

Understanding Reconciliation and Level 5 Reporting

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Overview

This document has been prepared to support OGMP 2.0 members¹ to conduct reconciliation exercises and develop Level 5 estimates for their assets under the OGMP 2.0 partnership. It builds on two consecutive years of successful Level 5 reporting in the partnership and is intended to act as a blueprint for members to follow, with the aim of accelerating progress and deepening collective understanding of OGMP 2.0 Level 5.

This document is supported by a library of case studies, which provide examples of some of the concepts presented in the document. It is intended that the library will be added to in future years as learnings continue.

Disclaimer: This document should be considered as **training and capacity building material** to support members early in their journey with OGMP 2.0. It does not seek to replace any current guidance and any provisions within should not be viewed as establishing precedent or requirements that are more stringent than any current guidance approved by the Steering Group. **Current, approved guidance has precedent over any examples within this document or the supporting case studies.**

The document, and the case studies referenced within, have been developed by the OGMP 2.0 team, with the support from members of the OGMP 2.0 Implementation Task Force between October 2024 and March 2026. The document and case studies were reviewed by the Mirror Groups prior to finalisation.

1. The Level 4 Inventory

1.1. What is a Level 4 Inventory?

Building on a Level 3 inventory, which estimates emissions from each source present at an asset using generic emission factors, the Level 4 emissions inventory estimates should be specific to the type of equipment/sources in operation at the asset.

The Level 4 inventory involves quantifying the material sources of emissions present at each asset or facility typically using either:

- direct measurement;
- specific measurement-based emission factors;
- emission models, including engineering calculations and process simulations; or
- a combination of the above

It is equally important to ensure the activity data is representative of the asset, rather than generic activity data estimates. The objective of the Level 4 inventory is to gain a deeper understanding of the emissions sources present at each asset and how each contributes to the overall emissions profile of the asset, with a view to identifying and prioritising mitigation actions.

1.2. Conducting an Asset-level Materiality Assessment

Developing a Level 4 inventory at an asset involves quantifying and reporting emission sources at Level 4 if they are material. Material emission sources at an asset are typically assessed to be the sources that collectively account for the majority of total emissions from that asset. The remainder of sources

¹ It should be noted that the document and concepts within mainly apply to upstream and midstream companies. An interim solution for downstream companies is included in the guidance specific to that segment.

may be reported at Level 3. Members should refer to current guidance to confirm acceptable Level 4 coverage at assets.

Table 1-1 below provides an example of an asset-level materiality assessment. At this asset, flaring, venting from tanks, stationary combustion and well casinghead venting are the material sources that are required to reach Level 4.

Table 1-1. Example of asset materiality assessment

Asset sources inventory	Percentage of emissions	Cumulative emissions	Material source (Yes/No)
Flaring	42%	42%	Yes
Venting - Tanks	23%	65%	Yes
Stationary combustion	17%	82%	Yes
Venting - Well casinghead venting	10%	92%	Yes
Venting - Centrifugal compressor shaft seals	5%	97%	No
Fugitives	3%	100%	No
Total	100%	100%	-

1.3. Determining Appropriate Level 4 Methods

As noted above, different approaches are available to quantify Level 4 emissions, and the approach may differ depending on the type of source or asset.

The [OGMP Technical Guidance Documents](#) provide guidance on methods suitable for each source type but are not exhaustive. Alternative methods can be used provided the alternative methods are broadly similar or enhanced in terms of their readiness, level of accuracy, and suitably evidenced in order to enable appropriate justification for their use at the member's assets.

Alternative methods may also be considered to overcome unique implementation feasibility challenges for specific sources present at specific assets. Measurement-based emission factors can be used as part of Level 4 quantification for like systems. As a general rule, events or equipment with similar operational, environmental or design characteristics can be considered as like systems. Variations around some characteristics are acceptable, if it can be demonstrated that these do not significantly affect methane emissions. Such emission factors can also be shared and applied across the partnership where these are deemed to be representative of the reporting member's sources and operations.

Examples of alternative methods that can be used in the right context may include:

- Manufacturer's estimates of emission rates provided they can be justified as representative based on specific operating conditions, and have procedures in place to identify abnormal events.
- Emission factors derived from academic or industry field campaigns that are of high data quality and representative, including for some source methods described in the API Compendium;
- Emission factors and methods approved for regulatory use that are based on representative measurement-based emissions estimates; or
- Source-resolved data provided by site-level technology, provided that the site-level measurement technology has appropriate detection thresholds and the ability to resolve individual sources

OGMP 2.0 is not providing a blanket endorsement of use any calculation method outlined in these estimation protocols or regulations, rather emphasizing that many source estimation methods outlined in these may qualify for use in developing source-level inventory customized to each operator asset portfolio.

Several parameters should be taken into consideration by members to select the appropriate quantification approach, which may include accuracy of the method, ease of site or source access, ease of installation of measurement equipment or frequency of deployment.

1.4. Adopting a Sampling and Extrapolation Approach

Given the large number of emission sources in oil and gas assets, appropriate direct measurement of every source may not be possible. In these situations, measurements can be conducted on a sample of 'representative sources' within each source category and then scaled up to estimate total emissions for the entire population of sources. This scaling process, also referred to as **extrapolation**, allows for estimating emissions both in space (across the population of sources) and in time (frequency and duration of emissions).

Members should refer to current guidance on defining appropriate sampling strategies. Rationale for sampling approaches and measurement frequency should be justified in the implementation plan, as incorrect grouping or unbalanced sampling could lead to misrepresentation and bias in source quantification.

Case Study: Extrapolating Source-level Measurements demonstrates methods for extrapolating measurement emissions from a sample population to an entire source population within an asset.

1.5. Constructing a Level 4 Inventory

A Level 4 inventory quantifies annual emissions from all sources within an asset. It should include appropriately extrapolated (where relevant) annual estimates for all material sources based on source-level quantification, emissions from abnormal conditions, as well as estimations for any emissions below the detection threshold of any measurement technologies used, if applicable (see **Figure 1-1** below). It should also include Level 3 estimates for all non-material sources.

