

METHODOLOGY

GS4GG PAA M400-15

SDG 3, 6, 11, 13

SAFE SANITATION SERVICES (SASS)

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SUMMARY

The methodology applies to activities that introduce, upgrade or scale safe sanitation services in communities where current infrastructure is inadequate, leading to untreated environmental discharge, anaerobic decay of faecal sludge or open defecation. It quantifies the greenhouse gas (GHG) emission reductions achieved through the safe management of sanitation waste, which avoids the methane (CH₄) emissions that would have occurred during the anaerobic decomposition of human waste in infrequently emptied pit latrines, septic tanks and unmanaged environments.

The methodology includes a suppressed demand framework, recognising that populations practising open defecation or relying on unimproved sanitation are constrained by a lack of basic infrastructure. It sets conservative baseline caps representing the emissions that would have occurred had these populations reached a basic standard of sanitation, and applies an uncertainty adjustment, an ambition adjustment and proportional crediting on verified safe management.

Aligned with the Gold Standard for the Global Goals (GS4GG) Paris Agreement Alignment (PAA) requirements, the methodology provides standardised approaches for:

- **Baseline setting:** using the 2019 Refinement to the 2006 IPCC Guidelines ([Volume 5: Waste](#)) to derive methane conversion factors (MCF), biochemical oxygen demand (BOD) and maximum methane-producing capacity (B₀).
- **Ambition:** applying a Downward Adjustment Factor (DAF) to align the crediting baseline with the host country's net-zero trajectory.
- **Leakage:** accounting for embodied emissions from the manufacture of sanitation hardware (e.g., container receptacles, vacuum trucks and centralised treatment infrastructure).

- **Monitoring:** Unique Identifier (UID) tracking of all containment units and digital or logbook tracking of the full service chain (containment, emptying, transport, treatment and safe disposal) to prevent double counting and ensure environmental integrity.

Only avoided methane is credited; the energy and material end-uses of activity outputs (e.g., biogas-to-energy, compost) are excluded and may be claimed under a separate, compatible methodology. The methodology applies to micro- and small-scale activities and contributes to SDGs 3, 6, 11 and 13.

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SASS

Safe Sanitation Services

SCOPE 13 Waste handling
MITIGATION Emission reduction

Crediting the methane avoided when non-sewered sanitation waste is safely contained, emptied, transported and treated, in place of pit latrines, septic tanks or open defecation.

MITIGATION TYPE

Avoided CH₄ only

Biogas-to-energy, compost and biochar end-uses are excluded and may be claimed under a compatible methodology.

ACTIVITY SCALE

Micro · Small only

Micro ≤ 10,000 and small ≤ 60,000 tCO₂e per year, as the crediting-period average, per activity or per VPA.

CREDITING PERIOD

5 years, renewable twice (15)

Within the technical lifetime. No renewal once an independent regional basic service is available.

GEOGRAPHY · GWP

Global · IPCC AR5, 100-year

CH₄ 28, N₂O 265. Deemed additionality under the Positive List limited to Annex 3 economies.

SANITATION SERVICE CHAIN Every link must be accounted for; one entity need not own or operate each link

S.3.1 · 5.1

01**Containment**

Toilets at households, institutions and SMEs: container-based sanitation, pit latrines and septic tanks. Each unit or end-user carries a Unique Identifier.

Operational Fraction

02**Emptying**

Container collection or mechanised emptying of pits and tanks. Containers and intermediate storage collected at least every 14 days.

≤ 14 days storage

03**Transport**

Vacuum trucks, tankers or carts to treatment. Emptying logs matched to intake weighbridge records; informal dumping lowers compliance.

Chain of custody

04**Treatment**

Faecal sludge treatment, composting, anaerobic digestion or decentralised wastewater treatment. Third-party facilities monitored; never an uncontrolled anaerobic process.

Collection Compliance

05**End-use or disposal**

Compost, digestate and biochar meet national rules or WHO limits for heavy metals and pathogens before release. Effluent discharge is accounted.

Not credited here

TARGET POPULATION households, shared toilets, institutions, non-industrial SMEs · refugee and IDP settlements under S.3.2.9

BASELINE PATHWAYS · MCF IPCC 2019 discrete categories, never interpolated, mapped from the Baseline Scenario Survey

ANNEX A2.3 · S.7.3.4

0.7**Wet pit latrine**

Wet climate or flush water; groundwater above the pit.

0.55**Septic tank**

With or without soil dispersal; emptied tanks divert 0.5 of the load.

0.5**Dry pit, > 5 persons**

Communal category; also stagnant sewer. Never a suppressed-demand counterfactual.

0.1**Dry pit, ≤ 5 persons**

Small-family category; groundwater below the pit.

0**Open defecation · unknown**

Open defecation is credited on the suppressed-demand counterfactual instead.

OUTSIDE SCOPE Construction or upgrade of centralised waterborne sewerage and large treatment plants; pilot-stage pathways; pathways with negligible methane impact.

SUPPRESSED DEMAND · OPEN DEFECATION & UNIMPROVED · S.7.3.5

MCF 0

Actual open-defecation emissions

MIN(0.5, mix)

Household-scale basic-service counterfactual

– 5%

Conservativeness deduction

Weighted from basic-service technologies already used in the area; the communal 0.5 is excluded. UAF on the counterfactual mix, 0.57 by default. Requires the Minimum Service Quality Standard.

SHARED FACILITIES · BASIC HUMAN NEEDS · S.3.2.3

4 hh · 20

Households or persons per cubicle, no further proof

50 m

Beyond this, safe access is justified

24 h

Safe access at all times, including darkness

Larger facilities need a hygiene and O&M regime, inclusivity and safety provisions, and an auditable served population. A facility failing inspection earns nothing for its users that period.

CORE APPLICABILITY · S.3.2

SERVICE

Raises the service level to safely managed sanitation (JMP); shared facilities qualify on safety of excreta management.

TECHNOLOGY

Field-proven and durable; ISO 30500:2025 or ISO 31800:2020 encouraged for prefabricated units.

LIFETIME

Containment, digesters and vessels ≥ 5 years, or replaced. Units past their lifetime count as non-operational.

CO-TREATMENT

Only where needed for process performance; emissions allocated by mass or energy; no credits for the co-treated stream.

DISPLACEMENT

Written agreement of the administering authority; access never conditional on carbon consent; continuity plan.

SAFEGUARDS

Worker PPE and H₂S/CH₄ training, water-source buffers, Benefit-Sharing Plan, rebound assessment above 5%.

INELIGIBLE · EXCLUDED FEEDSTOCK · S.3.2.6

Centralised sewer networks

Transient event populations

Purpose-grown biomass

Industrial or medical waste

Excavated landfill waste

Plastics and fossil textiles

Manure baseline methane

DOUBLE-COUNTING CONTROLS · S.3.4.4

UID

Every unit or assigned end-user tracked in the activity database.

RIGHTS

Ownership asserted to participants; documented end-user consent.

OVERLAP

Units in other voluntary, PACM or CDM activities excluded.

OUTPUTS

Energy, material and durable-carbon claims elsewhere avoid methane.

JURIS.

No double issuance with jurisdictional or sectoral programmes.

COMMON PRACTICE · MT400-06 · S.6.7

Stock-based, end-users · TMC-3

$$F = N_{\text{sim}} / N_{\text{all}}$$

F ≥ 25% C1 · 16% other → not additional

Households and facilities using equivalent safe technologies, over all end-users relying on non-sewered sanitation in the host country or a justified district. Carbon-credited installations excluded. Applies to Positive List activities too.

ADDITIONALITY · SECTION 6 · ANNEX 3

Positive List · C1–C4

LIC, LMIC, LDC or SIDS; unserved population; full chain; micro or small. Funding statement required.

Regulatory surplus

Open-defecation goals pass unless paired with funded, mandatory delivery.

Mandatory for all: regulatory surplus, lock-in, common practice, and ongoing financial need at renewal.

Activity-specific

Investment analysis under AMT-002, or barrier analysis validated by the VVB.

Lock-in · MT400-09

Exempt for zero-emission systems; 10-year lifetime exemption to 2030.

NET EMISSION REDUCTIONS · EQ. 11

$$ER_y = BE_{\text{crd},y} - AE_y - LE_y$$

Negative in a period → nothing claimed for that period

CREDITING BASELINE · EQ. 5-7

$$BE_{\text{crd}} = \min(BE_{\text{DAF}}, BE_{\text{BAU}}) \times OF \times CCF$$

$$\Delta = BE_{\text{BAU}} - BE_{\text{DAF, reported}}$$

Only methane the activity verifiably diverts is credited. Each loss is counted in one term only.

BE Baseline in five steps

SECTION 7

Approach (c), existing actual or historical emissions, adjusted downwards (MS400-04). CH₄ only, IPCC 2019 Refinement.

- 1 Approach (c) chosen: emissions depend on the pre-activity containment
- 2 $BE_{\text{unc}} = \sum P_i \times \text{days} \times \text{BOD} \times B_0 \times \text{MCF}_i \times F_{\text{div},i} \times \text{GWP}$, Eq. 1-1a
- 3 $BE_{\text{UAF}} = BE_{\text{unc}} \times \text{UAF}$, then $BE_{\text{DAF}} = BE_{\text{UAF}} \times (1 - \text{DAF})$, Eq. 2-3
- 4 Conservative BAU: uncertainty applied, ambition excluded, Eq. 4
- 5 Lower of steps 3 and 4, scaled by OF and CCF, Eq. 5-6

DEFAULT INPUTS · ANNEX 2

B_0 0.6 kg CH₄/kg BOD · BOD Africa 0.037
 UAF 0.57 default · pathway 0.31-0.72

SAFE-MANAGEMENT SCALING · EQ. 6

 P_i served → OF units in use → CCF waste safely treated

Abandoned units and reversion to open defecation reduce OF; dumping or untraced loads reduce CCF.

AE Activity emissions

SECTION 8

Sum of seven terms · Eq. 8

- OPS** Facility electricity and fuel; AMT-007 or 1.3 tCO₂e/MWh default, Eq. 9
- TRANS** Emptying and transport fuel, Tool 02; zero for push-carts or renewable e-trikes
- COMP** Composting CH₄ and N₂O from aeration or turning, TOOL13
- AD** Digester leaks and flaring inefficiency, TOOL 14
- FST** Tanks and ponds MCF 0.2 below 2 m, 0.8 at 2 m or more; drying beds 0.2; N₂O Eq. 9a-9b
- WW** Decentralised wastewater treatment, IPCC Tables 6.3 and 6.8a
- EFF** Residual BOD and nitrogen in effluent discharged downstream

Only the activity-attributable share of shared or co-treating facilities. Fossil-derived fractions in full. Storage over 14 days is not safely collected.

MONITORING · S.14

UID database · 90/10 sampling

Emptying logs matched to intake weights. Pathway mix fixed ex ante; VVB re-checks pits, 20% deviation rule.

LE Leakage

SECTION 9

Embodied + market + process · Eq. 10

- EMB** Cradle-to-gate hardware emissions, Annex A2.5 material factors or ISO 14040/44 LCA
- MKT** Diverted waste or feedstock and displaced disposal; dumping handled in CCF
- PRC** Digestate storage CH₄ and N₂O; land N₂O only where product is disposed of

EMBODIED TIERS · S.9.2.3

- T1** CBS receptacles, buckets, drums under 5 years: in full on deployment
- T2** Vaults, substructures, kiosks: annualised over 5 years
- T3** FSTPs, digesters, trucks: bill of quantities, 5 years; true-up on early exit

REVERSALS · S.12

No reversal risk

No removals credited. Activity failure is a performance risk: OF and CCF fall, issued credits unaffected.

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1 | KEY INFORMATION

The following table describes the key information for the application of the methodology.

Table 1. Key information

Activity summary	Introduction, upgrade or scaling of safely managed sanitation, replacing inadequate infrastructure (e.g., infrequently emptied pit latrines, septic tanks) or the practice of open defecation (suppressed demand). The activity may use centralised treatment of sanitation waste or <i>in-situ</i> technology, and spans the full sanitation service chain (safe containment, emptying, transport and treatment, e.g., composting or anaerobic digestion) to avoid CH ₄ emissions. The methodology applies to end-users in households, institutions, small and medium enterprises (SMEs) and communities, including refugee camps, refugee settlements and sites for internally displaced persons (Section 3.2.9).
Mitigation type	☒ Emission reduction
Applicable activity scale	☒ Micro scale ($\leq 10,000$ tCO ₂ e per year) ☒ Small scale ($\leq 60,000$ tCO ₂ e per year)
Sectoral scope	13. Waste handling and disposal
Activity Requirement	Community Services Activities [Circular Economy and Waste Systems - PC]
Activity start date	The date on which the first unit or facility under the activity begins operation or service delivery.
Crediting period start date	- For centralised treatment: the date of commencement of operation, or two years before the date of design certification, whichever is later. - For distributed units: the date on which the first distributed unit begins operation, or two years before the date of design certification, whichever is later.
Crediting period length	Five years, renewable twice (maximum of 15 years). The crediting period shall not exceed the technical lifetime of the activity technology unless replacement and maintenance measures are in place (Section 3.2.8). No renewal is permitted once an independent regional basic service has become available (Sections 15.1.3 and 17).
Geographical applicability	Global. Deemed additionality under the Positive List is limited to the economies defined at Annex 3 .
Limitations	Suppressed-demand baselines are limited to micro- and small-scale activities (Sections 3.2.4(a) and 7.3.5).

