



The Role of Satellite Measurements in UNEP's Voluntary OGMP 2.0 Programme

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The International Energy Authority's (IEA) Global Methane Tracker 2024 indicates that "methane emissions from the energy sector remained at a near-record high in 2023" and that "large methane emissions events detected by satellites also rose by more than 50% in 2023 compared with 2022" ⁽ⁱ⁾.

The Oil & Gas Methane Partnership 2.0 (OGMP 2.0) is the United Nations Environment Programme's (UNEP) flagship oil and gas reporting and mitigation programme. OGMP 2.0 is a voluntary framework for the oil and gas industry, for the measurement and reporting of methane emissions. "It supports them to better understand their emissions' profiles and, most importantly, use this knowledge to mitigate them in a cost-effective way, focusing the efforts on the most material sources. ⁽ⁱⁱ⁾"

The framework, consisting of five levels of reporting, mandates measurements at source level and site level, with reconciliation between source level and site level measurements to achieve Gold Standard Reporting ⁽ⁱⁱⁱ⁾. "If you can't measure it, you can't fix it ^(iv)." Satellites are a proven means of detection of the largest and most persistent methane sources over large geographic areas, which may otherwise continue unchecked.

The OGMP 2.0 Framework^(v)

The OGMP 2.0 framework focuses on reporting emissions from material assets, that is, the assets that account for 95% of the operator's total emissions. It has been designed to:

- Broaden the understanding of methane emissions across all oil and gas segments;
- Improve the credibility of methane reporting to better inform methane-reducing challenges and best practices through a more robust and consistent reporting framework; and
- Stimulate growth in OGMP 2.0 participation from non-members in the oil and gas industry by providing a roadmap to meet the reporting expectations of the Gold Standard.

The framework places an emphasis on quantification, stating that oil and gas operators should “prioritize increased coverage and direct measurement; reduce uncertainty next” and to reach Gold Standard, they should make more direct measurements, reconcile the data, and be transparent about the methodology used for reporting.

The OGMP 2.0 framework for reporting has five levels:

- Level 1 – Country / Venture / Asset level
- Level 2 – Emissions category level
- Level 3 – Generic emission factors for individual source types
- Level 4 – Specific measurement-based emission factors and activity factors for individual sources
- Level 5 – Specific emission and activity factors for individual sources (Level 4) and site level measurement

Emissions measurements are introduced for sources at Level 4 and sites at Level 5.

Level 4

For Level 4, OGMP guidance ^(vi) states that operators should “prioritize more complete coverage of Level 4 measurements at assets that account for a larger share of operator-level emissions, and that for a given asset, all sources should be ranked based on best available data”. In practice, an operator should “perform Level 4 on sources that account for a minimum of 70% of the methane emissions from each asset with a justification as to why >90% is not reached.” ^(vii) The expectation is that operators perform measurements on sources comprising 90% of emissions at each asset, with 70% being acceptable by exception only (for example, if a source is proposed to be mitigated). The ranking of sources is guided by inventory reporting from Level 3.

The resulting inventory may be biased by omissions, assumptions about source locations, and limitations in the technology employed and experience of the operator. This is why Level 5 and reconciliation are critical, to ensure all sources are accounted for.

Level 5

Level 5 emissions are reported similarly to Level 4, but with the addition of site level measurements (“measurements that characterize site-level emissions distribution for a statistically representative population^(v)”) and reconciliation process.

The reliance on inventory reporting (level 3) and source measurements (level 4) to drive a level 5 measurement strategy and reconciliation, is biased against finding the unexpected. For example, an operator may not make measurements in areas where methane emissions are considered unlikely, or for inaccessible areas such as flares, where combustion efficiency is known, and safeguards are considered reliable.

“The frequency for site-level measurements ... should be dictated using a risk-based approach.” Operations where the data suggests that there are very large discrepancies between the emissions quantified using source-level methods and those resulting from site-level measurement should be candidates for more regular follow-up measurement. No further guidance is provided for sites which aren’t part of Level 4 and Level 5 measurement programmes.

What does OGMP 2.0 say about technology for methane measurement?

Publicly available OGMP 2.0 Technical Guidance Documents (TGD) provide some guidance on measurement of specific sources, for example flares^(viii). Implementation and recommended practice guidance is also provided by independent industry groups. In considering frequency, IOGP guidance^(ix) states that “There is no single answer to this question, which depends on many things, including site configuration, local legislation, operational characteristics, expected emissions patterns that take account of emission source persistency, the type of technology used (for example, facility level versus source level), monitoring of other parameters already in place, historical record of successful reconciliation, and the costs and benefits of technology deployment.”