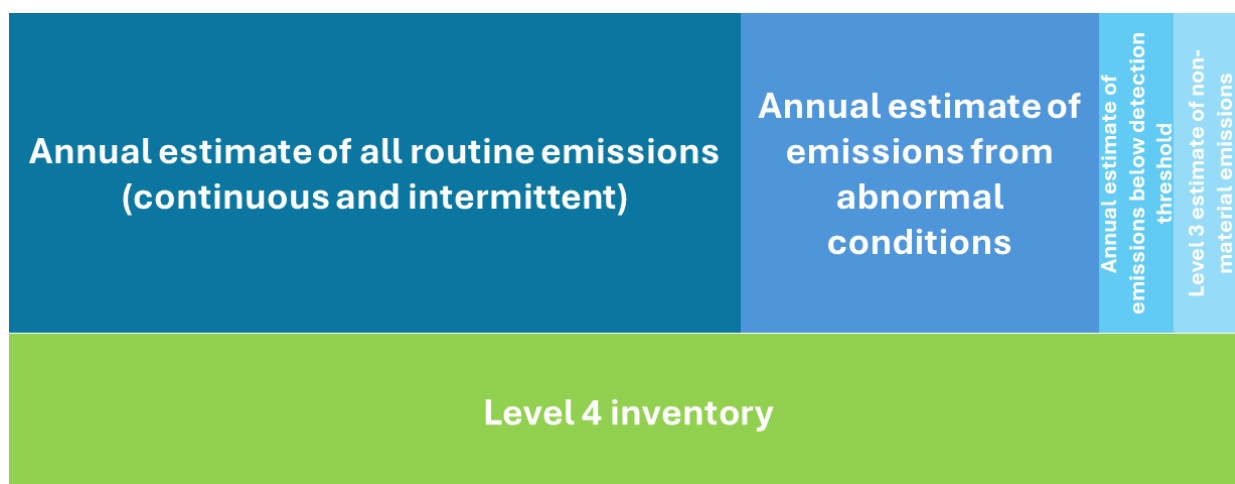


Figure 1-1 Schematic to indicate the key elements of a comprehensive Level 4 inventory

Case Study: Accounting for Emissions Below the Detection Threshold and Abnormal Events provides examples to illustrate how to incorporate abnormal conditions as well as emissions below the detection limit of measurement technologies in the Level 4 inventory.

1.6. Level 4 Inventory Uncertainty

As noted above, Level 4 inventories for a particular asset are comprised of different quantification approaches for each specific source present at the asset. Each of these source-level emission ‘models’ will carry some degree of uncertainty, and the combination of these uncertainties is the overall Level 4 inventory uncertainty.

Uncertainty assessments can be complex, but what is important is that members understand the parameters involved in each source-level emissions model and, consequently, understand how each may contribute to their confidence in the resulting emissions estimates. For example, **Figure 1-2** below illustrates a potential emissions model for flaring. In this case, the member should consider the confidence they have in each of the parameters that feeds into the emissions model and the potential impact each could have on overall emissions from flaring.

Such assessments of source-level uncertainty are important to help members identify potential weaknesses or blind spots in the emissions inventory, which may signal areas for improvement. Areas of uncertainty in source-level approaches are also important to consider during reconciliation and when developing mitigation opportunities.

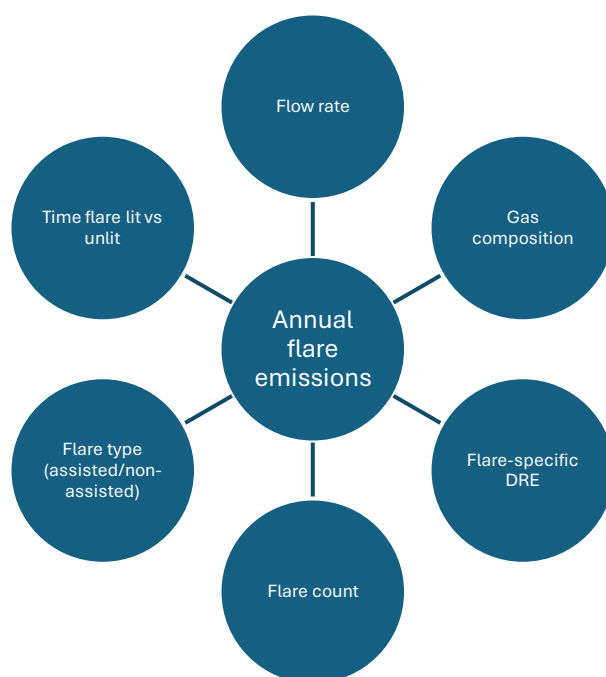


Figure 1-2 Illustration of a simple emissions model for flaring at an asset and the parameters that may be used to inform the estimate, each of which will have a degree of uncertainty.

To inform reconciliation, various approaches can be used. Members may conduct a full uncertainty propagation or a qualitative or a semi-quantitative assessment of their source-level uncertainty to identify and prioritize the key sources, elements, and assumptions that could impact their confidence in the Level 4 estimate used. The main objective of any uncertainty assessment used for reconciliation is to **identify the main parameters or variables that carry the highest uncertainty and potentially have the largest impact on the Level 4 inventory used for reconciliation**. This is particularly important in the case where discrepancies are identified between source- and site-level data during the reconciliation exercise.

Following the reconciliation exercise, a Level 4, source-level uncertainty assessment also provides an important foundation for developing a Level 5 inventory uncertainty when assets are reported at Level 5.

Case Study: A Qualitative Assessment of Level 4 Uncertainty illustrates how an initial qualitative assessment of a source-level inventory could be undertaken.

Note: a case study on *quantitative* approaches to uncertainty will be developed following an update of the Uncertainty and Reconciliation Guidance.

2. Site-level Measurement

2.1. What is Site-level Measurement?

Site-level measurement is a key component for constructing the Level 5 inventory. The purpose of site-level measurements is to employ a measurement method capable of measuring the total emissions from facilities/sites to assess whether the Level 4 inventory is complete and is accurate. This comparison and extraction of learnings occurs during the reconciliation process.

Site level measurement should not be confused with the Level 5 estimate. A site-level measurement refers to a direct measurement of site/facility wide emissions. In contrast, a Level 5 estimate represents the most accurate quantification of emissions for sites/facilities following a reconciliation between the bottom-up (Level 4) inventory and top-down, site-level measurements. For more information on reconciliation and the Level 5 estimate, see Sections 3 and 4 below.

The two major components of the site-level measurement campaign are **site-level measurement technology selection**, and the **measurement/sampling campaign design**. These elements will have implications for the reconciliation analysis (see Section 3 below). Being technology agnostic, OGMP 2.0 does not impose guidance on technology selection nor how to conduct site-level measurements. Members should provide sufficient documentation on measurement activities to justify the choice of method and sampling to the OGMP 2.0 team.

2.2. Developing a Site-level Measurement Strategy

2.2.1. Selecting Appropriate Technology

While a range of technologies is available for conducting site-level measurements, not all are suitable for every facility type or operational context.

When selecting site level technology, there are important factors that need to be considered, for example:

- **Measurement range:** the selected technology should be capable of measuring the range of emissions of the facility under normal operating conditions. In other words, the minimum detection threshold of the site-level technology should be sufficiently low to detect the material source-level emissions.
- **Technology validation:** site-level technologies should be validated through controlled release testing demonstrating both detection threshold and quantification performance. Such validations may be conducted by the vendor, during academic studies or by the member themselves. When such test results are publicly available, they enhance confidence in the technology's expected performance and provide transparency regarding its capabilities and limitations. Controlled-release data must be assessed with consideration for the environmental conditions and facility-specific characteristics present during testing, which may not fully reflect those expected during site-level deployment.
- **Technology capabilities in the site environment:** It is essential to ensure that the selected technology is compatible with the specific characteristics of the site. Certain technologies may require unobstructed line of sight, while others may be unable to detect methane emissions in the presence of clouds, dense vegetation, or over water.