	- Only avoided CH₄ is credited; energy and material end-uses of outputs (e.g., biogas-to-energy, compost displacing fertiliser, biochar) are not credited under this methodology and may be claimed under a separate, compatible methodology. - The construction or upgrade of comprehensive centralised waterborne municipal sewerage networks and associated treatment plants is not an eligible activity type. This does not disqualify an otherwise eligible activity that delivers collected sanitation waste to such a facility, subject to Section 3.1.2. - Co-treatment of non-sanitation organic feedstock is permitted only subject to the conditions in Section 3.2.6.
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2| DEFINITIONS

In addition to the terms and definitions in the [Glossary of Gold Standard for the Global Goals](#), the [Activity Requirements](#) and the referenced standards and tools, the following definitions apply in this methodology. Sanitation definitions align with the [WHO/UNICEF Joint Monitoring Programme \(JMP\)](#) and [City-Wide Inclusive Sanitation \(CWIS\)](#) frameworks.

Table 2. Terms and definitions

TERM	DEFINITION
Container-based sanitation (CBS)	A sanitation service in which excreta are captured in sealable, removable containers that are regularly collected and transported to treatment, classified as an improved facility under the JMP.
Co-treatment	The treatment of permitted non-sanitation organic feedstock (e.g., organic market or food waste) together with sanitation waste in the same treatment process, subject to attribution and double-counting safeguards.
Displacement setting	A refugee camp, refugee settlement or site for internally displaced persons, administered or recognised by a host-government authority or a mandated humanitarian agency, together with any host community served by the same activity.
Faecal sludge	The undigested or partially digested slurry or solids resulting from the storage of excreta in on-site sanitation systems (e.g., septic tanks, pit latrines, container-based systems), which has not been transported through a sewer.
Faecal sludge management (FSM)	The collection, conveyance, treatment and safe end-use or disposal of faecal sludge from on-site sanitation systems.

Improved sanitation facility	A facility designed to hygienically separate human excreta from human contact, in accordance with the WHO/UNICEF JMP classification (e.g., flush/pour-flush toilets to a piped sewer, septic tank or pit; ventilated improved pit latrines; pit latrines with a slab; composting toilets, including container-based sanitation).
Minimum Service Quality Standard (MSQS)	A sanitation facility that (a) hygienically separates excreta from human contact; (b) has a superstructure affording privacy and safe use, including a lockable door and, where applicable, lighting; (c) has provision for handwashing with soap and water at or adjacent to the facility; and (d) is maintained in functional condition. The Minimum Service Quality Standard is assessed at the level of the individual user and does not depend on whether the facility is shared.
Open defecation (OD)	Disposal of human faeces in fields, forests, bushes, open bodies of water, beaches or other open spaces. Treated as a case of suppressed demand.
Safely managed sanitation	Use of an improved sanitation facility that is not shared with other households and where excreta are safely disposed of in situ or transported and treated off-site (JMP). This is the service standard towards which the activity progresses, and the basis for SDG indicator 6.2.1a.
Sanitation	The provision of facilities and services necessary for the safe management of human urine and faeces, including initial containment of excreta, its transport, treatment, and ultimate disposal or reuse.
Sanitation service chain	The sequence by which excreta are managed from point of generation to safe end-use or disposal: containment, emptying, conveyance or transport, treatment, and safe end-use or disposal of treated outputs and effluent.
Sanitation service ladder (JMP)	The WHO/UNICEF Joint Monitoring Programme (JMP) classification of sanitation service levels, from highest to lowest: “safely managed”, “basic”, “limited”, “unimproved” and “open defecation”. ¹
Sanitation waste	Human excreta (faeces and urine) and the associated faecal sludge, blackwater or domestic wastewater managed by the activity, together with any permitted co-treated organic feedstock and with incidental contaminants and functionally

¹ “Basic” = an improved facility not shared with other households; “safely managed” additionally requires excreta to be safely disposed of in situ or removed and treated off-site (WHO/UNICEF JMP).

	integral consumables arriving with that stream. Excludes waste deliberately introduced as a feedstock other than in accordance with Section 3.2.6 .
Suppressed demand	A condition in which the pre-activity level of safe sanitation is below that needed to meet basic human needs because of barriers such as poverty or lack of infrastructure, such that current emissions understate the emissions that would accompany provision of a basic service.
Technical lifetime	The average period over which the activity technology can be operated safely and with minimal loss of performance, as stated in the manufacturer’s specification or an independent study report.
Technology	The single or multiple technologies and/or practices applied in the activity that result in emission reductions. Throughout this methodology, the term “technology” includes “practices”.

3| SCOPE, APPLICABILITY AND ENTRY INTO FORCE

3.1 | Scope

- 3.1.1 | This methodology applies to activities that establish, upgrade or scale non-sewered and decentralised safely managed sanitation services to reduce GHG emissions. Eligible activities shall cover the entire sanitation service chain (containment, emptying, transport, treatment and safe end-use or disposal). Emission reductions are quantified from avoided baseline methane only, net of activity emissions and leakage. Mitigation downstream of treatment (e.g., displacing fossil fertilisers with compost, or fossil fuel with biogas) is outside the scope of this methodology and may be claimed under a complementary methodology.
- 3.1.2 | The requirement to cover the entire sanitation service chain is a requirement to account for every link of that chain; it does not require a single entity to own or operate each link. Where sanitation waste is transferred to a third-party or municipal facility, the requirement is satisfied where:
- a|. chain of custody to the point of delivery is evidenced under SASS 9;
 - b|. rights to the emission reductions from the delivered stream are secured under [Sections 3.4.4\(c\)](#) and [11.3.1\(b\)](#);
 - c|. the absence of double issuance is demonstrated under [Sections 3.4.4\(e\) and \(g\)](#);
 - d|. the receiving facility’s treatment performance is monitored, its attributable process emissions are accounted under [Section 8](#) and its associated safeguards are demonstrated; and
 - e|. the receiving process is not an uncontrolled anaerobic process or an unmanaged discharge.

- 3.1.3 | The methodology applies to commonly deployed sanitation pathways that are materially relevant to methane. The included activity types are:
- a|. container-based sanitation (CBS), including collection and transport to treatment;
 - b|. on-site non-sewered systems (e.g., pit latrines, septic tanks) served by safe faecal sludge management — mechanised emptying, conveyance and treatment;
 - c|. faecal sludge treatment (e.g., settling or thickening, planted or unplanted drying beds, stabilisation);
 - d|. anaerobic digestion or biogas systems treating sanitation waste;
 - e|. composting or co-composting of sanitation waste;
 - f|. decentralised wastewater treatment serving the activity's population;
 - g|. other treatment pathways that are field-proven, for which representative emission data are available, and whose process CH₄ and N₂O are quantified using a recognised IPCC method or an applicable GS4GG approved CDM/PACM tool identified in the design document.
- 3.1.4 | **Outside scope:** the construction or upgrade of large centralised sewered wastewater treatment plants, which is better addressed under wastewater-specific methodologies; pathways at hypothetical or pilot stage for which representative emission data are unavailable; and pathways whose methane impact is demonstrably negligible. Delivery of sanitation waste collected by an eligible activity to a treatment facility that is itself outside scope does not make the activity ineligible, provided the conditions at [Section 3.1.2](#) are met.

3.2 | Applicability criteria

The methodology is applicable where all of the following conditions are met.

- 3.2.1 | **Target population:** The activity provides non-sewered sanitation services to households, shared or community toilet facilities, non-industrial SMEs or institutions (e.g., schools, clinics, hospitals). Transient populations attending temporary events do not constitute a target population for the purposes of this methodology; residents of displacement settings do, subject to Section 3.2.9. Temporary or relocatable units are eligible only where they serve an enrolled population within the activity boundary, identifiable in accordance with Section [3.4.4\(b\)](#).
- 3.2.2 | **Service level and quality:**
- a|. The activity shall raise the service level to safely managed sanitation, consistent with the WHO/UNICEF JMP definition of safely managed sanitation. Where the service is delivered through a shared or public facility permitted under [Section 3.2.3\(a\)](#), that facility shall satisfy the service-quality conditions of that criterion; such a facility meets this criterion even though the JMP service ladder classifies it as a limited service, that classification resulting from the sharing and not from the safety of excreta management.

- b|. Activities applying a suppressed-demand baseline shall meet the Minimum Service Quality Standard as defined in [Section 2](#).

3.2.3 | **Basic human needs and shared facilities:**

- a|. Shared toilet facilities are permitted. A facility serving no more than four households or twenty persons per toilet cubicle is permitted without further demonstration. A facility serving a greater number of users is permitted where the activity developer demonstrates, and the VVB validates, all of the following:
 - i. the facility is subject to a specified hygiene standard and documented operation and maintenance regime, forming part of the Monitoring Plan, which specifies the frequency of cleaning and of inspection, justifies that frequency against the number of users served, identifies the person or entity accountable for upkeep, and provides for each cleaning and inspection to be recorded;
 - ii. the inclusivity and safety requirements at [Section 3.4.5](#) are met, including lighting, internal locks, gender partition where culturally appropriate, and provision for menstrual hygiene management;
 - iii. the requirements at [Section 3.4.6](#) regarding health, safety, and environmental protection are met and monitored;
 - iv. an auditable method of determining the served population is applied in accordance with [SASS 6](#); and
 - v. compliance with (i) to (iii) is confirmed at the facility during the sampling undertaken for the operational fraction ([SASS 8](#)), a facility being recorded as compliant only where it is found at inspection to be clean, functional, with handwashing provision available and containment not overflowing. Where the conditions in this criterion cease to be met during a monitoring period, no emission reductions shall be claimed in respect of the population served by that facility for that period.
- b|. A facility shall be accessible to its assigned population safely and at all times, including during hours of darkness. The activity developer shall justify safe and continuous access for the served population (considering the number of users, the distance to designated households, users with special access needs and any other relevant factors), and continuing use shall be evidenced through the Operational Fraction ([SASS 8](#)). Sanitation facilities shall be within the residence compound where one exists. Where the distance from a household to its designated facility exceeds 50 m, the activity developer shall justify how that distance nonetheless meets the safety requirements at [Section 3.4.5](#).

3.2.4 | **Implementation structure and scale:**

- a|. The methodology applies only to micro- and small-scale activities ($\leq 60,000$ tCO₂e per year, as the annual average over the crediting period), assessed per activity or, in a PoA, per VPA.
- b|. Where sanitation waste is delivered to a treatment facility that also receives waste from populations outside the activity boundary, only the activity-attributable share of that facility's process and embodied emissions shall be accounted, determined on the documented mass or energy basis at [Section 8.1.1](#). The size of the population served by the receiving facility does not of itself affect eligibility, subject to [Section 3.1.4](#).

3.2.5 | **Technology specification and performance:**

- a|. The activity developer shall select technologies with predictable, field-proven and durable performance.
- b|. Where applicable, units and treatment processes shall comply with relevant international and national safety and performance standards. Prefabricated integrated treatment units are encouraged to conform to ISO 30500:2025, and prefabricated, energy-independent, community-scale resource-recovery faecal sludge treatment units to ISO 31800:2020, or to equivalent national standards. Systems constructed in situ, and units outside the scope of those standards, shall comply with relevant national safety and performance standards².
- c|. The activity design shall minimise uncontrolled anaerobic decomposition, including through adequate containment integrity and sufficiently frequent emptying of end-units and any intermediate storage.

3.2.6 | **Co-treated and mixed waste:**

- a|. The treatment facility may co-treat other biodegradable waste only where the activity developer documents that its addition is necessary to achieve or maintain specified treatment process performance, for example carbon-to-nitrogen ratio, moisture content or porosity. The target performance range and the quantity of co-treated waste used shall be recorded in the Monitoring Plan. Permitted co-feedstock includes organic market and household waste, animal manure, sawdust as a bulking agent, and straw. Baseline methane emissions associated with co-treated animal manure shall not be claimed under this methodology. Emission reductions from the use of co-treated waste, e.g., to generate methane for electricity generation, may be claimed under a complementary methodology.

² ISO 30500:2025, Non-sewered sanitation systems — Prefabricated integrated treatment units — General safety and performance requirements for design and testing; and ISO 31800:2020, Faecal sludge treatment units — Energy independent, prefabricated, community-scale, resource recovery units — Safety and performance requirements.

- b|. Where biomass is added under Section 3.2.6(a), it shall be demonstrated, using [CDM TOOL16: Project and leakage emissions from biomass](#), that the biomass is sustainably sourced.
- c|. Purpose-grown biomass (e.g., maize grown for digestion), industrial waste, medical waste, excavated landfill waste and fossil-fuel-based waste (plastics and relevant textiles) are ineligible and shall not be co-treated. Fossil-fuel-derived waste shall not be introduced as a feedstock. This does not preclude the treatment of incidental contaminants, or of functionally integral consumables arriving with the sanitation waste such as container liners, provided that:
 - i. screening is applied and the disposal of screening residues is documented;
 - ii. no emission reductions are claimed in respect of any fossil-derived fraction; and
 - iii. fossil CO₂ arising from the combustion or degradation of that fraction is accounted in full under [Section 8](#).
- d|. Where sanitation waste is collected from health clinics, clear separation protocols shall be documented.
- e|. Where co-treatment occurs, the treatment facility's operating and embodied emissions shall be allocated between the sanitation and non-sanitation streams on a documented mass or energy basis, fixed ex ante and applied consistently, and only the sanitation-attributable share shall be deducted. The non-sanitation share shall be reported. No emission reductions accrue to the co-treated stream under this methodology; they may be claimed under a complementary methodology.

