural gas, accounting for over 90% of the natural gas supplied commercially. It is also a powerful greenhouse gas (GHG) with a global warming potential 84 times that of CO₂ over a 20-year period, according to the UN Intergovernmental Panel on Climate Change. Every device in the extensive gas distribution system presents an opportunity for the gas to leak. When more than 3% of the gas is lost through leaks between extraction and end use, the environmental impact is equal or worse than that from using coal, the fuel it aims to replace in the energy transition.

Methane represents a low hanging fruit for emissions mitigation, however, as many leaks can easily be fixed if identified, significantly reducing contributions to climate change. It is therefore critical to regularly monitor the natural gas value chain to find leaks as quickly as possible so they can be repaired promptly to maintain the credibility of natural gas as a transition fuel to replace coal.

Where are the big gaps in monitoring GHG emissions around the world? Despite the accelerating emergence of new technologies in the last decade to identify and measure GHGs, much of the inventories are still performed from the bottom up. In other words, emissions are calculated using formulae that take into account the number of potential leak points in the equipment (valves, flanges, hatches, etc) and apply pre-determined emission factors. However, estimating emissions from facilities over the course of a year does not help in terms of taking action to reduce their impact on the environment. A top-down methodology, in contrast, not only creates inventories of emissions based on measurements rather than calculations, it also provides crucial and actionable information to fix leaks shortly after they are identified. The challenge with the top-down approach is to monitor as many facilities as frequently as possible while also minimising disruption to operations. GHGSat’s satellites are shifting this paradigm by providing frequent and affordable measurements directly from facilities, regardless of quantity or how remote, without ever needing to access them physically.

How effective is the technology to monitor methane emissions and is the next step to monitor carbon emissions using similar techniques? Satellites from space agencies have been monitoring GHGs at a regional scale from space for decades, primarily using spectrometry to measure the concentration of gases by looking at the absorption of sunlight at specific frequencies associated with the gases of interest. With its first satellite launched in 2016, GHGSat pioneered the ability to make emissions measurements. In the first four years of its mission, the satellite demonstrated that the technology could be adapted to monitor specific sites and provided invaluable lessons which were incorporated into the design of the next two satellites, the first of which was launched in September 2020. The impact of the technology was also made clear when our first satellite discovered a massive leak in Central Asia, which was subsequently repaired and resulted in the equivalent of a million cars being removed from the roads for a full year.**

The satellites can be tuned to other GHGs such as CO₂, and air quality gases such as NOₓ and SOₓ by focusing on different frequencies. However, the instruments must be tuned and optimised on the ground before the satellite is launched. In the next 18 months, GHGSat is turning its attention to the possibility of launching satellites focused on monitoring CO₂.

What is required for emissions mitigation in terms of governance and legislation globally? Policy and legislation are central to global efforts for advancing effective action on climate change. Emissions mitigation requires that governments take new approaches to legislation and policy. In 2019 some countries revised their carbon emissions targets; for example, the UK was the first to make legislative commitments to net zero by 2050. Ratifying the Paris Agreement is also a substantive step forward for governments around the world. The niche for GHGSat is in the provision of data that can support these governments as they review policies and legislation.

What measures would you like to see introduced/ ratified at next year’s COP26 meeting? The President of COP26, Alok Sharma, has set out a comprehensive set of priorities, from unleashing finance to prepare for climate change to accelerating zero-carbon with electric cars. The action area of greatest relevance for GHGSat is the COP26 priority for safeguarding ecosystems, particularly ‘keeping carbon out of the atmosphere’.

We believe that better understanding of emissions from industrial facilities helps improve operational decision making and can help governments meet their commitments to the Paris Agreement. The nationally determined contributions (NDCs) capture each country’s commitments to reduce emissions and plans to adapt to the impact of climate change. Every five years Paris Agreement signatories will evaluate national efforts, with successive NDCs informed by a global stocktake. It is within this stocktake that GHGSat measurements can help with validation of emissions’ benchmarks and performance.

* IP Week will be taking place as a three-day virtual event on 23–25 February 2021. See inside front cover for details.
** For more information, visit https://bit.ly/2GnHAC