- **Weather conditions:** certain technologies rely on mass balance or inverse modelling approaches, which require measurements of wind speed and direction to convert observed methane concentrations into emission flow rates. In such cases, obtaining accurate, site-specific wind data is critical to ensure the reliability and precision of the resulting methane quantification. As noted in reference (iii) below, *“without high-quality wind information, even the most advanced methane measurement technologies face inherent limitations in their ability to provide accurate emission estimates”*. In addition, some technologies are also vulnerable to wind speed and direction which can place limitation on their effectiveness.

For further information on appropriate site-level technologies and their opportunities and limitations, the following references may be useful:

- [Controlled release testing of multiple European methane measurement technologies](#)
- [Technological Maturity of Aircraft-Based Methane Sensing for Greenhouse Gas Mitigation](#)
- [Multiscale Measurements of Greenhouse gas Emissions at U.S. Natural Gas Liquefaction Terminals](#)
- [Assessment of current methane emission quantification techniques for natural gas midstream applications](#)
- [IOGP methane detection and quantification filtering tool](#)

2.2.2. Defining the Sampling Approach

In cases where a company operates a large portfolio of similar facilities (for example, such as many near-identical onshore well pads or offshore unmanned well-head platforms), the company, may opt for a sampling approach by surveying a subset of representative units or facilities. A similar sampling approach used for sources (see section 1.4 above) can be adopted, for example:

- Group sites/facilities into ‘like system’ categories.
- Define an adequate sample within each category using criteria such as population size in each category, complexity, emissions distribution, emissions frequency, materiality, and technical time and resources constraints.
- Consider how many measurements per year are necessary to characterize emissions over the course of a year.

Members should refer to current guidance on sampling to support development of their sampling strategy.

2.2.3. Selecting a Measurement Frequency

The frequency for site-level measurements should be dictated using a risk-based approach taking into account the materiality at portfolio level, temporal variability and sources of emissions as they are understood for Level 4 reporting based on the operator judgement.

Based on current understanding and interpretation of guidance, members have typically been conducting site-level measurements on an annual basis as a minimum, with more frequent measurements conducted in some cases. Members should refer to current guidance when deciding on a measurement frequency.

Case Study: Designing a Site-level Measurement Strategy for an Offshore Platform and Case Study: Designing a Site-level Measurement Strategy for a Large, Varied Upstream Asset provide some examples to help members think through the design of their site-level measurement campaigns.

2.3. Site-level Measurement Uncertainty

The site-level measurement uncertainty is often taken as the uncertainty indicated by the vendor for the measurement technology. While this claim is generally accepted as a reasonable starting point, members should keep in mind that this uncertainty is often derived from controlled release or

laboratory tests that may not be fully representative of the actual site-level conditions. Beyond the uncertainty specified by the manufacturer, members are encouraged to exercise engineering judgment to assess whether additional parameters may have influenced the site-level measurement uncertainty, such as:

- **Weather conditions, wind speed and direction at the time of the measurements:** significant variability in wind speed or changing wind direction may impair the measurement and increase its uncertainty. Members should work with their vendors to establish wind conditions during the time of the site-level measurements.
- **Ability of the site-level technology to capture all the emissions:** for example, the presence of physical barriers (elevation, trees) or emissions occurring in inaccessible zones.
- **Number of the measurements undertaken:** more than one measurement of the same facility will reduce measurement uncertainty.

The quantified site-level uncertainty is an important parameter to inform the reconciliation exercise, as detailed in the following section.

3. Reconciliation

3.1. What is Reconciliation?

Reconciliation is the process of comparing the Level 4, source-level (bottom up) inventory with the results from independent site-level (top-down) measurements over similar temporal and spatial scales. The objective of comparing those two sets of data is to ensure the methane source inventory is complete and that all material sources of emissions have been appropriately captured and quantified.

The reconciliation exercise involves firstly **conducting an investigation** to compare the two datasets and, ultimately, confirming if there is reasonable agreement or a potential discrepancy, from which important learnings and improvement opportunities can be identified to either improve the inventory or inform mitigation.

Discrepancies between the Level 4 inventory and site-level measurements are common and should be expected, particularly when a member is early in their OGMP 2.0 journey. While the purpose of reconciliation is ultimately to have these two datasets converge, its primary value lies in using both datasets to deepen understanding of the emissions present at the asset through investigation and analysis during the reconciliation exercise. This deeper insight informs more accurate reporting and, ultimately, helps identify meaningful opportunities for mitigation.

Where there is no reasonable agreement between the Level 4 and site-level measurements, discrepancies must be investigated and understood. Insights and learnings gained from the investigation can inform adjustment to the emissions inventory and help refine future source- and site-level measurement campaigns where needed.

3.2. Identifying the Relevant Scale of Reconciliation

When comparing the Level 4 inventory with site-level measurements, it is crucial to ensure that the comparison is made at a relevant scale, in both space and time, and across relevant sources. For example, if site-level measurements do not capture all methane sources – such as emissions below the detection threshold or intermittent sources not emitting at the time of the survey – these missing sources must either be incorporated into the site-level measurement data or excluded from both site-level and source-level estimates for a fair comparison. Any omitted emissions should then be reintegrated into the final reporting to create a comprehensive Level 5 estimate.