Where technical guidance doesn’t specify accepted detection and quantification methods, operators are advised to “include methods prescribed by local regulation and methods recognized by international standards. OGMP 2.0 members are encouraged to use detection and quantification technologies which are well suited to the source and operating conditions”^(vi).

It is noted that, in addition to publicly available documentation, OGMP 2.0 members also benefit from the OGMP 2.0 community of practice. This includes experience sharing seminars, technical sessions, a mentoring program and an annual implementation conference during which members share experience and learnings from technology deployment.

In communications in the preparation of this document, it was stated that “Regardless of the measurement technology, OGMP 2.0 recognizes the importance of previously validated, fit for purpose technologies. One key aspect for validation is the empirical determination of detection threshold under real-world conditions (e.g., 90% probability of detection). Data on non-detects (which is different from a confirmation of zero emissions) is critical to a comprehensive assessment of emissions across assets and to the Level 5 reconciliation process.”

What does OGMP 2.0 say about satellites?

The OGMP guidance references the importance of satellite data in the context of the International Methane Emissions Observatory (IMEO). The Methane Alert and Response System (MARS) was launched at COP27 by IMEO, relying on data from satellites to detect very large emissions around the world (greater than 1,000 kg methane per hour).^(x) “International Methane Emissions Observatory is expected to be able to play a role in supporting the identification of asset types/regions (using e.g. satellite data) for which more regular site-level measurement should be conducted.”^(v) IMEO also acknowledges the role of integrating satellite data to characterize regional emissions and provide assurance to the OGMP reporting process.

Whilst the importance of satellite for detecting very large emissions is recognised, the value of satellites which can detect smaller emissions sources of the order of 100 kg methane per hour is not explicitly communicated, with guidance noting that. “...satellite observations from individual point sources can be part of a multi-tiered monitoring approach that provides useful information to the OGMP 2.0 reconciliation process—however, they are insufficient as a single technology for site-level measurements”^(xii).

Publicly available OGMP 2.0 documentation provides limited guidance on the potential of current methane satellites to monitor large areas of operations as part of a tiered programme, in particular those areas not subject to Level 4 and Level 5 measurements, and for the periods between measurement campaigns using other top-down methods.

This contrasts with the recent technology compatibility assessment by MiQ^(xii) which includes guidance for GHGSat DATA.SAT satellite monitoring alongside airborne and ground-based measurement technologies.

Takeaways

The OGMP 2.0 guidance on the use of satellites has proven to be confusing to many operators. In particular, stating that satellites are insufficient as a single technology for site level measurements, has been interpreted by some as implying that satellites

should simply not be used. Satellites are an important tool for operators to consider as part of any methane measurement programme, including under OGMP 2.0. For example, if no measurements are made at a location, there is no possibility of fixing an unreported or previously unknown issue.

From the information published from OGMP 2.0 and related activities it's logical to conclude that:

1. 5% of assets for an oil and gas operator are considered immaterial “because they have a significantly small contribution to total emissions from a given operator,” and are not required to get to Level 4 or 5. i.e. 5% of an operator's assets are not subject to any site-level measurements.
2. Guidance on Level 5, to survey a statistically representative population, using a risk-based approach, will likely result in some operator infrastructure not being subject to any site-level measurement at various points in time.
3. Upon joining the partnership, operators can achieve Gold Standard Pathway during the first two years based on planning, without a measurement programme being conducted at the time. Gold Standard is lost if the plan is not implemented within 3 years for operated assets and 5 years for non-operated assets. Companies at Gold Standard ^(xii) from 2021 are due to report at Level 4 and Level 5 in 2024.

In planning any measurement programme, it is prudent to consider the total methane potential of each site as well as evidence from emissions inventories to account for the possibility of sources not conceived of in design or captured in emissions inventories.

IMEO's Methane Alert and Response System (MARS) is another example of how satellites are being used to support OGMP 2.0 objectives. However, GHGSat does not participate in MARS and this programme currently does not have the capability to identify many smaller sources under 1000 kg/hr. Instead, operators can work with satellite data such as GHGSat provides to identify methane plumes (~ 100 kg/hr). This may be achieved through joint industry collaboration and working directly with GHGSat, equally supporting OGMP 2.0 objectives, but outside of the MARS programme.

In summary, there is an opportunity for OGMP 2.0 member companies to work with GHGSat and other satellite data providers to deploy satellite monitoring as part of a comprehensive programme to safeguard against large and persistent methane sources. Satellite monitoring is consistent with the stated objective of OGMP 2.0, to focus on the most material sources, and will inevitably lead to a reduction in total methane emissions from oil and gas operations worldwide.

References

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