3.2.7 | **Monitoring systems and data management:**

- a|. The activity developer shall implement monitoring systems capable of demonstrating safe management throughout the chain and of quantifying the parameters, in particular management compliance (the fraction of sanitation waste safely collected, conveyed and treated) and treatment performance.
- b|. Data logging, storage, handling of data gaps, and QA/QC shall be detailed in the Monitoring Plan ([Section 14](#)).

3.2.8 | **Technical lifetime and replacement:**

- a|. If the technical lifetime of the technology is shorter than the crediting period, the activity developer shall ensure that end-users are provided with replacement technology of comparable or better quality at the end of the technical lifetime, by replacement or by retrofitting essential parts with a performance guarantee. Containment units, digesters and treatment vessels shall have a documented technical lifetime of not less than five years, being one crediting period, evidenced by manufacturer specification, warranty, certification under ISO 30500:2025 or ISO 31800:2020, or field performance data. Short-lived containment receptacles subject to Tier 1 under Section

[9.2.3\(a\)](#) are exempt, their embodied emissions being deducted in full on deployment.

- b|. Where neither can be demonstrated, no emission reductions shall be claimed for that technology after its technical lifetime has ended.

3.2.9 | **Displacement settings:**

- a|. The methodology applies to displacement settings, subject to the criteria in this [Section 3.2](#).
- b|. The activity shall be implemented with the written agreement of the host-government authority or mandated agency that administers the settlement, which shall be treated as the host entity for the purposes of [Section 3.4.4\(d\)](#). The activity shall be coordinated with the humanitarian sanitation coordination arrangements in place for the settlement.
- c|. Access to the sanitation service shall not be conditional on consent to, or participation in, the claiming of emission reductions.
- d|. The served population shall be determined under SASS 6. Where the population assigned to a shared facility is determined from the registration records of the administering authority or agency for the block or section served, those records shall be updated at least each monitoring period, and the lower of the registered and the enrolled population shall apply. Persons who leave the settlement shall be removed from the served population from the date of departure.
- e|. Personal data from registration records shall be used only in aggregated or pseudonymised form, in accordance with the data-protection requirements of the administering authority or agency and applicable law.
- f|. The activity developer shall agree with the administering authority or agency a plan for continuing the service should the activity terminate. Where the settlement closes or its population is relocated outside the activity boundary, [Section 9.2.4](#) applies.

3.3 | **Entry into force**

- 3.3.1 | The date of entry into force is the publication date of this methodology.

3.4 | **Mandatory compliance and safeguards**

- 3.4.1 | **GS4GG requirements:** The activity shall adhere to the Gold Standard [Principles & Requirements](#), the [Safeguarding Principles & Requirements](#), the [Community Services Activity Requirements](#), and the [Stakeholder Consultation & Engagement Requirements](#).

3.4.2 | **Regulatory compliance and governance:**

- a|. The activity shall document the national, regional and local regulatory framework for sanitation services within the activity boundary and shall not conflict with it.

- b|. The activity shall not undermine or conflict with any national, sub-national or local regulation or guidance for sanitation, water or, where relevant, land use.

3.4.3 | **Contractual obligation:** The activity developer shall, by ownership, contractual agreement or other arrangement, establish access to the monitoring data and supporting documentation required by this methodology and the relevant GS4GG requirements.

3.4.4 | **Avoidance of double counting:** To avoid double counting and double claiming, the activity developer shall:

- a|. describe the method of distribution or deployment in the design document (PDD or VPA-DD);
- b|. assign and track a Unique Identifier (UID) for each distributed unit or assigned end-user in the activity database;
- c|. clearly assert ownership of, and intention to claim, the emission reductions by contract or written assertion to all activity participants, manufacturers and service providers;
- d|. inform end-users and obtain their explicit, documented consent that the emission reductions shall not be claimed separately. Where the end-user is a host entity, consent shall be obtained from that entity, and the population served shall nonetheless be enumerated in accordance with [SASS 6](#);
- e|. exclude any unit or population already included in another voluntary, PACM or CDM activity;
- f|. where energy or material end-use of activity outputs is credited under a separate methodology, demonstrate that the same emission reductions are not claimed twice. Where a treatment pathway produces durable carbon, only avoided baseline methane is creditable under this methodology; the durable carbon may be claimed only under an applicable removals methodology, and the activity developer shall demonstrate that the removals methodology adopts a baseline consistent with [Section 7.3](#) without claiming avoided methane, and that the process emissions of the treatment step are accounted under one methodology only; and
- g|. where the activity boundary overlaps a relevant jurisdictional or sectoral programme, demonstrate that the emission reductions are not subject to double issuance.

3.4.5 | **Inclusivity:** There shall be no discrimination in access, pricing or service provision. Services in institutions, health facilities and SMEs shall be accessible to people with limited mobility and disabilities. Public and shared toilets shall meet dignity, safety and privacy standards, including hygiene provisions (water, soap), sanitary bins, secure locks, lighting, safe access and protective measures for children.

3.4.6 | **Health, safety and environmental protection:**

- a|. **System integrity:** All elements in the sanitation service chain shall be designed and operated to prevent physical leaks, overflows or seepage into groundwater.
 - b|. **Worker safety:** Formal contracts, personal protective equipment (PPE) and training (including hazard training for H₂S and CH₄ exposure) shall be provided to all sanitation, emptying and transport workers in accordance with Safeguarding Principle 3.
 - c|. **Water safety:** Activities shall demonstrate that they do not compromise drinking water sources (e.g., by maintaining safe buffer zones from boreholes and using impermeable liners for compost pits).
 - d|. The activity shall comply with health and safety requirements following the WHO Guidelines on Sanitation and Health³ and Principle 3 of the GS4GG [Safeguarding Principles & Requirements](#). A risk assessment shall be conducted for hazardous materials used in the activity, and pollutants (solid, liquid and gaseous) shall be addressed in line with the Safeguarding Principles & Requirements. Personnel collecting or treating sanitation waste shall receive training for safe handling, be provided with personal protective equipment, and be protected against exposure to toxic gases (e.g., H₂S, CH₄).
- 3.4.7 | **Resilience:** Services shall be designed to maintain containment in all foreseeable weather and seasons (storms, droughts, floods) to prevent surface water and groundwater contamination.
- 3.4.8 | **Product safety (end-use):**
- a|. Faecal sludge products intended for soil application (e.g., compost, biochar, digestate) shall comply with national agricultural regulations, or in case these do not regulate the activity end-use, WHO Guidelines on Sanitation and Health regarding safe limits for heavy metals and pathogen destruction (e.g., E. coli, helminth eggs) prior to release from the activity boundary.
- 3.4.9 | **Perverse incentives assessment:** The activity developer shall document measures to mitigate the following perverse incentives:
- a|. **Service substitution:** The risk that activity developers prioritise higher-income clients who can pay tariffs, excluding the ultra-poor. Mitigation: A mandatory Benefit-Sharing Plan (BSP) documenting the subsidisation or prioritisation of vulnerable populations.
 - b|. **Perverse waste handling:** The risk that collection systems encourage informal dumping if disposal pathways fail. Mitigation: Mandatory chain-of-custody documentation (e.g., digital logs from vacuum trucks matched to intake weights at the treatment plant).
 - c|. **Baseline classification:** The risk that pit latrines are recorded as wet or as serving more than five persons in order to raise the baseline.

³ WHO, Guidelines on Sanitation and Health. Geneva: World Health Organization, 2018.

Mitigation: The classification and the number of persons served per pit are recorded in the Baseline Scenario Survey and re-checked by the VVB under [Section 7.3.1\(e\)](#).

3.4.10 | **Rebound effects:** The activity developer shall conduct a rebound assessment identifying plausible direct (e.g., increased water use), indirect (market) and energy-substitution rebound effects and assessing their materiality. Where a rebound effect is plausible and material (could offset more than 5% of claimed emission reductions), the Monitoring Plan shall include parameters to detect, quantify and subtract the effect from the emission reductions.

4| NORMATIVE REFERENCES

The following standards, tools, and guidelines are normative references for the application of this methodology. Activity developers shall apply the latest valid version of these documents, as applicable:

4.1 | Gold Standard

- a|. [Principles & Requirements](#);
- b|. [Safeguarding Principles & Requirements](#);
- c|. Activity Requirement: [Community Services Activities](#);
- d|. [Stakeholder Consultation & Engagement Requirements](#);
- e|. PAA MS400-04: [Requirements for Baseline Determination in Methodologies](#);
- f|. Methodology Tool 01: [Project or Leakage Emissions From Fossil Fuel Combustion](#);
- g|. Methodology Tool 02: [Emissions from Freight Transport](#);
- h|. PAA MT400-05: [Downward Adjustment Factor Determination](#);
- i|. [Requirements for Additionality Demonstration](#);
- j|. PAA MT400-06: [Common Practice Tool](#);
- k|. [Requirements for Addressing Leakage in Methodologies](#);
- l|. [GHG Emissions Reductions & Sequestration Product Requirements](#);
- m|. PAA MT400-10: [Addendum to the A6.4 tool for the grid emission factor](#).

4.2 | UNFCCC sources

4.2.1 | The following PACM/CDM references also apply.

- a|. Article 6.4 mechanism methodological tools:
 - i. [A6.4-AMT-002 \(investment analysis\) A6.4-AMT-002: Investment analysis | UNFCCC](#);
 - ii. [A6.4-AMT-007 \(emissions from electricity generation and consumption\) A6.4-AMT-007: Emissions from electricity generation and consumption | UNFCCC](#);

- iii. [A6.4-AMT-010 \(sampling and surveys\)](#).
- b|. CDM methodological tools or the succeeding PACM or GS4GG equivalent:
 - i. [TOOL13 \(project and leakage emissions from composting\)](#);
 - ii. [TOOL14 \(project and leakage emissions from anaerobic digesters\)](#);
 - iii. [TOOL16 \(project and leakage emissions from biomass\)](#).

4.3 | Other sources

4.3.1 | The following external references also apply.

- a|. IPCC, [2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5, Chapter 6 \(Wastewater Treatment and Discharge\)](#); where the 2019 Refinement provides a value or method it prevails, and the 2006 IPCC Guidelines, Volume 5, apply only where the Refinement does not provide one;
- b|. IPCC Fifth Assessment Report (AR5, 2014): 100-year global warming potential values;
- c|. WHO, [Guidelines on Sanitation and Health](#) (2018);
- d|. WHO/UNICEF Joint Monitoring Programme (JMP), [sanitation service ladder and monitoring](#), including [Monitoring safely managed on-site sanitation](#);
- e|. ISO 30500:2025 (non-sewered sanitation systems); ISO 31800:2020 (faecal sludge treatment units — prefabricated units); ISO 14040:2006 and ISO 14044:2006 (life cycle assessment — principles, framework and requirements); ISO 14067:2018 (carbon footprint of products); ISO 14025:2006 (Type III environmental declarations); and ISO 21930:2017 or EN 15804 (environmental product declarations for construction products);