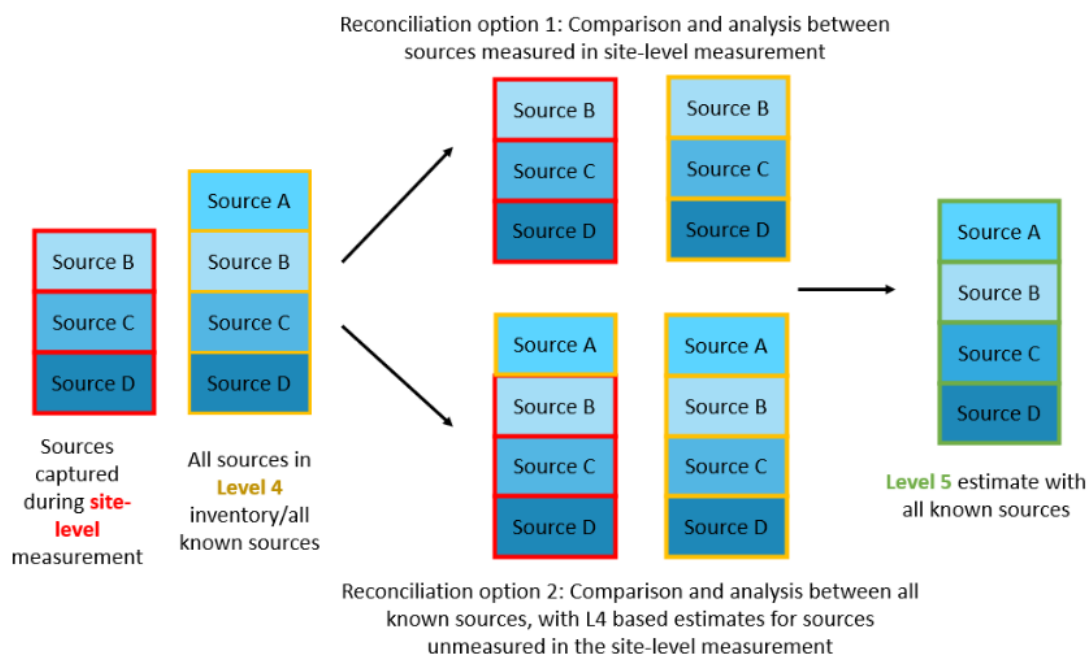


Figure 3-1. Simple schematic showing two possible approaches to ensure a fair comparison for the purpose of reconciliation

For example, in **Figure 3-1** above, the member should seek to understand which sources were included in the site-level measurement and any reasons why Source A may have not been captured by the site-level technology (i.e. intermittency of emissions, plume rise, emissions below detection threshold, etc). This source would still need to be incorporated into the Level 5 estimate.

Failing to consider the relevant scale of reconciliation can lead to inaccurate and incomplete emissions estimates. For instance, scaling site-level measurements to an annual timeframe without capturing the temporal variability of emissions can result in misleading conclusions. If a site operates in multiple modes but only one mode is measured, the reconciliation should focus on the measured mode rather than extrapolating to the annual scale, as emissions may differ significantly between modes. By aligning the scale of reconciliation with the operational context, operators can address variability in emissions and improve the accuracy and reliability of final estimates.

3.2.1. Temporal scale of reconciliation: instantaneous reconciliation

When source-level emissions data are available with a high temporal granularity, and site-level measurements are not frequently conducted (for example, once per year), members may opt for **instantaneous reconciliation**. This reconciliation should be carried out **for the time period when the site-level measurement occurs** in order to ensure reasonable comparison.

Instantaneous reconciliation requires members to have a detailed understanding of their operations, and resulting Level 4 inventory, at the time of the site-level measurement. While interpolated yearly emission rates may be acceptable for steady sources with low variability, it is preferable to use real-time data recorded during the site-level measurement period – for example, from flowmeters and in-line chromatographs – to ensure more accurate reconciliation. It is also key to discuss with the operational teams to identify the presence of any punctual or intermittent source at the time of the survey (such as the shutdowns, decompressions, start-ups of turbomachines, maintenance operations, annulus pressure decompression, etc.).

The reconciliation should also be conducted for each individual site-level measurement, regardless of whether it covers the whole facility or just a subset of the facility. In some cases, members have found

it beneficial to divide larger facilities up into distinct measurement areas, or reconciliation unit², separately. This approach helps identify discrepancies within specific subsets within the facility and prevents compensating errors when aggregating measurements to derive a facility-wide site-level estimate.

3.2.2. Temporal scale of reconciliation: annualized reconciliation

When site-level data is gathered through multiple measurement campaigns spanning a large asset or basin, or when the Level 4 inventory lacks sufficient temporal granularity, the member may choose to perform **an annualized reconciliation**. This approach involves averaging the measured site-level emissions and comparing the result against the annual Level 4 inventory for the corresponding asset or basin.

If the site-level technology allows segregation of the different sources, the reconciliation can also be performed for each individual source, comparing the average site-level measurement for a source to the annual Level 4 estimation for that source.

Figure 3-2 below distinguishes between two different temporal approaches to reconciliation. The choice of the temporal scale will depend on the quality of the source-level data as well as the frequency and coverage of site-level measurement. These two approaches are not necessarily exclusive, and members may decide to adopt an approach that combines elements of each.

² It is common for large assets to be subdivided into segments/areas for the purposes of site-level measurement and reconciliation. At smaller facilities, and with certain site level technologies, it may be possible to reconcile individual sources.

