OGMP Technical Guidance Document – Level 1 and 2

Level 1

Brief description of reporting level

Country/venture/asset level reporting is the lowest reporting level for the OGMP 2.0. Reporting at Level 1 is reserved for operations where a company has a very limited information on the operations and methane emissions situation. This reporting level will typically be applicable for assets for which a company has not undertaken any methane emission source mapping or survey activities or where information from the operator is limited. Reporting at this level involves the reporting of a single consolidated emission number (or a limited number of emission numbers) representing the emissions from a reporting unit. Within Level 1, emissions can be reported as a single consolidated number either for one asset or for a group of assets within a country or region. Emissions reported at this level are not allocated to individual categories or source types.

Quantification methodology

Quantification occurs at asset, regional or country level. Emissions reported at this level can be quantified using high-level standard factors, which may be based upon the assumption that emissions for a specific asset/venture are similar to those for a comparable asset/venture for which more data is available. Some estimates of methane emissions intensity are also available per segment, for some countries. Practitioners are encouraged to use emission factors that best characterize their facilities. A few examples include (non-exhaustive list):

Reference	Segment	Country/Region	Value
Allen, D et al.	Onshore natural gas production and gathering	US	0.42% of gross gas production
Alvarez, A et al.	Gas (and oil) production, gas processing and transport	US	2.3% of gross gas production
Hensen et al.	Offshore oil and gas production	Netherlands	0.69 t $CH_4/10^3$ m^3 oil equivalent
IOGP (1)	Onshore oil and gas production	Europe	1.95 t CH_4/kt hydrocarbon produced
	Offshore oil and gas production		0.21 t CH_4/kt hydrocarbon produced
IOGP (2)	Oil and gas production	World	Various emission factors depending on the region
Marcogaz	Transmission	Europe	568 kg CH_4/km
	Underground gas storage		347 kg $CH_4/10^6$ m^3_n storage capacity
	Distribution		660 kg CH_4/km (more detailed EFs available)
	LNG regassification terminals with flares		0.12 g CH_4/ m^3_n (send-out)

Riddick et al.	Offshore gas production	UK	0.27% of volume gas production (2.05 t CH_4/kt oil equivalent)
Rutherford, J et al.	Onshore oil and gas production	US	1.3% of gross gas production
Zavala-Araiza, D et al.	Onshore and offshore oil production	Mexico	3.02 t CH_4/kt oil produced
IPCC	Gas processing	World	Various emission factors depending on practices and available data
IPCC	Gas liquefaction (LNG production)	World	1660 t CH_4/station
ICCT	LNG transport	World	0.06-5.5 g CH_4/kWh depending on engine type

n – normal conditions

The following formula is a general formula which allows to calculate methane emissions based on an emission factor:

$$E_i = EF_i * AF_i$$

Where:

- E_i Methane emission related to asset *i*
- EF_i Emission factor related to asset *i*
- AF_i Asset production/throughput activity factor *i*

As a company's assets may span multiple segments and geographies, the company is encouraged to select those emission factors they feel best reflect each part of their asset portfolio. If Level 1 quantification covers several segments, it is recommended to sum the emissions from the different segments or to select an emission factor which covers the same segments.

Level 2

Reporting at OGMP 2.0 Level 2 builds on Level 1 reporting by adding additional granularity around major source categories. While individual source types may be similar along the whole gas supply chain, different segments in the supply chain may have historically categorized their source types differently, reflecting the preferences of companies working in that segment. For the purposes of OGMP 2.0 Level 2 reporting, two categorizations are provided: one for the upstream segment and one for the mid- and downstream segment.

Brief description of reporting level

Upstream

Reporting at OGMP 2.0 Level 2 involves the reporting of methane emissions for each asset based upon 5 different emission categories (as defined by the IOGP) for upstream:

- Venting (i.e. planned releases of gas to the atmosphere as a result of process design)
- Fugitive losses (i.e. unintentional releases to the atmosphere resulting from leaking equipment)
- Flaring (i.e. the unburned fraction)
- Energy / Combustion (i.e. the unburned fraction)

- **Other / Unspecified** (i.e. for emission events or sources which do not align with one of the other 4 categories)

IOGP, Methane Management in the Upstream Oil and Gas Industry: Policy recommendations in the context of the EU Methane strategy, 2020 – Provides more details on emission categories.

Mid - Downstream

Reporting at OGMP 2.0 Level 2 involves the reporting of methane emissions for each asset based upon 3 different emission categories (as defined by Marcogaz) for mid- and downstream:

Fugitive losses

- Leaks from connections
- Tightness failure
- Permeation

Vented

- Operational emissions
  - Purging/venting for works, commissioning and decommissioning
  - Regular emissions of technical devices
  - Starts & stops
- Incidents

Incomplete combustion

Marcogaz, Assessment of methane emissions for gas Transmission and Distribution system operators, 2019 – Provides more details on emission categories.

Quantification methodology

Emissions reported in each of these categories are typically quantified using generic emission factors, though more advance forms of quantification may also be used. Quantification methodologies, prescribed by local regulations, can also be used to determine methane emissions at Level 2, provided they follow the emission categories presented above.