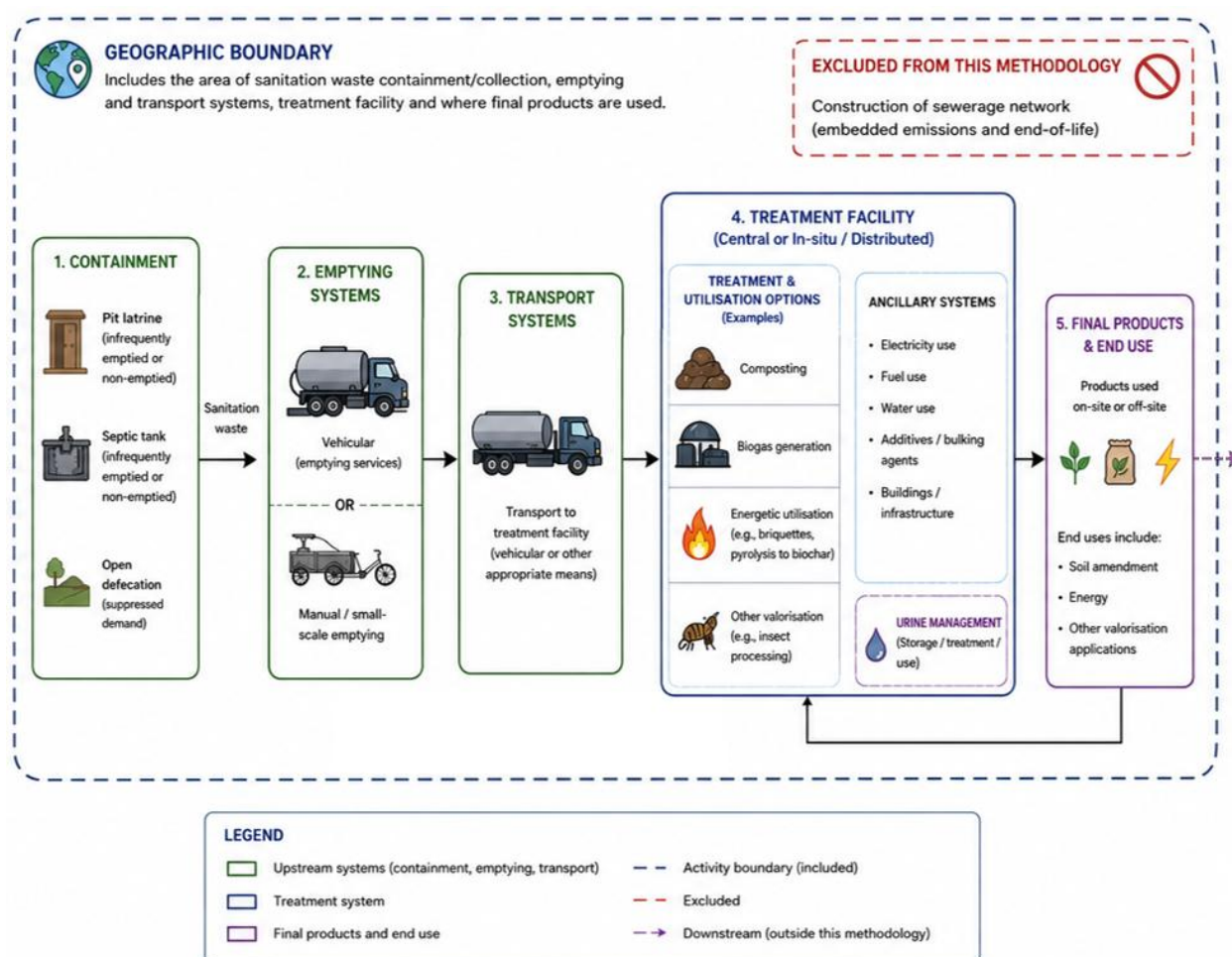
5| ACTIVITY BOUNDARY AND GHG SOURCES

5.1 | Activity boundary

- 5.1.1 | The activity boundary includes the geographic area in which sanitation waste is contained or collected, the emptying and conveyance or transport systems, the treatment facility and process, and the location at which treated outputs and effluent are safely used or disposed of. Where the activity co-treats permitted non-sanitation feedstock, the treatment facility is included within the boundary in its entirety. The boundary comprises:
- a|. **Containment:** the sites of households and institutions using the toilets.
 - b|. **Transport:** the routes used by vacuum trucks or collection carts to move faecal sludge.
 - c|. **Treatment:** the physical footprint of the centralised or decentralised faecal sludge treatment plant(s).

- d|. **End-use:** the location where final stabilised products (e.g., compost, biochar) are used or safely disposed of.

Figure 1. Activity diagram



5.2 | GHG sources

5.2.1 | The following table sets out the greenhouse gases included in, or excluded from, the activity. Carbon dioxide of biogenic origin from the decomposition of human excreta is not accounted (the natural carbon cycle). Global warming potentials are the IPCC AR5 100-year values (Annex A2.1).

Table 3. GHGs included in, or excluded from, the activity

Source	Gas	Included?	Justification
Baseline scenario			
Sanitation waste (anaerobic decomposition in pits, septic tanks or open environments)	CH ₄	Yes	Principal baseline source: methane from anaerobic decomposition of excreta under baseline pathways.
	CO ₂	No	Biogenic; part of the natural carbon cycle.

	N ₂ O	No	Baseline pathways are not expected to generate material N ₂ O ⁴ .
Activity scenario			
Treatment facility (energy use)	CO ₂	Yes	Electricity and fossil-fuel consumption for facility operation.
Interim storage or conveyance of sanitation waste	CH ₄	Yes	Methane from sanitation waste held before treatment. Not accounted: waste held for more than 14 days is treated as not safely collected (Section 8.9).
Transport and emptying	CO ₂	Yes	Fossil fuel used for emptying and conveyance of sanitation waste.
Composting and co-composting	CH ₄	Yes	Process emissions during composting.
	N ₂ O	Yes	Process emissions during composting.
Anaerobic digestion and biogas	CH ₄	Yes	Process and fugitive emissions (e.g., digester leaks, incomplete combustion).
	CO ₂	Yes	Fossil-derived CO ₂ from process energy, where applicable.
Wastewater treatment	CH ₄	Yes	Process emissions from decentralised wastewater treatment, where included.
	N ₂ O	Yes	Process emissions from decentralised wastewater treatment, where included.
Effluent discharge	CH ₄	Yes	Residual BOD in treated effluent discharged to the environment, generating downstream methane ⁵ .
	N ₂ O	Yes	Nitrogen in discharged effluent, where applicable.

⁴ IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.8a assigns a nitrous oxide emission factor of zero to latrines and to septic tanks without a soil dispersal field, and 0.0045 kg N₂O-N per kg N to septic systems incorporating a soil dispersal field. Baseline nitrous oxide is excluded across all baseline pathways; where a baseline pathway incorporates a soil dispersal field the exclusion is conservative, omitting a baseline source while activity-scenario nitrous oxide is accounted in full.

⁵ IPCC 2019 Refinement, Volume 5, Chapter 6.

Leakage			
Embodied emissions	CO ₂ e	Yes	Section 9.2
Digestate and compost management	CH ₄ , N ₂ O	Yes	Methane and nitrous oxide from digestate storage; nitrous oxide from land application where the product is disposed of rather than used (Section 9.2.2(a)).
Other (activity-specific)	CH ₄ , CO ₂ , N ₂ O	Yes/No	To be identified and justified by the activity developer (Section 9).

5.3 | Baseline, activity and leakage emissions

- 5.3.1 | **Baseline emissions** comprise the methane that would be generated by anaerobic decomposition of excreta under the baseline pathways (Section 7). Only avoided methane is creditable.
- 5.3.2 | Activity emissions comprise energy and fuel for treatment and transport, and process emissions from composting, anaerobic digestion and decentralised wastewater treatment (Section 8).
- 5.3.3 | Leakage emissions comprise embodied (life-cycle) emissions of equipment and infrastructure, market and behavioural leakage, and process leakage such as digestate management (Section 9).

6 | DEMONSTRATION OF ADDITIONALITY

6.1 | Requirements

- 6.1.1 | The activity developer shall demonstrate, in accordance with the GS4GG [Requirements for Additionality Demonstration](#), that the activity would not have occurred in the absence of the incentive provided by revenue from emission reductions.

6.2 | Additionality approach selection

- 6.2.1 | The activity developer shall demonstrate additionality under one of the following options:
 - a|. **Positive List (deemed additionality):** An activity within the qualifying class at Annex 3 (A3.2) is deemed additional, subject to the funding statement at A3.2.4 and the exclusions at A3.6.
 - b|. **Activity-specific assessment:** Where the activity does not qualify for the Positive List (e.g., activities in economies outside the qualifying class at Annex 3, or activities subject to an exclusion at A3.6), additionality shall be demonstrated through an activity-specific assessment under Section 6.5 or 6.6.
- 6.2.2 | **Mandatory analyses:** All activities, regardless of the approach selected, shall successfully complete the following mandatory analyses:

- a|. Regulatory surplus analysis (Section 6.3);
- b|. Lock-in risk analysis (Section 6.4);
- c|. Common practice analysis (Section 6.7); and
- d|. Ongoing financial need at crediting period renewal (Sections 6.8 and 17.3.2(b)).

6.3 | Regulatory surplus analysis

- 6.3.1 | The activity developer shall demonstrate that the emission reductions achieved by the activity are regulatory surplus, meaning they are not required by any existing laws, regulations, or mandates (legal requirements) within the host Party's jurisdiction. In high-income economies, all legal requirements are deemed to be enforced. Elsewhere, a legal requirement may be treated as not enforced only on the basis of authoritative and up-to-date information on its non-enforcement that is relevant to the activity, validated by the VVB.
- 6.3.2 | The analysis shall verify that legal requirements do not:
 - a|. directly mandate the implementation of the mitigation activity;
 - b|. indirectly mandate the implementation of the mitigation activity by requiring a certain technological, performance or management action, or by preventing alternative scenarios; or
 - c|. establish a support scheme (e.g., a subsidy programme) designed to achieve a quantitative target for the relevant technologies that would likely result in the same amount of emission reductions if the activity were not implemented. (Note: Broad national or municipal goals to "eradicate open defecation" do not violate regulatory surplus unless paired with fully funded, mandatory infrastructural execution mechanisms affecting the specific target demographic.)
- 6.3.3 | The assessment shall be conducted at the start of the first crediting period and at each renewal of the crediting period.

6.4 | Lock-in risk analysis

- 6.4.1 | The activity developer shall assess the risk that the activity may lead to a lock-in of GHG emissions, technologies, or carbon-intensive practices inconsistent with the achievement of the host country's NDC or the long-term goals of the Paris Agreement. Every activity, including one exempt from the full assessment under Section 6.4.2, shall state in the design document how it is compatible with the host country's NDC and, where submitted, its LT-LEDS.
- 6.4.2 | **Assessment framework and exemptions:** The assessment follows the framework in the GS4GG [Requirements for Additionality Demonstration](#):
 - a|. For sanitation solutions with negligible associated activity emissions and a demonstrable technical or operational lifetime of less than 10 years, no significant lock-in risk may be assumed, provided the activity aligns with the host country's sustainable-development and sanitation strategies. The validity of this 10-year exemption is limited

to 31 December 2030. Activities validated before that date retain the exemption for the remainder of their crediting period.

- b|. **Full exemption (zero-emission containment or treatment):** Technologies with zero operational processing emissions (e.g., manually collected container-based sanitation, non-mechanised aerobic composting toilets) are exempt from the lock-in risk assessment, as they are fully compatible with net-zero pathways.
- c|. **Conditional exemption (low-emission technologies):** For technologies using small amounts of electricity or fossil fuel (e.g., container toilets with collection and central treatment), exemption applies only where the activity developer provides verifiable evidence (e.g., manufacturer specifications) that the distributed units have a technical or operational lifetime of 10 years or less.
- d|. **Fossil-fuel backup and transport:** The use of fossil-fuel backup generation and of fossil-fuel transport for collection, limited to 10% of operational energy, does not by itself trigger a full lock-in risk assessment, provided the primary technology meets the full or conditional exemption.

6.4.3 | **Requirements for full lock-in risk assessment:** Where the technology deployed does not meet the criteria for full or conditional exemption, the activity developer shall conduct a full lock-in risk assessment and shall demonstrate that the activity:

- a|. is consistent with the host country's LT-LEDS, if one has been submitted;
- b|. employs the technology with the lowest greenhouse gas intensity feasible in the relevant region, considering the technology's lifespan and national circumstances; and
- c|. does not create infrastructural or socio-economic path dependencies that inhibit the transition to lower-emission alternatives.

6.5 | Investment analysis

6.5.1 | Where the activity-specific assessment is used, the activity developer shall conduct an investment analysis in accordance with A6.4-AMT-002 (Section 6.5.2) or a barrier analysis (Section 6.6).

6.5.2 | The investment analysis shall be conducted at the start of the first crediting period in accordance with A6.4-AMT-002, including its requirements on the inclusion of all costs, revenues and public funding, the sensitivity analysis and the demonstration that revenue from emission reductions enables the activity.

6.6 | Barrier analysis (optional alternative)

6.6.1 | As an alternative to the investment analysis, an activity may demonstrate additionality through a barrier analysis, all elements of which shall be validated by the VVB. The activity developer shall:

- a|. identify the barriers that prevent the activity in the absence of revenue from emission reductions, limited to financial, institutional and information barriers and the sanitation-specific barriers set out at Annex 3 (A3.3), and quantify each barrier where possible;
- b|. provide verifiable evidence of each barrier, and that revenue from emission reductions is the decisive element in overcoming it;
- c|. demonstrate that at least one alternative to the activity, normally the baseline scenario, does not face the identified barriers; and
- d|. interpret the evidence conservatively, so that the effect of a barrier is not overestimated.

6.7 | Common practice analysis

- 6.7.1 | All activities, including those on the Positive List, shall assess common practice in accordance with GS4GG [PAA MT400-06](#). The activity developer shall assess the market penetration of equivalent technologies (those providing a similar level of service and meeting the quality standards of this methodology) within the applicable geographic area. The activity is considered additional if the market penetration, excluding installations registered under a carbon-crediting programme, is below the applicable threshold.
- 6.7.2 | Activity developers shall apply the following definitions and parameters:
- a|. **Indicator (P) and assessment approach:** count-based, stock-based. The metric is the number of households or institutional or commercial facilities (end-users) using the technology. A stock-based approach is used because the technologies are durable goods, for which cumulative adoption (from a census or comprehensive surveys) is a more reliable measure of prevalence than annual sales.
 - b|. **Target market size (P_{all}):** The total number of households and institutional or commercial facilities within the applicable geographic area (the host country or a justified sub-national district) relying on non-sewered sanitation, whether or not safely managed.
 - c|. **Reference point:** cumulative adoption at the end of the most recent calendar year for which reliable market data or official statistics are available.
 - d|. **Common Practice Factor (F),** representing the market penetration, as follows: $F = P_{sim}/P_{all}$ (Similar Activities/ Target Market Size)
- 6.7.3 | **The Common Practice Factor (F)** shall be compared with the Common Practice Threshold (F_{max}) specified at Section 6.7.4. If $F \geq F_{max}$, the activity shall be considered common practice and is therefore not additional.

Table 4. Attribute matrix for determining similar activities (P_{sim})

Attribute	Description	Required for similarity (Yes/No)
Application	Safe sanitation services at household, SME and/or institutional levels.	Yes
Performance requirement	Meets the prescribed safety requirements.	Yes
Technology principle	e.g., container-based sanitation, faecal-sludge treatment, anaerobic digestion, composting.	No
Carbon exclusion	Facilities registered under a carbon-crediting programme are excluded from the count.	Yes

6.7.4 | Common Practice Threshold (F_{max}): Technology Maturity Category (TMC) **classification:** TMC-3 (early majority). Autonomous adoption of safe sanitation solutions is hindered by upfront costs, lack of infrastructure and the need for ongoing maintenance. F_{max} **(stock-based):** economies meeting criterion C1 at Annex 3, 25%; other economies, 16%.