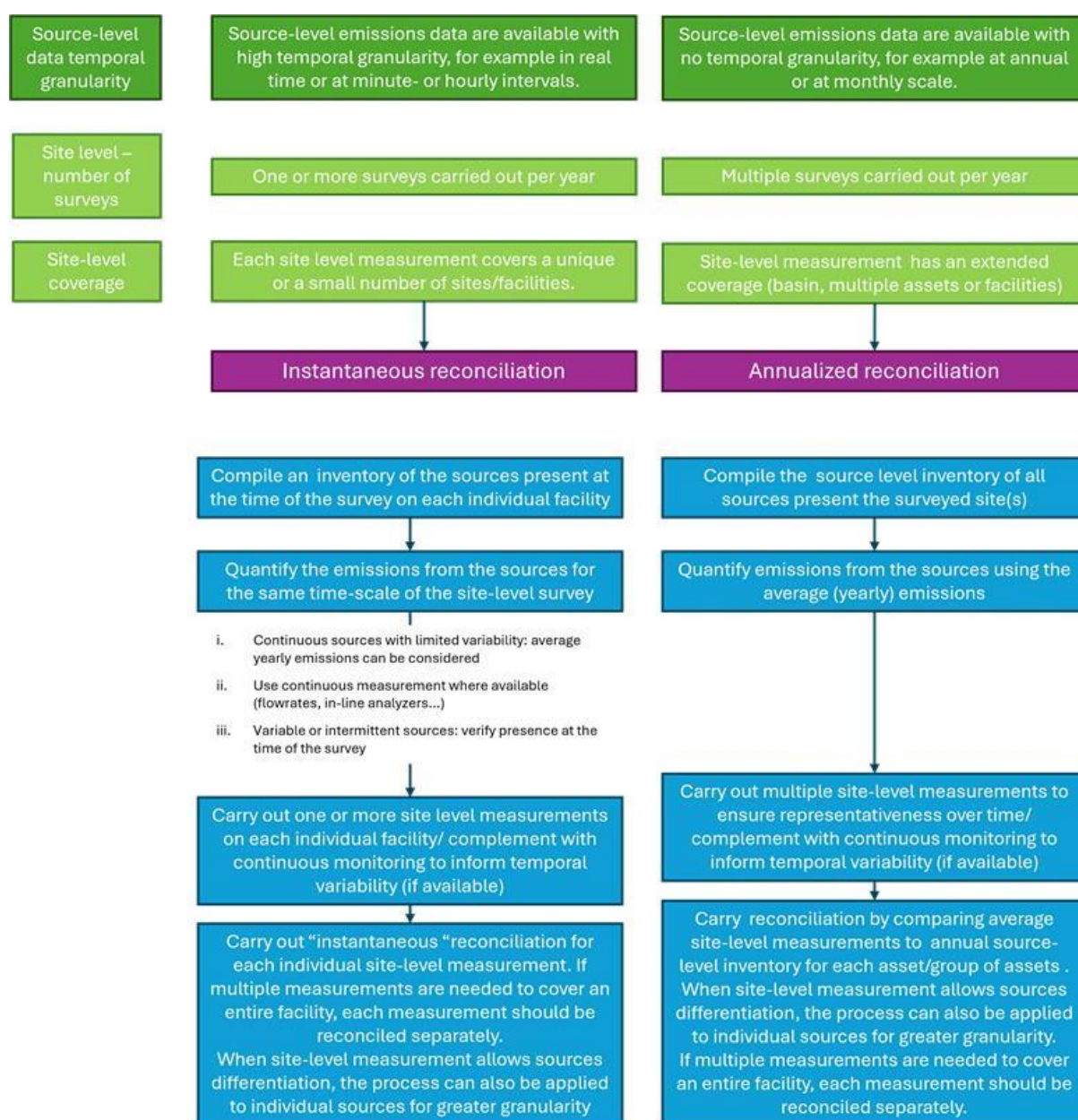


Figure 3-2 Temporal Scales of Reconciliation

3.3. Potential Reconciliation Outcomes

Once the appropriate scale of reconciliation is chosen and the Level 4, source-level estimates are compared to site-level estimates, the following major outcomes can emerge: the two estimates may have reasonable agreement, show small differences or exhibit large discrepancies.

The reconciliation of these estimates is an investigative process aimed at understanding the root causes of these outcomes (including the potential for compensating errors, methodological biases, or potential omissions/improvement opportunities) and assessing their significance. The goal of the reconciliation process is to identify and correct significant errors in quantification, understand the factors that drive the emission profile and ultimately to identify significant emission mitigation opportunities. It is important to note that discrepancies may manifest not only in quantitative terms, such as emission magnitudes, but also qualitatively—for instance, in the nature, categorization, or attribution of sources.

3.3.1. Reasonable Agreement (Pathway 1)

Pathway 1 is achieved when there is a **reasonable agreement** between the sum-of-source estimates (Level 4) and site level measurements at comparable spatial and temporal scales.

When site-level uncertainty has been quantified for the purposes of reconciliation, reasonable agreement is confirmed when the sum-of-source central estimate falls within the bands of the site-level measurement uncertainty (see below) or, conversely, when source-level uncertainty has been quantified, the central estimate of the site-level measurement falls within the source-level uncertainty bands.

If there is reasonable agreement between the Level 4 inventory and site-level measurements, and no qualitative or quantitative discrepancies are identified during the reconciliation analysis (see **Figure 3-3** below), the reconciliation is deemed successful. **This corresponds to OGMP 2.0 Reconciliation Pathway 1.**

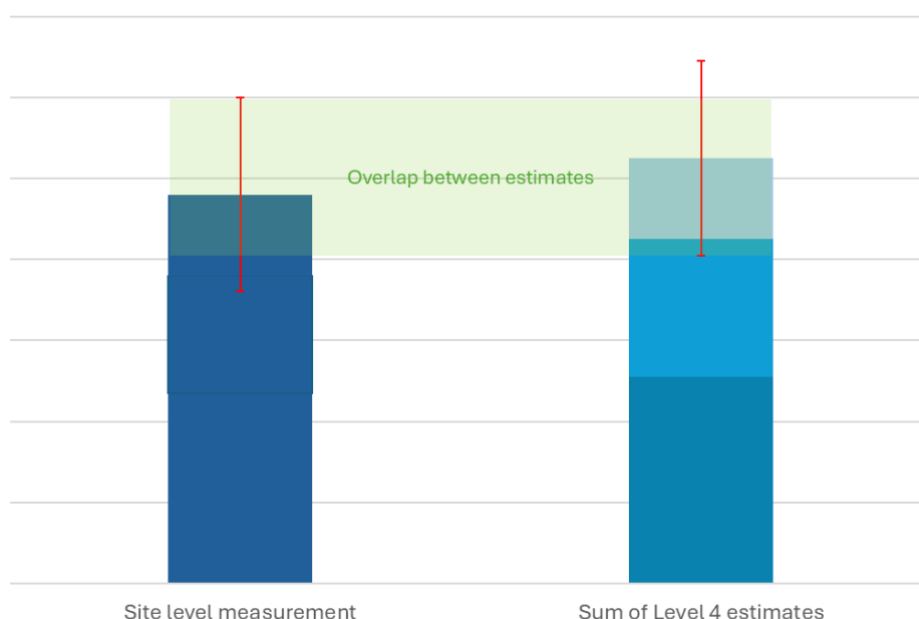


Figure 3-3. Example of Pathway 1 successful reconciliation

Where there is reasonable agreement between the Level 4 inventory and site-level measurements, it is important to ensure that the agreement is not due to **compensating errors**, which can occur if the scale of reconciliation is not properly chosen, or when offsetting errors in source quantification mask inaccuracies. For example, an overestimation in one reconciliation unit (which could be a specific source or subset of an asset that has been sampled individually) could offset an underestimation of emissions in another, masking underlying discrepancies (see **Figure 3-4** below). Understanding the distribution of source- and site-level emissions at each reconciliation unit is important to enable members to identify and prioritise potential mitigation opportunities.

Where possible, a careful root cause analysis of the contributing reconciliation units and operating conditions should be conducted to confirm whether the agreement is truly representative or simply coincidental, and to understand the potential causes of discrepancies when they occur. If discrepancies are confirmed, the reconciliation should be treated as either Pathway 2 (if the discrepancies can be explained, see Section 3.3.2) or Pathway 3 (if they cannot be explained, see Section 3.3.3).

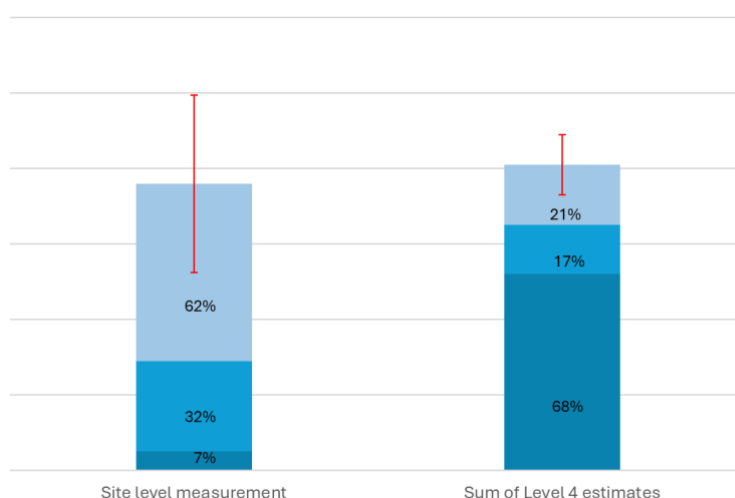


Figure 3-4. Example of reconciliation overlap with the sum of the central Level 4 estimate falling between the site-level measurement uncertainty band. However, there are significant discrepancies in emissions distribution between reconciliation units (could be an individual source or a segment of the asset that has been sampled individually).

