

THE IMPERATIVE FOR METHANE EMISSIONS MONITORING

As a result of the Ukraine war and the resulting sanctions against Russia, supplies of LNG derived from shale gas in the USA and from conventional natural gas from Africa and the Middle East will substitute Russian pipeline gas in Central Europe. Amidst net-zero ambitions, the role of LNG as a 'bridge' to renewable energy is now seen as essential. However, the use of LNG is not without concern. Methane, which is the main constituent of natural gas, is a potent greenhouse gas. Since LNG will be with us for the coming decades, there must be a relentless focus on eliminating methane emissions from upstream, midstream, and downstream operations.



Gas compression stations are a major source of methane emissions in the oil and gas sector

Comparative greenhouse gas emissions from pipeline gas and LNG

The total greenhouse gas emissions from the LNG supply chain are generally expressed as equivalent tonnes of CO₂ (CO₂e). Taking Germany as an example, supply of Russian pipeline natural gas results in more than 10 kgCO₂e per GJ of energy. For the Norwegian and NL pipeline natural gas this number reduces to 2.8 and 3.5 kgCO₂e per GJ respectively. The reduction is due to the shorter pipeline distances and fewer recompression stations required.

LNG imports from the USA and Qatar have slightly less CO₂e greenhouse gas emissions than Russian pipeline gas. Circa 50% of these emissions are related to liquefaction of the natural gas to LNG. Another major portion (circa 40%) is emitted during LNG shipping and transfers between shore terminals and the tanker. The balance of circa 10% is due to pipeline emissions in the producing country as natural gas flows from wells to liquefaction facilities.

As Russian gas supplies to central Europe reduce and LNG imports increase, the overall climate impact is likely to remain the same. However, there is still the need to reduce methane emissions in these LNG supply chains.

Tackling methane emissions from the oil and gas sectors

According to the European Pollutant Release and Transfer Register (E-PRTR), refineries in Europe that reported data emitted 4,200 tonnes of methane in 2020. This is a tremendous reduction since the peak of 28,400 tonnes that were emitted in 2013 and indicates that the IED and its associated best practices led to significant reductions in methane emissions.

Data from US oil and gas operations reported by the US Department of Energy showed that 41% of methane leaks in 2017 were related to methane compression. This category is the largest source of methane emissions. The same report confirms that the second most significant source, responsible for 35% of methane emissions from the sector, were related to pneumatic controllers at oil and gas processing locations. Focus in these two areas alone will target more than three quarters of methane emissions from within the sector. Static leak detection equipment used around the equipment most prone to leak can help to identify issues that require maintenance and leak reduction.

Gas analysers and gas detection equipment are used extensively on gas pipelines to ensure pipeline integrity. Oxygen sensors are permanently looking for air ingress, which is characteristic of a gas pipeline leak. Flow and pressure measurement are also essential to monitor for leaks. Emergency shut off valves can be installed in the pipeline to minimise emissions in the event of a catastrophic pipeline failure.



Methane emissions from the LNG supply chain must be monitored



Landfill sites are a major source of methane emissions

Flaring is also a source of methane emissions and the recently introduced regulation in the USA (US EPA, 40 CFR § 63.670 - Requirements for flare control devices) will require frequent analysis of flared gases to ensure complete combustion as an indication that methane emissions are being controlled. Similar legislation is in force in South Korea and the EU has drafted a directive for this purpose also.

Further methane emissions reductions required

E-PRTR data for 2020 reports methane emissions from thermal power stations and other combustion installations at 99,300 tonnes. That is 23 times more than the emissions reported from refineries. Furthermore, the E-PRTR data reveals that landfill sites emitted more than 483,000 tonnes of methane in 2020: 115 times more than the European refining sector.

At COP26, the recent United Nations Climate Change Conference in Glasgow, many nations announced their commitment to reduce methane emissions by 30% between now and 2030. The energy sector has some work to do, and other sectors must also make significant changes to reduce their greenhouse gas emissions. Fortunately, highly reliable and sensitive methane gas detection and gas analysis instrumentation exists to provide visibility of the problems that need to be addressed.

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