6.8 | Ongoing financial need

6.8.1 | At renewal of the crediting period, the additionality of the activity shall be reassessed in accordance with Gold Standard requirements. The activity developer shall provide evidence (e.g., an updated financial analysis or funding assessment) that the activity still requires revenue from emission reductions to remain operational and sustainable in the renewed period (Section 17.3.2).

7 | BASELINE SCENARIO AND EMISSIONS

7.1 | Stepwise baseline approach

7.1.1 | The baseline scenario and the crediting baseline shall be determined in accordance with GS4GG [PAA MS400-04](#) (Requirements for Baseline Determination in Methodologies), following the five steps below.

- Step 1: Selection and justification of the baseline approach.
- Step 2: Application of the selected approach before downward adjustment (including suppressed demand).
- Step 3: Application of the downward adjustment (uncertainty and ambition).
- Step 4: Identification of a conservative business-as-usual (BAU) baseline.
- Step 5: Comparison and selection of the final crediting baseline (BE_y).

7.2 | Step 1: Selection and justification of the baseline approach

7.2.1 | In accordance with GS4GG requirements, this methodology uses approach (c): an approach based on existing actual or historical emissions, adjusted downwards.

- a|. **Justification:** Sanitation emissions depend on the pre-activity containment system (e.g., a pit latrine in an area with a high water table emits methane differently from one in an arid area), so a generic global benchmark is not technically feasible. Approach (c) allows the activity developer to survey the historical practices of the target population, map them to the IPCC 2019 Refinement methods for methane generation and apply the downward adjustments (Uncertainty Adjustment Factor, Downward Adjustment Factor and suppressed-demand caps).

7.3 | Step 2: Application of the selected approach

7.3.1 | **Identification of the baseline scenario:**

- a|. The business-as-usual (BAU) scenario reflects the historical sanitation practices within the activity boundary.
- b|. The activity developer shall conduct a Baseline Scenario Survey to determine the proportion of the target population relying on specific baseline pathways (i) (e.g., wet pit latrines, unmanaged septic tanks, open defecation) before the activity. The survey shall record, for each baseline pathway involving a pit latrine, the number of persons served per pit, which is the basis on which the methane conversion factor is selected under Section 7.3.4. The pathway set shall be drawn from the IPCC categories (e.g., open defecation or no facility, pit latrines, septic systems, open and closed sewers, and treatment systems) and shall include an “unknown” category for persons for whom no information is available, or who spend a material part of their time outside the activity boundary or in an unknown location.
- c|. In determining the proportion relying on each pathway, the activity developer shall account for the locations where the served population spends its time. For example, school-aged children may be expected to spend a predictable fraction of their time at school, relying on the school’s sanitation service rather than the household’s.
- d|. The Baseline Scenario Survey (conducted in accordance with the sampling requirements at Section 14.5) may be substantiated by national statistics, peer-reviewed publications or both and, where available and quality-assured, by municipal city-wide sanitation models⁶. The population shall be determined by a census of all served households, SMEs and institutions; by a survey of served households in accordance with Section 14.5; or from official population data where

⁶ For example, [Shit Flow Diagrams \(SFDs\)](#).

the activity boundary coincides with the reported region and all households in the region are served.

- e|. The VVB shall re-check, for the units in its validation and verification sample, the number of persons served per pit against the register under SASS 6 and the dry or wet classification of pit latrines by site observation. Where the findings of the VVB differ from the Baseline Scenario Survey by more than 20% for a stratum, the lower of the two candidate methane conversion factors shall apply to that stratum.

7.3.2 | **Consistency check between the baseline scenario and the served population:**

- a|. Where an aggregated, area-wide baseline scenario is used, the activity developer shall verify that the baseline pathway mix is representative of the population actually served. A material discrepancy occurs where the served population's actual baseline pathway mix would yield lower baseline emissions than the area-wide estimate. Where a material discrepancy occurs, it shall be resolved using a threshold-based approach:
 - i. **Deviation at or below the validity threshold ($\leq 20\%$ absolute):** the activity developer shall apply a conservative adjustment, revising PBP_i to match the observed, lower-emitting baseline profile of the served population.
 - ii. **Deviation above the validity threshold ($> 20\%$ absolute):** the area-wide baseline scenario is invalid for the affected cohort, and the activity developer shall redefine the baseline scenario for that cohort through a new Baseline Scenario Survey.
- b|. Activities that collect validated, comprehensive baseline data for 100% of served households at onboarding (enabling household-specific baseline determination) are exempt from this consistency check, the survey population and the served population being identical. The activity developer shall not arbitrarily exclude lower-emitting households from the calculations in order to support a higher baseline.

7.3.3 | **Calculation of unadjusted baseline emissions:** Unadjusted baseline emissions are calculated with the *2019 Refinement to the 2006 IPCC Guidelines (Volume 5: Waste)* and account only for methane (CH_4) from the anaerobic decay of sanitation waste.

$$BE_{unadj,y} = \sum_i (P_{i,y} \times Days_y \times BOD_{capita,i} \times B_0 \times MCF_{BAU,i} \times f_{rem,i}) \times GWP_{CH_4} \times 10^{-3} \quad (\text{eq.1})$$

Where

Parameter	Description
$BE_{unadj,y}$	Unadjusted baseline emissions in monitoring period y (tCO_2e).
$P_{i,y}$	Total population relying on baseline pathway i that is served by the activity in monitoring period y (persons) (SASS 6).

$Days_y$	Number of days in monitoring period y (days) (SASS 7).
$BOD_{capita,i}$	Per capita biochemical oxygen demand (kg BOD per person per day) (SASS 4).
B_0	Maximum methane-producing capacity: 0.6 kg CH ₄ /kg BOD (IPCC 2019 default), equivalent to 0.25 kg CH ₄ /kg COD (SASS 3).
$MCF_{BAU,i}$	Methane conversion factor for baseline pathway i (fraction) (Section 7.3.4; SASS 5).
$f_{rem,i}$	Fraction of the baseline organic load of pathway i diverted by the activity; 1 except for containment retained and emptied by the activity (Section 7.3.6) (fraction).
GWP_{CH_4}	Global warming potential of methane (28; IPCC AR5, 100-year).
10^{-3}	Conversion factor (kg to tonnes).

7.3.4 | $MCF_{BAU,i}$ shall be the value for the baseline pathway in Annex A2.3 (IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.3), unless a value is substantiated under Section 7.8. Dry pit latrines shall be classified by the number of persons served per pit, as recorded in the Baseline Scenario Survey: five persons or fewer, 0.1; more than five persons, 0.5. These are discrete categories and shall not be interpolated. Where the survey does not record persons served per pit, the communal value shall not be applied. The value for the “unknown” pathway shall be zero. For a population connected to a sewer that discharges without treatment meeting the safely managed definition (Section 17.2.1(b)(ii)), the value shall be the sum of the sewer value and the value for discharge to aquatic environments in Annex A2.3, applied on the organic-load basis at Annex A2.8.

7.3.5 | **Suppressed demand assessment and caps:**

- a|. Populations lacking access to basic sanitation (e.g., practising open defecation or using unimproved, unlined “flying toilets”) have suppressed demand⁷. To account for this, the methodology assumes that, to meet basic human needs, the target population *would have* built and used a standard basic sanitation facility.

⁷ The suppressed-demand baseline credits the methane that would arise once a population currently practising open defecation or using unimproved facilities reaches a basic sanitation service — the level required to meet basic human needs. This is consistent with the Paris-aligned treatment of basic-needs services: the counterfactual baseline is not the population’s current low-emitting deprivation but the basic service the population is entitled to and would adopt on a development path. Additionality is preserved because the activity, not the household, finances and sustains safe collection and treatment (Section 6); and conservativeness in crediting is ensured by the conservative cap on the counterfactual (Section 7.3.5), the restriction to micro- and small-scale activities, and the host-country Downward Adjustment Factor — together honouring the equity rationale while keeping the baseline conservative.

- i. **Minimum service level (MSL) cap:** For populations practising open defecation or using unimproved sanitation, the methane conversion factor ($MCF_{BAU,i}$) shall be determined as follows. The basic-service counterfactual shall be determined from the observed mix of household-scale basic-service technologies among the already-served population in the applicable geographic area, as evidenced by the Baseline Scenario Survey or a recognised dataset. The communal dry pit latrine value (0.5) shall not be applied to a suppressed-demand counterfactual, a communal facility being capital infrastructure that would not have been built in the absence of the activity. The methane conversion factor shall be set to the lower of 0.5 and the resulting weighted value. A recognised dataset used for this purpose shall be representative of the applicable geographic area and meet the precision required for the Baseline Scenario Survey (Section 14.5), or the conservative bound of its confidence interval shall apply. The suppressed-demand counterfactual applies only to populations shown by the Baseline Scenario Survey or JMP data to lack a basic sanitation service, and the Uncertainty Adjustment Factor for the pathway shall be determined on the counterfactual mix (0.57 where not computed). In a displacement setting, the applicable geographic area is the settlement. Where no household-scale basic service exists among the already-served population of the settlement, the suppressed-demand counterfactual does not apply, and the methane conversion factor of the observed baseline pathway shall be used.
- b|. For suppressed-demand cases, $MCF_{BAU,i}$ shall then be reduced by a mandatory conservativeness deduction of 5% (SASS 14) before use⁸.

7.3.6 | **Containment retained and emptied by the activity:**

- a|. Where the activity empties pit latrines or septic tanks that remain in use, only the organic load removed from the containment is diverted from baseline decomposition. For such pathways, the fraction of the baseline organic load diverted by the activity in Equation 1 shall be determined as follows; for all other pathways it equals 1:
 - i. septic tanks emptied by the activity: 0.5, the IPCC default fraction of the organic load removed as sludge from a septic

⁸ This 5% reduction is a mandatory conservativeness deduction applied specifically to the suppressed-demand counterfactual baseline, reflecting that the basic-service level a deprived population would adopt is an assumed (not observed) counterfactual and should be set conservatively. It is in addition to, and applied before, the uncertainty and ambition adjustments.

- tank that is emptied regularly (IPCC 2019 Refinement, Volume 5, Chapter 6, Equation 6.3c); and
- ii. pit latrines emptied by the activity: the value calculated with Equation 1a from the mass of faecal sludge removed (SASS 18) and the organic content of faecal sludge (SASS 15, or SASS 21 where measured under Section 7.3.6(c)), not exceeding 1.

$$f_{rem,i} = MIN(1; \frac{M_{FS,i,y} \times OC_{FS} \times 10^3}{P_{i,y} \times Days_y \times BOD_{capita,i}}) \quad (\text{eq.1a})$$

Where

Parameter	Description
$f_{rem,i}$	Fraction of the baseline organic load of pathway i diverted by the activity (fraction).
$M_{FS,i,y}$	Mass of faecal sludge removed by the activity in period y from pit latrines of pathway i that remain in use (t, wet basis) (SASS 18).
OC_{FS}	Organic content of faecal sludge removed from pit latrines (kg BOD per kg of wet sludge) (SASS 15, or SASS 21 where measured under Section 7.3.6(c)). Other symbols as in Equation 1; 10^3 converts t to kg.

- b|. Where the Baseline Scenario Survey records that the containment was already emptied in the baseline, the methane conversion factor for the pathway shall be that of the disposal route recorded for the emptied sludge in Annex A2.3, in place of that of the pit or tank, or zero where Annex A2.3 gives no value for that route.
- c|. The activity developer may apply a measured organic content of the faecal sludge removed from pit latrines by the activity (SASS 21) in place of the default (SASS 15), provided that:
 - i. samples are taken at emptying under a sampling protocol set out in the Monitoring Plan and validated, stratified by baseline pathway, containment type and emptying interval;
 - ii. BOD5 is analysed by an accredited laboratory, on a wet-mass basis consistent with the mass recorded under SASS 18;
 - iii. the value applied is the lower bound of the one-sided 90% confidence interval of the mean;
 - iv. the value is re-established in each monitoring period, and whenever the containment type, emptying interval or service area changes; and
 - v. the measured value is applied whether it is higher or lower than the default.

7.3.7 | Where the activity developer measures B_0 , BOD per capita, the methane conversion factor for the activity's baseline pathways, the Uncertainty

Adjustment Factor may be computed from the measured uncertainties in place of the default values at Annex A2.6, provided that:

- a|. the measurement follows a documented protocol specifying sampling design, sample size, laboratory accreditation and analytical method, set out in the Monitoring Plan and validated;
- b|. the uncertainty applied is that computed from the measured data at 95 per cent confidence, and shall not be lower than the precision demonstrated by the sampling design;
- c|. the sampling is representative of the baseline pathway across the activity boundary, stratified where the served population is heterogeneous;
- d|. the measured value is applied in place of the default irrespective of whether it increases or decreases baseline emissions; and
- e|. aggregation and conversion follow Annex A2.6.

7.4 | Step 3: Application of the downward adjustment

7.4.1 | **Adjustment for uncertainty (UAF):** The baseline emission factor is the product of three IPCC Tier 1 default parameters: maximum methane-producing capacity (B_0), per-capita organic load (BOD) and the methane conversion factor (MCF). The *UAF* discounts the unadjusted baseline for the uncertainty of the parameters that are not otherwise conservatively bounded.