Case Study: Checking for Compensating Errors provides some examples of how members can make the best use of available data to check for compensating errors in the case where site-level technology does not provide source-level resolution.

In the case where uncertainties are large and the absolute difference in estimates is substantial, (see **Figure 3-5** below), the reconciliation may not be considered successful under Pathway 1, and this should be investigated as a potential discrepancy in the first instance (see Section 3.3.2 below).

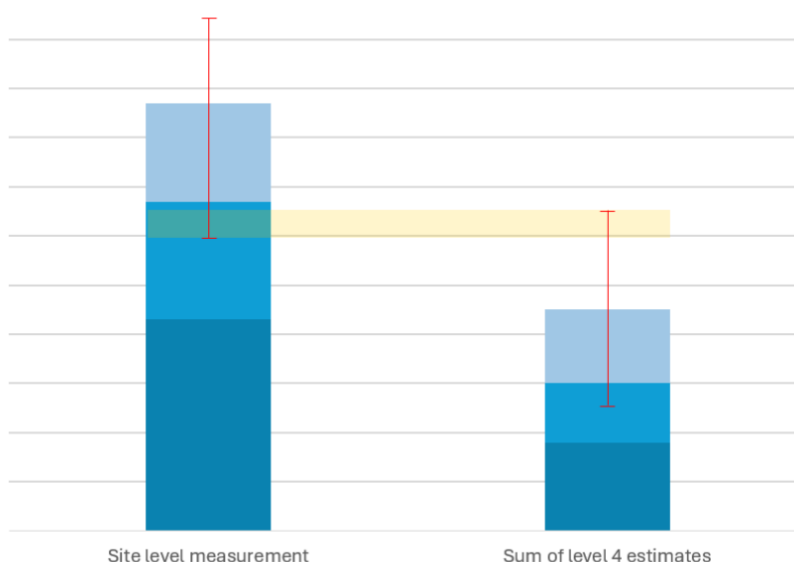


Figure 3-5. Example of a reconciliation where the 'overlap' between Level 4 and site level measurements is driven by substantial measurement uncertainty. In this case, the reconciliation may not be considered successful under Pathway 1 and this should be investigated as a potential discrepancy in the first instance.

3.3.2. Discrepancies (Pathway 2)

If there are discrepancies between the Level 4 estimate and the site-level measurement results, it is important that the member seeks to understand and investigate such discrepancies. A non-exhaustive list of possible causes for discrepancies is presented **Table 3-1** below.

Table 3-1 Examples of possible causes of discrepancy between the Level 4 inventory and site-level measurements

Cause of discrepancy related to the Level 4 inventory	Cause of discrepancy related to site-level measurement	Cause of discrepancy related to sampling/grouping strategies, or to measurement extrapolation
- Missing emission source: emission source overlooked during the inventory, new leak, passing valve... - Operational event or upset, such as an unlit or malfunctioning flare, - Maintenance event: equipment being started, stopped or purged during the event. - Errors in emissions quantification approach, for example caused by wrong input parameters such as gas composition.	- Unsuitable technology selection – e.g. detection threshold too high or not suitable for environmental conditions at asset - Emissions not properly measured (plume not entirely captured, impact of environmental conditions on the measurement...) - Inaccurate input data such as wind speed and direction, affecting final quantification. - Upwind contamination from outside the fenceline - Incorrect aggregation of measurements for individual reconciliation units.	- Sample selected for source- or site-level measurement not representative of the entire population. - High variability of emissions leading to misrepresentation of the source- or site-level emissions. - Wrong assumptions of spatial or temporal variability when extrapolating source- or site-level measurement.

If the key sources of discrepancies are identified, the next step is to quantify them where possible. For example, if source-level methods are found to be underestimating emissions, additional efforts should be undertaken to quantify the observed discrepancy. Once quantified, the source-level estimate and subsequent Level 4 inventory should be updated accordingly.

There are several possible outcomes as a result of investigations into discrepancies:

- The member is able to identify, understand and quantify the source of the discrepancy and is able to update the Level 4 inventory to account for the discrepancy within the same reporting year.
- The member understands the source of the discrepancy but is unable to update the Level 4 inventory within the same reporting year. However, the member has sufficient understanding to derive a Level 5 estimate based on a combination of source-level and site-level measurements, and establishes an action plan to improve the Level 4 inventory the following year in light of these insights.
- The member is able to identify and understand the discrepancy and has a higher confidence in the site-level measurement results than the source-level estimate (for example, because the selected technology has a sufficiently low detection threshold, measurements are frequent and cover a large sample size and repeatedly show the same results) and establishes an action plan to improve its Level 4 inventory the following year.
- Conversely, if the site-level technology was not able to capture all of the site-level emissions (for example, technology failed to capture known emission sources or a plume not fully captured due to flight height restrictions), but nonetheless provided assurance that nothing significant was missing from the Level 4 inventory, the member may have higher confidence in their Level 4 inventory and identify an action plan to improve the site-level measurement approach, where possible, the following year.

All these above outcomes are deemed successful and correspond to OGMP 2.0 Reconciliation Pathway 2. The member has developed a deeper understanding of emissions at the asset and has either already updated its source-level (Level 4) inventory accordingly or has identified actions to close

the discrepancy in future years, either through improvements to the Level 4 approach or through improvements to the site-level measurement approach. The member is also able to derive a Level 5 estimate based on either the Level 4 inventory, the site-level measurements or a combination of both (see Section 4.3 below). It is recognised that updates to Level 4 approaches may take time and there is no expectation that such updates are completed within the same reporting year as the reconciliation in order to report the asset at Level 5. **What is important is that the member has identified and committed to an action plan to close the discrepancy in future.**

3.3.3. Unresolved Discrepancies (Pathway 3)

In some cases, discrepancies may remain unresolved, for example, if operational constraints prevent further investigation, or if the reason is simply unknown.

While such cases do not allow for full assessment and verification of the source-level inventory, and the asset remains at Level 4, documenting these discrepancies and their potential causes is still valuable. This documentation can inform future measurement campaigns and ensure that reconciliation insights contribute to the ongoing refinement of emissions inventories.

If an asset remains at Level 4 but there is documented evidence of the reconciliation exercise and explanation as to why it was not possible to identify or understand the source of the discrepancy, a company may still achieve Gold Standard Reporting. **This corresponds to OGMP 2.0 Reconciliation Pathway 3.**

3.4. Reconciliation Summary

The main objective of the reconciliation exercise is to compare the Level 4, source-level inventory with corresponding site-level measurements to confirm that the inventory is complete and provides a robust estimate of emissions at the asset. Where discrepancies arise, the member should investigate such discrepancies, seek to quantify any missing or mis-reported emissions in the Level 4 inventory and develop an action plan to close such discrepancies in the future.