Upstream

Emission category	Quantification methodology	Example formula
Venting	Apply segment-specific IPCC disaggregation percentages for venting to Level 1 emission estimates factors to determine vented emissions for a given asset.	$Level\ 1\ Activity\ data * Level\ 1\ EF * IPCC\ share_{vents}$
Fugitive losses	Apply segment-specific IPCC disaggregation percentages for fugitive emissions to Level 1 emission estimates factors to determine fugitive emissions for a given asset.	$Level\ 1\ Activity\ data * Level\ 1\ EF * IPCC\ share_{fugitives}$
Flare	Calculate based on gas sent to flare. Assume 98% flare destruction efficiency for methane and if methane content of gas to flare is not known, assume 100% of the gas is methane. Can also be applied to thermal oxidizers and combustors	$Gas\ to\ Flare * Gas\ composition * CE$
		e.g. $Gas_{flare} * 100\%\ CH_4 * 98\%$

Energy/Fuel combustion	Calculate based on fuel gas consumption by individual stationary and portable combustion equipment (except for flares). Multiply fuel consumption to combustion equipment by applicable emission factors (e.g. API compendium – see references section). Where applicable for a specific emission factor and not known, assume 100% of the gas to the combustion equipment is methane.	$Fuel\ consumption * Fuel\ composition * EF$
		e.g. $Fuel_{consumption} * 100\%\ CH_4 * EF_{fuel}$
Other/Unspecified	Calculate based on company incident reporting (e.g. loss of primary containment tracking)	-

Mid - Downstream

Emission category	Quantification methodology	Example formula
Venting[1]	IPCC factors (per segment, choice of EF depending on available activity data) or reasonable endeavors at summing individual sources	$Level\ 1\ Activity\ data * Level\ 1\ EF * IPCC\ share_{vents}$
Fugitives	IPCC factors (per segment, choice of EF depending on available activity data) or reasonable endeavors using higher level approaches (e.g. facility) or equipment level EFs (API compendium (1))	$Level\ 1\ Activity\ data * Level\ 1\ EF * IPCC\ share_{fugitives}$
Incomplete combustion	Based on fuel consumption, fuel composition (if not readily available, assume 100% methane) and fuel based EFs (e.g. API compendium (2)) or combustion efficiency for flares (apply 98%) or IPCC factors (per segment, choice of EF depending on available activity data)	$Fuel\ consumption * Fuel\ composition * EF$
		e.g. $Fuel_{consumption} * 100\%\ CH_4 * EF_{fuel}$
		$Level\ 1\ Activity\ data * Level\ 1\ EF * IPCC\ share_{incomplete\ combustion}$

For companies operating in similar conditions as those on which the survey was conducted, the breakdown per emission category can be taken from

- Marcogaz, Surveys for downstream methane emissions in Europe, 2018 Link transmission Link storage Link distribution Link LNG terminals

and applied to total emissions determined using Level 1 methodology to obtain emissions per emission category.

[1] Incidents are included in this category

References

- Allen, D. et al., *Measurements of methane emissions at natural gas production sites in the United States,* 2013 – methane intensity for upstream gas in the US Link
- Alvarez, A. et al., *Assessment of methane emissions from the US oil and gas supply chain,* 2018 – methane intensity for the US (not per segment) Link
- API (1), *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry,* 2009 – Tables 6-3 to 6-8 Link
- API (2), *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry,* 2009 – Tables 4.5 and 4.6 Link
- Hensen et al., *Methane emission measurements of offshore oil and gas platforms,* TNO Report R10895, 2019 – methane emissions from offshore oil and gas production in the Netherlands (can be used to derive corresponding emission factors) Link
- ICCT, *The climate implications of using LNG as a marine fuel,* 2020 Link
- IOGP (1), *Methane Management in the Upstream Oil and Gas Industry – Policy recommendations in the context of the EU Methane strategy,* 2020 – methane emission factors for onshore and offshore oil and gas production in Europe Link
- IOGP (2), *IOGP Environmental performance indicators – 2019 data,* 2020 (p. 14) – methane emissions per unit of hydrocarbon production by region Link
- IPCC, *IPCC refinement guidelines – Volume 2: Energy – Chapter 4: Fugitive emissions*, 2019 Link–
  - Table 4.2.4H, EFs for gas processing
  - Table 4.2.4I, EFs for gas liquefaction (LNG production)
  - Tables 4.2.4, to determine emissions at level 1, combined with breakdown per category from Tables 4A.2.1-4A.2.7
- Maazallahi, H. et al., *Methane mapping, emission quantification and attribution in two European cities; Utrecht, NL and Hamburg, DE,* 2020 – methane emissions from gas distribution in Europe (can be used to derive corresponding emission factors) Link
- Marcogaz, Surveys for downstream methane emissions in Europe, 2018 Link transmission Link storage Link distribution Link LNG terminals

- Riddick et al., *Methane emissions from oil and gas platforms in the North Sea,* 2019 – methane intensity of offshore oil and gas production Link
- Rutherford, J. et al., *Closing the gap: Explaining persistent underestimation by US oil and natural gas production-segment methane inventories,* 2020 – methane emissions from oil and gas production in the US (can be used to derive corresponding emission factors) Link
- Zavala-Araiza, D. et al., *A tale of two regions: methane emissions from oil and gas production in offshore/onshore Mexico,* 2021 – methane emissions for upstream in Mexico (can be used to derive corresponding emission factors) Link