- a|. *UAF* Default: The Uncertainty Adjustment Factor shall be determined for the activity's baseline pathway mix using the parameter uncertainties at Annex A2.6, aggregated by root sum of squares at 95% confidence and converted to a one-sided 90% lower bound by the factor 0.6541. The resulting pathway-specific factors are:
 - i. dry pit latrine, small family: 0.57;
 - ii. septic tank: 0.67;
 - iii. communal dry pit latrine and stagnant sewer: 0.69;
 - iv. wet pit latrine: 0.72; and
 - v. sewered discharge to aquatic environments: 0.31.
- b|. Where the activity developer does not compute a pathway-specific factor, an Uncertainty Adjustment Factor of 0.57 shall apply. For the sewered-without-adequate-treatment pathway, the factor for sewered discharge to aquatic environments applies to the whole pathway.

$$BE_{unc,y} = BE_{unadj,y} \times UAF \quad (\text{eq.2})$$

Where

Parameter	Description
$BE_{unc,y}$	Uncertainty-adjusted baseline emissions in monitoring period y (tCO ₂ e).
$BE_{unadj,y}$	Unadjusted baseline emissions in monitoring period y (tCO ₂ e).

<i>UAF</i>	Uncertainty Adjustment Factor $\approx$ pathway-specific; 0.57 where not computed (Section 7.4.1(a) and Annex A2.6) (SASS 13).
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7.4.2 | **Adjustment for ambition (DAF):** A Downward Adjustment Factor ($DAF_{NetZero}$) shall be applied to the uncertainty-adjusted baseline emissions to encourage ambition over time. The factor shall be taken from GS4GG [PAA MT400-05](#) according to the host-country net-zero classification, including for suppressed-demand baselines.

$$BE_{adj,y} = BE_{unc,y} \times (1 - DAF_{NetZero}) \quad (\text{eq.3})$$

Where

Parameter	Description
$BE_{adj,y}$	Ambition-adjusted (downward-adjusted) baseline emissions in monitoring period y (tCO ₂ e).
$DAF_{NetZero}$	Downward Adjustment Factor for net-zero alignment (fraction), per GS4GG PAA MT400-05 (SASS 12).

7.5 | Step 4: Identification and calculation of the conservative BAU scenario

7.5.1 | The conservative business-as-usual (BAU) scenario represents the emissions that would occur in the absence of the activity, accounting for uncertainty (*UAF*) but excluding the policy-driven *DAF* (ambition):

$$BAU_y = BE_{unc,y} \quad (\text{eq.4})$$

Where

Parameter	Description
BAU_y	Conservative business-as-usual emissions in monitoring period y (tCO ₂ e).

7.6 | Step 5: Selection of the crediting baseline

7.6.1 | The crediting baseline before the safe-management adjustment is the lower of the downward-adjusted baseline (Step 3) and the conservative BAU baseline (Step 4).

$$BE_{min,y} = MIN(BE_{adj,y}, BAU_y) \quad (\text{eq.5})$$

7.6.2 | **Crediting baseline:** Only methane that the activity verifiably avoids may be credited. Baseline methane is avoided only to the extent that the activity collects, conveys and safely treats the sanitation waste of the served population, diverting it from anaerobic decomposition in the baseline. The crediting baseline (BE_y) is therefore scaled by the safe-management parameters, the Operational Fraction (SASS 8) and the Collection Compliance

Factor (SASS 9), which represent the fraction of sanitation waste safely collected, conveyed and treated in the period:

$$BE_y = BE_{min,y} \times OF_y \times CC_y \quad (\text{eq.6})$$

Where

Parameter	Description
BE_y	Crediting baseline emissions in monitoring period y, after the safe-management adjustment (tCO ₂ e).
$BE_{min,y}$	Crediting baseline before the safe-management adjustment (Equation 5).
OF_y	Operational Fraction: fraction of toilets or containment units verifiably in active use by the population (SASS 8).
CC_y	Collection Compliance Factor: fraction of faecal sludge safely collected, transported and successfully treated, meeting environmental product safety standards, without illegal dumping (SASS 9).

7.6.3 | The three population and performance terms apply to distinct, non-overlapping populations or fractions and are multiplicative:

- a|. $P_{i,y}$ — the population enrolled in and served by the activity on baseline pathway i (which, in the baseline, has an emitting profile);
- b|. OF_y — of the units serving that population, the fraction verifiably in active use (units abandoned, destroyed, or where users have reverted to open defecation count as zero);
- c|. CC_y — of the sanitation waste arising from units in active use, the fraction verifiably collected, conveyed and safely treated.

A given loss (e.g., a household reverting to open defecation, or a load dumped informally) shall be reflected in exactly one of these terms, so that no reduction is discounted twice (see the hierarchy under SASS 9).

7.6.4 | Quantification of the difference between BAU and crediting baseline: As required by GS4GG [PAA MS400-04](#), the difference between the conservative BAU and the selected baseline before the safe-management adjustment ($BE_{min,y}$), being the quantity to which the ambition adjustment applies, shall be quantified and reported in the monitoring report. This difference represents the emissions excluded from crediting by the ambition adjustment:

$$\Delta_y = BAU_y - BE_{min,y} \quad (\text{eq.7})$$

7.7 | Safeguard for technical lifetime

7.7.1 | Emission reductions shall be claimed only for sanitation containment hardware and treatment plant components operating within their manufacturer-rated technical lifetime. Units exceeding their technical lifetime

shall be deemed non-operational (OF_y) unless verifiable replacement or retrofitting is recorded in the activity database.

7.8 | Substantiation of baseline parameters

- 7.8.1 | The activity developer may propose a substantiated value for B_0 , per-capita organic load or the methane conversion factor of a baseline pathway in place of the default at Annex 2, and the corresponding measured uncertainty in place of the default at Annex A2.6, where the design document sets out:
- a|. the measurement protocol, including sampling design, sample size, laboratory accreditation and analytical method; the conditions to which the value applies, including climate zone, groundwater regime, containment technology and desludging practice;
 - b|. the uncertainty computed at 95% confidence, which shall not be lower than the precision demonstrated by the sampling design; and a demonstration that sampling is representative of the baseline pathway across the activity boundary, stratified where the served population is heterogeneous.
- 7.8.2 | A value substantiated under another mitigation activity may be applied where the activity developer demonstrates that the conditions are materially the same, and applies the value at the conservative bound of its stated confidence interval.
- 7.8.3 | A proposed value and uncertainty shall be assessed at validation and confirmed at each verification. Where either is not accepted, the default value at Annex 2 and the default uncertainty at Annex A2.6 shall apply for the period concerned.
- 7.8.4 | A substantiated value shall be applied in place of the default whether it increases or decreases baseline emissions.
- 7.8.5 | The methane conversion factors and nitrous oxide emission factors of treatment units in Section 8.8.1 shall not be substantiated under this Section; Section 8.8.2 applies.

8 | ACTIVITY EMISSIONS

8.1 | Identification of the activity scenario

- 8.1.1 | The activity scenario is defined by the deployment of the activity technology along the sanitation service chain and the associated energy, fuel and process emissions. Where the activity includes technologies with materially different performance characteristics, the activity developer shall analyse whether multiple activity scenarios should be identified and monitored separately. Where a treatment facility co-treats non-sanitation waste, or receives sanitation waste from populations outside the activity boundary, the facility's process and embodied emissions shall be allocated between the activity-attributable and non-attributable streams on a documented mass or energy basis, fixed ex ante and applied consistently, and only the activity-attributable share shall be accounted; the residual share shall be reported.

Where sanitation waste is delivered to a facility not owned or operated by the activity developer, the attributable share of that facility's process emissions shall be accounted on the same basis. Carbon dioxide arising from the combustion or degradation of any fossil-derived fraction present in the treated stream, including functionally integral consumables admitted under Section 3.2.6(c), shall be accounted in full.

8.2 | Calculation of total activity emissions

8.2.1 | Activity emissions (AE_y) are all anthropogenic GHG emissions occurring within the activity boundary that are attributable to the activity. Where the activity co-treats permitted non-sanitation feedstock, only the sanitation-attributable share of the treatment facility's operating emissions shall be accounted, allocated as set out in Section 8.1.1. Incidental spillage of sanitation waste, which is expected to undergo aerobic decomposition, is not treated as an activity emission, provided the activity developer demonstrates that spillage is non-systematic and immaterial. Only the emission sources relevant to the technologies deployed apply; non-applicable terms are set to zero. Total activity emissions are:

$$AE_y = AE_{op,y} + AE_{trans,y} + AE_{comp,y} + AE_{biogas,y} + AE_{fst,y} + AE_{ww,y} + AE_{eff,y} \quad (eq.8)$$

Parameter	Description
AE_y	Total activity emissions in monitoring period y (tCO ₂ e).
$AE_{op,y}$	Activity emissions from operation of the treatment facility (energy and fuel) in period y (tCO ₂ e) (Section 8.3).
$AE_{trans,y}$	Activity emissions from emptying and transport in period y (tCO ₂ e) (Section 8.4).
$AE_{comp,y}$	Activity emissions from composting or co-composting in period y (tCO ₂ e) (Section 8.5).
$AE_{biogas,y}$	Activity emissions from anaerobic digestion and biogas in period y (tCO ₂ e) (Section 8.6).
$AE_{fst,y}$	Emissions from faecal sludge treatment in period y (tCO ₂ e) (Section 8.8).
$AE_{ww,y}$	Activity emissions from decentralised wastewater treatment in period y (tCO ₂ e), where applicable (Section 8.7).
$AE_{eff,y}$	Emissions from effluent discharge (residual-BOD downstream methane and any N ₂ O) in period y (tCO ₂ e) (Section 8.7).

8.3 | Emissions from process operations

8.3.1 | Emissions from electricity and fossil-fuel consumption for treatment-facility operation ($AE_{op,y}$) are the sum of electricity- and fuel-related emissions:

$$AE_{op,y} = AE_{op,elec,y} + AE_{op,fuel,y} \quad (eq.9)$$

Where

Parameter	Description
$AE_{op,elec,y}$	Activity emissions from operation of the treatment facility (electricity) in period y (tCO ₂ e).
$AE_{op,fuel,y}$	Activity emissions from operation of the treatment facility (fuel) in period y (tCO ₂ e).

8.3.2 | This term covers emissions from grid electricity or fossil fuel combustion used to operate centralised or decentralised treatment facilities (e.g., aerators, mechanical presses, facility lighting). Emissions from electricity consumption shall be calculated using [A6.4-AMT-007](#), with [GS4GG PAA MT400-10](#), or with the default emission factor at Section 8.3.3. Emissions from fossil fuel combustion shall be calculated using GS4GG Methodology [Tool 01: Project or Leakage Emissions from Fossil Fuel Combustion](#). Where the facility co-treats other waste streams, its operating emissions shall be allocated as set out in Section 8.1.1.⁹

8.3.3 | As a simplified alternative, the activity developer may apply the conservative default emission factor of 1.3 tCO₂e/MWh (SASS 16) to electricity consumed from the grid, in accordance with Option B of [A6.4-AMT-007](#) (section 5.7.2), the quantity consumed being taken from metered or billed data.

8.4 | Emissions from sludge transport

8.4.1 | This term covers emissions from fossil fuels consumed by vacuum trucks, tanker fleets or motorised collection carts carrying faecal sludge from containment units to the treatment plant, calculated using GS4GG Methodology [Tool 02: Emissions from Freight Transport](#). Where the activity uses manual push-carts, or electric tricycles charged with 100% renewable energy, this term is zero.

8.5 | Emissions from aerobic treatment and composting

8.5.1 | Where the activity uses aerobic composting (e.g., co-composting sludge with organic waste) or container-based aerobic processing, fugitive emissions (CH₄ and N₂O) from forced aeration or windrow turning shall be quantified using [CDM TOOL13: Project and leakage emissions from composting](#), or the succeeding PACM or GS4GG equivalent.

⁹ Activity emissions are quantified using recognised tools. Where a more recent Gold Standard or PACM tool supersedes a referenced CDM tool, the prevailing Gold Standard tool shall be applied. All tools shall apply AR5 100-year GWP values consistently.

8.6 | Emissions from anaerobic digestion and biogas generation

8.6.1 | Where the activity treats sludge by anaerobic digestion, physical leaks from the digester dome and flaring inefficiencies shall be quantified using [CDM TOOL14: Project and leakage emissions from anaerobic digesters](#), or the succeeding PACM or GS4GG equivalent.

8.7 | Emissions from effluent discharge

8.7.1 | Where liquid effluent from the treatment plant is discharged into the environment (e.g., rivers or wetlands), downstream methane from residual BOD shall be calculated using the IPCC 2019 Refinement, Volume 5, Chapter 6 default equations for wastewater discharge, based on the methane conversion factor of the receiving environment. Where the activity includes decentralised wastewater treatment, the associated process emissions ($AE_{ww,y}$) shall be calculated using the emission factors for the corresponding treatment system at IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.3 (methane), applied on the same organic-load basis as the baseline, and Table 6.8a (nitrous oxide), applied with Equation 9a or, where nitrogen content is measured, Equation 9b (Section 8.8.3).