It is important to note that understanding uncertainty of both source and site-level estimates plays an important role in reconciliation, as it shapes the interpretation of discrepancies and informs decisions on whether differences are meaningful. A well-executed reconciliation process, accounting for uncertainty, strengthens trust in emission estimates and supports credible, data-driven mitigation strategies.

Lastly, reconciliation is not a one-time comparison but a continuous improvement process. The Level 5 estimate derived from reconciliation is expected to evolve as understanding of emissions, measurement strategies, and technological advances emerge. Each iteration of reconciliation strengthens the reliability of emission estimates and enhances the methodologies used to assess and quantify emissions over time.

The following case studies illustrate various reconciliation outcomes corresponding to Pathways 1, 2 and 3:

- **Case Study: Reconciliation at an Upstream Asset (Pathway 1 Example)**
- **Case Study: Reconciliation at an Onshore Upstream Asset (Pathway 2 Example)**
- **Case Study: Reconciliation at a Midstream Asset (Pathway 2 Example)**
- **Case Study: Reconciliation at an Underground Storage Asset (Pathway 2 Example)**
- **Case Study: Reconciliation at a Midstream Asset (Pathway 3 Example)**

4. The Level 5 Estimate

4.1. What is a Level 5 Estimate?

The Level 5 estimate is defined as the **best estimate of annual emissions** from an asset, following the reconciliation exercise outlined in Section 3 above. The Level 5 estimate must include ALL sources, even if they were not present/included in the reconciliation exercise, such as:

- Sources below the detection threshold;
- Intermittent sources that were not present during the site-level measurement campaign, but are included in the Level 4 inventory;
- Abnormal or non-routine emissions that were not present during the site-level measurement campaign but are included in the level 4 inventory; and
- Any new sources found during the site-level measurement campaign.

As noted in Section 2.1 above, the Level 5 estimate should not be confused with the results from the site-level measurement.

4.2. Building a Level 5 Estimate for Pathway 1

When there is reasonable agreement between Level 4 inventory and site-level measurements, and the member has confidence that the Level 4 inventory is complete and adequately represents emissions from the facility, the member can report the sum of the Level 4 inventory as the Level 5 estimate. The OGMP 2.0 team refers to this as 'Level 4 reported as Level 5'.

However, members following reconciliation Pathway 1 may also generate a Level 5 estimate based on a combination of both their source- and site-level information, or an annual estimate of emissions using site-level information alone. The Level 5 estimate is the member's best estimate of emissions, and it is for members to decide and justify which value to report.

4.3. Building a Level 5 Estimate for Pathway 2

When there are discrepancies between the Level 4 and site-level measurements, and the member can quantify such discrepancies, it is important that these learnings are captured into the Level 5 estimate for the asset.

Table 4-1 below shows the four possible outcomes from a Pathway 2 reconciliation effort discussed in Section 3.3.2 above, and how the Level 5 estimate could be developed under each.

Table 4-1 Potential Level 5 estimate Approaches for Pathway 2 outcomes

Pathway 2 Outcome	Potential Level 5 Estimate
a) The member is able to identify, understand and quantify the source of the discrepancy and is able to update the Level 4 inventory to account for the discrepancy.	The updated Level 4 inventory can be reported as the Level 5 estimate
b) The member understands the source of the discrepancy but is unable to update the Level 4 inventory within the same reporting year. However, the member has sufficient understanding to derive a Level 5 estimate based on a combination of source-level and site-level measurements, and establishes an action plan to improve the Level 4 inventory the following year in light of these insights.	The member can account for the quantified discrepancy in the Level 5 estimate, i.e. $L5 = L4 + L4_{mod}$ or $L5 = L4 + \text{annual extrapolation of difference between site-level and } L4$
c) The member has a higher confidence in the site-level measurement results and establishes an action plan to improve its Level 4 inventory, which may include using the site-level data to inform a measurement-based approach for detected sources.	$\text{Level 5} = \text{annual extrapolation of site-level measurement}$
d) Site-level measurements may not have captured all of the site-level emissions but nonetheless provided assurance that nothing significant was missing from the Level 4 inventory, the member may have higher	$\text{Level 4 reported as Level 5}$

confidence in their Level 4 inventory and identify an action plan to improve the site-level measurement approach.

The important factor is that the learnings from the reconciliation exercise are appropriately accounted for in the Level 5 estimate. In cases where there are discrepancies, members have successfully used a combination of both the Level 4 inventory and emissions quantified during the site-level measurements to generate the Level 5 estimate.

4.4. Level 5 Inventory Uncertainty

As noted in Section 1.6 above, when considering the overall uncertainty of an emissions inventory, it is important to consider all the parameters that feed into the emission models for each individual source within the inventory. This is no different when assets are reported at Level 5, and members can use their Level 4 inventory uncertainty assessment as a foundation to develop their Level 5 inventory uncertainty, adding in the relevant learnings from the reconciliation exercise.

Quantification of Level 5 uncertainty is important as it defines the accuracy of the verified methane inventory for a given asset. Regulators and buyers may use this uncertainty to assess and compare the performance and credibility of producers. As an initial approach to Level 5 inventory uncertainty, and in cases where legal or regulatory frameworks do not mandate a quantitative assessment, members may adopt a *qualitative* evaluation of Level 5 uncertainty, which can subsequently serve as the basis for deriving a quantitative assessment in future iterations.

Building on the different approaches to construct a Level 5 inventory, **Table 4-2** below suggests how to derive the associated Level 5 uncertainty.

Table 4-2 Approaches to derive Level 5 uncertainty

Level 5 estimate	Associated Uncertainty
The updated Level 4 inventory is reported as the Level 5 estimate	The updated Level 4 uncertainty (either qualitative or quantitative) can be used as Level 5 uncertainty.
The member can account for the quantified discrepancy in the Level 5 estimate, i.e. $L5 = L4 + L4_{mod}$ or $L5 = L4 + \text{annual extrapolation of difference between site-level and L4}$ <i>Level 5 = annual extrapolation of site-level measurement</i>	Quantitative Level 5 uncertainty can be determined by combining the Level 4 uncertainty with the uncertainty of the correction brought to the source-level inventory. The site-level measurement uncertainty can be combined to the uncertainty of the temporal extrapolation to derive a Level 5 uncertainty.
<i>Level 5 = Level 4 inventory</i>	The Level 4 uncertainty (either qualitative or quantitative) can be used as Level 5 uncertainty

5. The OGMP 2.0 Reporting & Review Process

5.1. What are the OGMP 2.0 Reporting Requirements?

Under the OGMP 2.0 reporting framework, members are required to:

- Submit emissions data for all in scope assets using the OGMP 2.0 excel-based reporting templates; and
- Submit an implementation plan detailing the asset-specific approach that has been or will be adopted to achieve Level 4 and Level 5 reporting for all in scope assets.