8.8 | Emissions from faecal sludge treatment

8.8.1 | Where the activity treats faecal sludge in drying beds (planted or unplanted), settling or thickening tanks or stabilisation ponds, the CH₄ and N₂O generated by anaerobic zones within these processes shall be quantified as follows:

- a|. methane, by applying Equation 1 to the pathways whose sanitation waste is treated in the unit, each unit in a treatment line being quantified on the full organic load treated in that line, with the diverted fraction determined under Section 7.3.6 and the methane conversion factor of the unit in place of that of the baseline pathway: for settling or thickening tanks and stabilisation ponds, 0.2 where less than 2 m deep and 0.8 where 2 m deep or more; for drying beds, 0.2 (IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.3, anaerobic lagoon categories, there being no category for drying beds); and
- b|. nitrous oxide, by applying Equation 9a with the emission factor for the corresponding treatment system in IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.8a or, where the table gives no factor for the system, the default factor for centralised wastewater treatment plants.

$$E_{N2O,k,y} = \sum_i (P_{i,k,y} \times f_{rem,i}) \times N_{capita} \times \frac{Days_y}{365} \times EF_{N2O,k} \times \frac{44}{28} \times GWP_{N2O} \times 10^{-3} \quad (eq.9a)$$

Where

Parameter	Description
$E_{N2O,k,y}$	Nitrous oxide emissions from treatment, storage or land application k in period y (tCO ₂ e).

$P_{i,k,y}$	Population of baseline pathway i whose sanitation waste is subject to treatment, storage or land application k in period y (persons).
N_{capita}	Nitrogen in excreta per person (kg N per person per year) (SASS 17).
$EF_{N2O,k}$	Direct nitrous oxide emission factor for k (kg N ₂ O-N per kg N), as specified in Sections 8.7.1, 8.8.1(b) and 9.2.2(a).
GWP_{N2O}	Global warming potential of nitrous oxide (265; IPCC AR5, 100-year) (Annex A2.1). Other symbols as in Equation 1; 44/28 converts N ₂ O-N to N ₂ O and 10 ⁻³ converts kg to t.

8.8.2 | Where a recognised Gold Standard or PACM tool provides a more specific quantification for the treatment system used, and that tool operates on the same organic-load basis as the baseline, that tool may be applied. Where a tool operates on a chemical oxygen demand basis, conversion shall follow Annex A2.8.

8.8.3 | Where the nitrogen content of the sanitation waste or product delivered to treatment, storage or land application k is measured (SASS 22), nitrous oxide may be calculated with Equation 9b in place of Equation 9a, provided that samples are taken under a sampling protocol set out in the Monitoring Plan and validated, total Kjeldahl nitrogen is analysed by an accredited laboratory on a wet-mass basis consistent with the mass recorded, and the value is re-established in each monitoring period. The value applied shall be the upper bound of the one-sided 90% confidence interval of the mean, whether the result is higher or lower than that of Equation 9a.

$$E_{N2O,k,y} = M_{k,y} \times N_{k,y} \times EF_{N2O,k} \times \frac{44}{28} \times GWP_{N2O} \times 10^{-3} \quad (eq.9b)$$

Where

Parameter	Description
$E_{N2O,k,y}$	Nitrous oxide emissions from treatment, storage or land application k in period y (tCO ₂ e).
$M_{k,y}$	Wet mass of sanitation waste or product delivered to treatment, storage or land application k in period y (t), from weighbridge, intake or delivery records.
$N_{k,y}$	Nitrogen content of the sanitation waste or product delivered to k (kg N per t, wet basis) (SASS 22). Other symbols as in Equation 9a; 10 ⁻³ converts kg to t.

8.9 | Storage before treatment

8.9.1 | Sanitation waste held in containers or intermediate storage before treatment, other than in pit latrines or septic tanks emptied under Section 7.3.6, shall be collected at intervals not exceeding 14 days, as shown by the collection records under SASS 9; methane from such storage is not accounted. Sanitation waste held for longer shall be treated as not safely collected in determining the Collection Compliance Factor (SASS 9).

9| LEAKAGE EMISSIONS

9.1 | Identification of leakage emission sources

9.1.1 | The activity developer shall identify all material leakage sources. Leakage under this methodology comprises three categories:

- a|. **Embodied (life-cycle) emissions** — the upstream emissions embodied in the manufacture and installation of activity equipment and infrastructure (e.g., containers, digesters, treatment units, collection vehicles, pipework), where material.
- b|. **Market and behavioural leakage** — emissions arising outside the activity boundary as a consequence of the activity (e.g., diversion of sanitation waste or co-treated feedstock from other safe-capture systems, or displacement of disposal activity elsewhere), linked to the perverse incentives and rebound assessments (Sections 3.4.9 and 3.4.10).
- c|. **Process leakage** — emissions from the management of process residues outside the core treatment step, in particular methane and nitrous oxide from digestate storage, and nitrous oxide from digestate or compost disposed of to land (Section 9.2.2(a)).

9.1.2 | Total leakage emissions are:

$$LE_y = LE_{embodied,y} + LE_{market,y} + LE_{proc,y} \quad (eq.10)$$

9.2 | Estimation of leakage emissions

9.2.1 | Embodied (life-cycle) emissions shall be quantified using the material-factor method and default values in Annex A2.5, with each item's embodied emissions amortised as set out at Section 9.2.3. The standardised tiers at Section 9.2.3 are permitted simplifications of the Annex A2.5 method.

9.2.2 | Market, behavioural and process leakage ($LE_{market,y}$ & $LE_{proc,y}$)

- a|. **Digestate and by-product disposal:** Where anaerobic digestion is used, the resulting digestate shall be managed safely (e.g., aerobically composted or applied to soil). Methane from digestate disposed of in a solid waste disposal site or held in anaerobic storage, such as an un-aerated lagoon, shall be quantified as leakage using CDM TOOL14, applying the global warming potentials at Annex A2.1. Nitrous oxide from digestate storage shall be quantified with Equation 9a or, where nitrogen content is measured, Equation 9b (Section 8.8.3), using the direct emission factor for the storage system in IPCC 2019 Refinement, Volume 4, Chapter 10. Nitrous oxide from the land application of digestate or compost shall be accounted only where the product is disposed of to land rather than supplied for use as a fertiliser or soil improver meeting SASS 11, and shall then be quantified with Equation 9a or Equation 9b, using the default direct emission factor for nitrogen applied to soils (EF1) in IPCC 2019 Refinement, Volume 4, Chapter 11, Table 11.1.

- b|. **Informal dumping or perverse handling:** Where containment units are illegally dumped or sold outside the activity boundary, this shall be managed through the UID tracking system and chain-of-custody logs. Where chain of custody between extraction and treatment intake cannot be demonstrated for a stream, the Collection Compliance Factor for that stream shall be determined under the missing-data rule in SASS 9; no separate leakage deduction is made.

9.2.3 | The cradle-to-gate embodied emissions of the physical sanitation infrastructure (e.g., from manufacturing plastics, concrete, steel and vehicles) shall be deducted. The following standardised tiers and amortisation rules apply:

- a|. Tier 1: Short-lived containment (technical lifetime < 5 years):
 - i. Examples: Plastic container-based sanitation (CBS) receptacles, buckets, transfer drums.
 - ii. Amortisation: Deducted in full from the crediting calculation in the first year of the unit's deployment.
- b|. Tier 2: Durable in-situ hardware (technical lifetime $\geq$ 5 years):
 - i. Examples: Concrete compost toilet vaults, fibreglass substructures, local transfer kiosks.
 - ii. Amortisation: Distributed evenly (annualised) over the 5-year crediting period.
- c|. Tier 3: Centralised treatment plants (FSTPs) and vacuum trucks:
 - i. Examples: Centralised mechanical plants, concrete digesters, fleet vehicles.
 - ii. Approach: For treatment plants and vehicle fleets procured by the activity, embodied emissions shall be quantified from the bill of quantities and the factors at Annex A2.5. An activity developer may instead submit a life cycle assessment conducted in accordance with ISO 14040 and ISO 14044 and reported in accordance with ISO 14067. Embodied emissions are attributed on a causation basis: where treatment infrastructure existed before the activity and would have existed in its absence, its embodied emissions are not attributable to the activity and no deduction arises, the attributable share of that facility's operating emissions continuing to be accounted under Section 8; where infrastructure was constructed, expanded or refurbished in order to serve the activity, or in anticipation of the activity as evidenced by the prior-consideration record, its embodied emissions shall be attributed on the share allocated on a mass or energy basis (Section 8.1.1), irrespective of ownership.
 - iii. Amortisation: Annualised over the 5-year crediting period.

9.2.4 | Mandatory true-up: Where an activity ceases verification or permanently terminates before the end of the 5-year crediting period, any remaining

unamortised embodied emissions for active fleets or plants shall be deducted in full in the final issuance request.

10| NET GHG EMISSION REDUCTIONS

10.1 | Calculation of net GHG emission reductions

10.1.1 | The net GHG emission reductions in monitoring period y are the crediting baseline emissions (after the safe-management adjustment), less activity emissions and leakage emissions:

$$ER_y = BE_y - AE_y - LE_y \quad (eq.11)$$

Parameter	Description
ER_y	Net emission reductions in monitoring period y (tCO ₂ e).
BE_y	Crediting baseline emissions in monitoring period y (tCO ₂ e).
AE_y	Activity emissions in monitoring period y (tCO ₂ e).
LE_y	Leakage emissions in monitoring period y (tCO ₂ e).

10.1.2 | Where ER_y is negative in a period, no emission reductions shall be claimed for that period.

11| MEETING METHODOLOGICAL PRINCIPLES

11.1 | Encouraging ambition over time

11.1.1 | The methodology builds increasing ambition into the crediting baseline through the mandatory DAF in Step 3 of the baseline calculation. The DAF, set under GS4GG PAA MT400-05 according to the host-country classification, lowers the crediting baseline over time, shifting the cost of sanitation provision back towards public utilities over the long term.

11.2 | Equitable sharing of mitigation benefits

11.2.1 | Sanitation activities deliver significant socio-economic and public health benefits. To meet the GS4GG Community Services Activity Requirements and prevent service substitution (where activity developers target only middle-income populations able to pay tariffs while bypassing the ultra-poor), the activity developer shall implement and audit a Benefit-Sharing Plan (BSP). The BSP shall document how carbon revenues are used to:

- a|. cross-subsidise sanitation tariffs or connection fees for ultra-poor households and informal settlement residents; and
- b|. provide formal PPE, health training and fair-wage employment for local, often stigmatised, sanitation and emptying workers.

11.3 | Avoidance of double counting

11.3.1 | To mitigate the risk of double issuance and double claiming:

- a|. Asset census tracking: Every household containment unit or subsidised latrine shall be tagged with a Unique Identifier (UID) and logged in a centralised digital database.
- b|. Carbon rights waivers: The activity developer shall secure explicit, documented consent from participating households, institutions or partner municipalities waiving their rights to claim independently the emission reductions from the waste collected.

11.4 | Aligning with NDC and LT-LEDS

- 11.4.1 | The capture of methane from waste and the formalisation of sanitation supply chains support the NDCs of most developing countries. The lock-in risk analysis (Section 6.4) ensures that the activity does not finance carbon-intensive, fossil-reliant treatment infrastructure that would contradict national long-term low-emission development strategies (LT-LEDS).

11.5 | Encouraging broad participation

- 11.5.1 | By providing a suppressed-demand baseline for populations practising open defecation, with a conservative cap (a methane conversion factor of 0.5), the methodology enables activity developers to extend services into the most disadvantaged, hard-to-reach informal settlements, extending climate finance to populations historically excluded from carbon markets.

11.6 | Including data sources, accounting for uncertainty and monitoring

- 11.6.1 | Methane accounting for biological processes carries inherent uncertainty. The methodology manages it by:
 - a|. applying a pathway-specific Uncertainty Adjustment Factor to the baseline, derived from the published uncertainty ranges of the parameters used rather than from a single blended value, so that the discount is commensurate with the uncertainty assessed for the pathway; and
 - b|. applying the 90/10 rule: where field sampling used to assess ex-post compliance (e.g., *OFy* or *CCy*) does not achieve 90% confidence with 10% relative precision, the conservative bound of the confidence interval shall be applied.

11.7 | Taking into account policies, measures and relevant circumstances

- 11.7.1 | The mandatory regulatory surplus analysis (Section 6.3) ensures that carbon finance does not replace existing municipal obligations. Where a centralised municipal sewer network expands into the activity boundary and provides safely managed sanitation to the target dwellings, the baseline shall be updated at crediting period renewal (Section 17.2), so that carbon finance does not subsidise legally mandated, state-funded public works. This restates the regulatory surplus requirement at Section 6.3 and does not operate as a

free-standing bar. Public or municipal ownership of the service does not of itself affect eligibility; what is excluded is the crediting of a service that is both legally mandated and state funded.

12| REVERSALS

12.1 | Assessment of reversal risks

- 12.1.1 | The mitigation outcomes generated under this methodology are not at risk of reversal. No removals are credited under this methodology; durable carbon in treated outputs, such as biochar, may be claimed only under an applicable removals methodology (Section 3.4.4(f)).