In order to aid the OGMP 2.0 technical review of assets reported at Level 4 and Level 5, the documentation submitted should provide a sufficient level of detail to justify the methods adopted to achieve Level 4, the details of and results from the site level measurement campaigns, the results of the reconciliation exercise and the justification for the Level 5 estimate.

5.2. Documentation to Support Level 4 and Level 5 Reporting

To support assets reported at Level 4 and Level 5, companies should provide information documenting:

1. the quantification methodologies and technologies used to generate the Level 4 inventory for material sources, including reference to technology verification where available and applicable;
2. the quantification methodologies and technologies used for site-level measurement, including reference to documentation related to technology verification where available;
3. the sampling approach used for both Level 4 and site-level measurements, if applicable;
4. details of and the results from the site-level measurement campaign(s);
5. details of and the results of the reconciliation exercise, either in tabular or diagrammatic form;
6. a discussion on the learnings and findings from the reconciliation exercise and the Pathway conclusion;
7. any identified future actions to improve either the Level 4 inventory or the site-level measurement approach; and
8. the resulting Level 5 estimate, including a justification for the Level 5 estimate.

Members are also encouraged to share any mitigation actions or opportunities that have been identified or implemented following the Level 4 and Level 5 activities.

To support members with reporting, templates for the Implementation Plan and 'one-pagers' to support when reporting assets at Level 5 are available to members on the OGMP 2.0 member portal. **Members are encouraged to use these templates to submit their information to OGMP 2.0.**

Members are kindly reminded that the level of information submitted does not need to be highly detailed, but needs to be sufficient to enable the OGMP 2.0 team to assess whether the methods used to quantify sources are sufficiently specific to qualify as Level 4, whether the site-level measurement method is appropriate and has a reasonable detection threshold, and whether the sampling strategies and quantification approaches (Level 4 or Level 5) cover a sufficient percentage of emissions. It is also important members present the outcome of their reconciliation exercise, convey a good understanding of emissions from their assets following the reconciliation exercise, have a strong justification for their Level 5 estimate and have a forward plan to close any discrepancies.

5.3. The OGMP 2.0 Review Process

The OGMP 2.0 team conducts a detailed review of individual company submissions each year and prepares company feedback in accordance with a detailed reporting checklist for the current reporting year. The latest reporting checklist is available to members via the OGMP 2.0 members portal. In some cases, members may receive initial feedback with some questions that require clarification before the OGMP 2.0 team finalizes its review.

The OGMP 2.0 review is based on a data quality assurance process following four key steps.

1. Data Quality:

The OGMP 2.0 team performs initial data quality checks to ensure that company-reported data is complete, consistent and conforms with OGMP 2.0 reporting requirements. This includes:

- Completeness, for example comparing company asset list with external databases to ensure it includes all operated and non-operated assets, ensuring no missing information for any asset or source category and reviewing any excluded assets and rationale for exclusion.

- Consistency, for example, ensuring correct asset type and definition have been used, ensuring consistent source categorisation across assets and companies and ensuring correct and consistent units of measure (e.g. tonnes, kg).
- Conformity, for example, ensuring robust assessment of materiality at both portfolio and asset level, ensuring all assets reported at L4 have at a sufficient portion of emissions sources at L4, with the rest at L3 as a minimum, and ensuring all assets reported at L5 have associated uncertainties.

2. Data Analytics:

The OGMP 2.0 team analyses reported data across the partnership to establish patterns and trends and identify potential anomalies. This includes:

- Year on year analysis by member, asset and source category to identify trends and seek explanation for such trends in the submitted documentation and bilateral engagements
- Evolution of source- and asset-level emissions as members move through OGMP 2.0 reporting levels to understand changes moving from estimated to empirical data
- Benchmarking by asset type, segment and company to identify potential outliers and facilitate engagement with companies regarding emissions performance

3. Data Integration:

The OGMP 2.0 team cross-references company data with independent databases. For example, data from IMEO's methane science studies and the Methane Alert and Response (MARS) program can be used to verify completeness and robustness of the methane emissions data submitted by members. In specific cases, IMEO may commission focused science studies or measurements to assess a specific basin, for example if there are gaps in knowledge and understanding of emissions across the basin.

4. Implementation Review:

The OGMP 2.0 team conducts a detailed review of the company's submitted implementation plan and documentation to support assets reported at Level 4 and Level 5, including quantification methodologies and technologies, and reconciliation.

The OGMP 2.0 team meets regularly during the review process to discuss specific company cases and ensure consistency of approach between members. Where further information is needed to support the review, the OGMP 2.0 team may seek to resolve questions with members via email, via initial feedback identifying gaps, via a bilateral meeting or a combination.

Ultimately, members are provided with detailed feedback on their Level 4 and Level 5 approaches, including whether the OGMP 2.0 team is able to recognise the assets at Level 4 and/or Level 5. Where necessary, the OGMP 2.0 team will also suggest opportunities for improvement to support members to refine their approaches in future years.

In many cases, the OGMP 2.0 team meets regularly with members on a bilateral basis throughout the year to discuss their implementation plans, learn about their progress and provide advice and guidance.

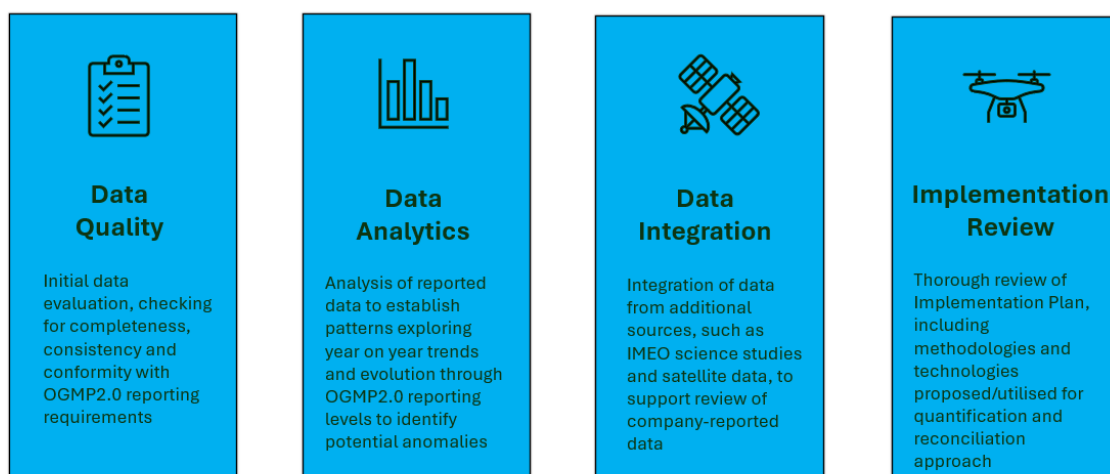


Figure 5-1 The four pillars of the OGMP review process