12.2 | Mitigation and management of reversal risks

- 12.2.1 | As there is no risk of physical reversal, reversal mitigation mechanisms (such as contributions to the GS4GG Compliance Buffer Pool) are not required for this methodology.
- 12.2.2 | Management of performance risks (non-permanence of the activity): While credited emission reductions cannot be reversed, the activity itself may cease to generate future benefits. For example:
- a|. Households may abandon container-based toilets and revert to open defecation.
 - b|. Vacuum truck operators may revert to informal dumping of sludge into local waterways.
 - c|. The centralised faecal sludge treatment plant (FSTP) may suffer mechanical failure, leading to untreated anaerobic discharge.
- 12.2.3 | This is a performance risk, not a reversal risk, and is managed through ex-post monitoring (Section 14). Emission reductions are quantified ex post and scaled by two compliance parameters: the Operational Fraction (OF_y) and the Collection Compliance Factor (CC_y). If the activity fails, these parameters fall, potentially to zero, halting crediting without affecting the integrity of emission reductions already issued.

12.3 | Addressing reversals

- 12.3.1 | Procedures for addressing reversals (e.g., compensation mechanisms, reversal event reporting, buffer deductions) do not apply to this methodology.

13| UNCERTAINTY QUANTIFICATION

13.1 | Approach to uncertainty management

- 13.1.1 | The methodology quantifies and manages uncertainty so that the reported net emission reductions are conservative. Uncertainty is addressed according to the nature of the data:

- a|. **Standardised parameters (IPCC Tier 1 defaults):** To avoid requiring micro-scale activities to conduct costly primary biochemical oxygen demand (BOD) testing across thousands of decentralised households, IPCC regional defaults are used. The uncertainty of these defaults is managed by applying the pathway-specific Uncertainty Adjustment Factor (*UAF*) determined under Section 7.4.1 and Annex A2.6 to the unadjusted baseline.
- b|. **Sampled data (statistical conservativeness):** Parameters derived from sampling or testing (such as the served population, baseline pathway proportions, the safe-management compliance parameters and treatment-performance parameters) are subject to the 90/10 rule (90% confidence, 10% precision). Where the rule is not met, the conservative bound of the 90% confidence interval shall be applied: the lower bound for parameters whose higher values increase emission reductions, and the upper bound for parameters whose higher values reduce them.
- c|. **Explicit baseline uncertainty adjustment:** The combined uncertainty of the emission-factor parameters B_0 , *BOD* per capita and the methane conversion factor is addressed by applying the pathway-specific Uncertainty Adjustment Factor determined under Section 7.4.1 to the unadjusted baseline emissions. The served population is excluded from this aggregation; its downside being taken by the 90/10 sampling rule and the requirement to apply the conservative bound where the required precision is not met. Together, the Uncertainty Adjustment Factor (parameter uncertainty) and the conservative-bound rule for sampled data (sampling uncertainty) address the overall uncertainty of the quantification, each being applied in the conservative direction.

13.2 | Sources of uncertainty and mitigation

13.2.1 | The following table summarises the key sources of uncertainty and the mitigation measures required by this methodology.

Table 5. Key uncertainty sources and mitigation measures

Source of uncertainty	Parameter(s) affected	Mitigation measure(s)
Emission-factor parameter uncertainty (defaults)	B_0 , <i>BOD</i> , <i>MCF</i>	Conservative IPCC (or peer-reviewed regional) defaults; pathway-specific <i>UAF</i> determined under Section 7.4.1 (0.57 default); 5% conservativeness deduction on the suppressed-demand counterfactual.
Sampling uncertainty (population and pathway mix)	P_{iy} , $PBP_{i,y}$	Sampling under Section 14.5; 90/10 rule with the conservative bound applied where not met; consistency check between baseline scenario and served population (Section 7.3.2).

Performance and compliance uncertainty	OF_y , CC_y (safe-management compliance), treatment performance	The 90/10 rule applies to field surveys; where precision targets are not met, the conservative bound of the 90% confidence interval shall be applied. Digital or logbook cross-referencing: containment emptying logs are matched with intake weighbridge records at the treatment plant. Unverified sludge volumes reduce CC_y ; where a stream cannot be quantified, the missing-data rule in SASS 9 applies.
Measurement uncertainty (energy, fuel, transport)	Metered electricity and fuel; transport activity data	Tool requirements (A6.4-AMT-007 or the default at Section 8.3.3; GS4GG Methodology Tools 01 and 02); meter accuracy, calibration and maintenance.
Process-emission uncertainty	Composting, anaerobic digestion and wastewater process emissions	Quantification using recognised tools (CDM TOOL13 and TOOL14) and the IPCC 2019 Refinement, Volume 5, Chapter 6 emission factors.
Behavioural and market uncertainty	Leakage (rebound, feedstock diversion)	Perverse incentives and rebound assessments (Sections 3.4.9 and 3.4.10); quantification and deduction where an effect is plausible and material (Section 9).

14| MONITORING METHODOLOGY

14.1 | Monitoring requirements

14.1.1 | The activity developer shall develop and implement a Monitoring Plan detailing the procedures for data collection, chain-of-custody management and quality control. The monitoring system shall ensure continuous, accurate and transparent quantification of safe sanitation service delivery.

14.1.2 | Core monitoring activities and their frequency:

- a|. Activity database: continuous maintenance and updating (deployment, maintenance, replacement, removal of units; served population).
- b|. Safe-management compliance and treatment performance: monitored each monitoring period, with the frequency and method specified per parameter below.
- c|. Baseline Scenario Survey: ex ante; baseline pathway mix fixed for the crediting period (reassessed at renewal, [Section 17.2](#)).
- d|. Energy, fuel and transport metering or records: continuous, in accordance with the relevant tools.

14.1.3 | Activity database: The activity developer shall maintain a comprehensive electronic database including, at minimum: a Unique Identifier (UID) for each unit or assigned end-user; technology type and date of commissioning; the served population and its assignment to baseline pathways; the corresponding baseline scenario; safe-management compliance and treatment-performance records; and records of maintenance, calibration and any data gaps. Personal and geolocation data shall be collected and stored only to the extent permitted by applicable data-protection law, with relational identifiers maintained for VVB verification to prevent double counting.

14.2 | Data and parameters not monitored

14.2.1 | The following parameters are determined ex ante and fixed for the crediting period (reassessed at renewal). Default values are consolidated in Annex 2.

Parameter ID	SASS 1
Data/parameter:	<i>i</i>
Description	Set of treatment and discharge pathways present in the baseline (including open defecation or no facility, pit latrines, septic systems, open and closed sewers, treatment systems, and an “unknown” category).
Data unit:	Dimensionless (category)
Equations referred:	1, 2
Purpose of data:	☒ Baseline emissions
Value(s) applied:	Determined at activity level
Source of data:	☒ Measured ☐ Other source IPCC 2019 Refinement, Volume 5, Chapter 6 (pathway categories); Baseline Scenario Survey, official statistics or peer-reviewed studies for the applicable geographic area.
Choice of data or measurement methods and procedures:	Where official data from national, regional or municipal authorities are not available, peer-reviewed studies may be used. A baseline study by the activity developer may be used instead of a peer-reviewed study where its rigour and independence are demonstrated.
Treatment of uncertainty	Pathway categories per IPCC; uncertainty in proportions addressed under SASS 6 and the consistency check (Section 7.3.2).
Comments:	Fixed for the crediting period; reassessed at renewal.

Parameter ID	SASS 2
Data/parameter:	GWP_{CH_4}
Description	Global warming potential of methane

Data unit:	tCO ₂ e/tCH ₄
Equations referred:	1
Purpose of data:	☒ Baseline emissions
Value(s) applied:	28 (IPCC AR5, 100-year, biogenic methane).
Source of data:	☐ Measured ☒ Other source IPCC AR5, 100-year values.
Choice of data or measurement methods and procedures:	N/A
Treatment of uncertainty	N/A (defined constant).
Comments:	Fixed: IPCC AR5 100-year value.

Parameter ID	SASS 3
Data/parameter:	B_0
Description	Maximum methane-producing capacity
Data unit:	kg CH ₄ /kg BOD
Equations referred:	1
Purpose of data:	☒ Baseline emissions
Value(s) applied:	Default 0.6 kg CH ₄ /kg BOD (Annex A2.2).
Source of data:	☐ Measured ☒ Other source 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5: Waste, Chapter 6, Table 6.2.
Choice of data or measurement methods and procedures:	Global default value for domestic wastewater/sludge.
Treatment of uncertainty	Conservative default; UAF applied at baseline level
Comments:	Use BOD and B ₀ on a consistent basis. Fixed for the crediting period.

Parameter ID	SASS 4
Data/parameter:	$BOD_{capita,i}$

Description	Per-capita organic load.
Data unit:	kg BOD per person per day
Equations referred:	1, 1a
Purpose of data:	☒ Baseline emissions
Value(s) applied:	IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.4: the country value where the table gives one, otherwise the regional value: Africa — 0.037 (Egypt 0.034) Asia, Middle East and Latin America — 0.040 (India 0.034; Brazil 0.050) Canada, Europe, Russia and Oceania — 0.060 United States — 0.085 A substantiated value may be applied under Section 7.8.
Source of data:	☐ Measured ☒ Other source 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5: Waste, Chapter 6, Table 6.4.
Choice of data or measurement methods and procedures:	The activity developer shall select the IPCC default corresponding to the location of the target population.
Treatment of uncertainty	Conservative default; UAF applied at baseline level
Comments:	Apply the value for the applicable geographic area. Fixed for the crediting period.

Parameter ID	SASS 5
Data/parameter:	MCF_{BAUi}
Description	Methane conversion factor for baseline pathway i .
Data unit:	Fraction
Equations referred:	1
Purpose of data:	☒ Baseline emissions
Value(s) applied:	The value for the baseline pathway in Annex A2.3 (IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.3), mapped to the Baseline Scenario Survey; for suppressed-demand cases, the value determined under Section 7.3.5. A substantiated value may be applied under Section 7.8.
Source of data:	☐ Measured ☒ Other source

	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5: Waste, Chapter 6, Table 6.3; Section 7.3.5 for suppressed demand.
Choice of data or measurement methods and procedures:	Where multiple baseline pathways exist in the target population, the activity developer shall calculate a weighted average methane conversion factor or treat the pathways as separate strata.
Treatment of uncertainty	The 0.5 cap for suppressed demand bounds the value against overestimation.
Comments:	Selection shall be justified for the applicable geographic area. Fixed for the crediting period.

Parameter ID	SASS 13
Data/parameter:	<i>UAF</i>
Description	Uncertainty Adjustment Factor
Data unit:	Fraction
Equations referred:	2
Purpose of data:	Baseline emissions
Value(s) applied:	Pathway-specific (Section 7.4.1(a); Annex A2.6); 0.57 where not computed.
Source of data:	IPCC 2019 Refinement, Volume 5, Chapter 6, Tables 6.3 and 6.7; Annex A2.6.
Choice of data or measurement methods and procedures:	IPCC Approach 1 aggregation of the parameter uncertainties, converted to a one-sided 90% lower bound.
Treatment of uncertainty	This parameter is the uncertainty adjustment.
Comments:	Fixed for the crediting period; recomputed only for a value substantiated under Section 7.8.

Parameter ID	SASS 14
Data/parameter:	<i>ADJ_{SD}</i>
Description	Conservativeness deduction applied to the suppressed-demand counterfactual
Data unit:	Fraction
Equations referred:	1 (Section 7.3.5(b))
Purpose of data:	Baseline emissions

Value(s) applied:	0.05
Source of data:	Section 7.3.5(b).
Choice of data or measurement methods and procedures:	Fixed value.
Treatment of uncertainty	Conservative deduction.
Comments:	Fixed.

Parameter ID	SASS 15
Data/parameter:	OC_{FS}
Description	Organic content of faecal sludge removed from pit latrines
Data unit:	kg BOD per kg of sludge (wet)
Equations referred:	1a
Purpose of data:	Baseline emissions
Value(s) applied:	0.0018 kg BOD per kg of wet sludge.
Source of data:	Bassan, M., Tchonda, T., Yiougo, L., Zoellig, H., Mahamane, I., Mbéguéré, M., & Strande, L. (2013). Characterization of faecal sludge during dry and rainy seasons in Ouagadougou, Burkina Faso. 36th WEDC International Conference, Nakuru, Kenya, Table 2 (faecal sludge from pit latrines). Heinss, U., Larmie, S. A., & Strauss, M. (1998). Solids separation and pond systems for the treatment of faecal sludges in the tropics (SANDEC Report No. 05/98), Table 2.
Choice of data or measurement methods and procedures:	Default value: the one-sided 90% lower bound of the mean measured BOD5 of faecal sludge emptied from pit latrines, at a density of 1 kg/L, rounded down.
Treatment of uncertainty	Lower confidence bound of the measured mean; addressed conservatively.
Comments:	Fixed for the crediting period; replaced by SASS 21 where measured under Section 7.3.6(c).

Parameter ID	SASS 16
Data/parameter:	EF_{EL}

Description	Default emission factor for electricity consumption (simplified option, Section 8.3.3)
Data unit:	tCO ₂ e/MWh
Equations referred:	Section 8.3.3
Purpose of data:	Activity emissions
Value(s) applied:	1.3
Source of data:	A6.4-AMT-007, Option B (conservative default emission factor, section 5.7.2), for electricity consumed by the activity.
Choice of data or measurement methods and procedures:	Applies where the activity developer elects the simplified option at Section 8.3.3.
Treatment of uncertainty	Conservative default.
Comments:	Fixed.

Parameter ID	SASS 17
Data/parameter:	N_{capita}
Description	Nitrogen in excreta per person
Data unit:	kg N per person per year
Equations referred:	9a
Purpose of data:	Activity emissions; leakage emissions
Value(s) applied:	Annual per capita protein supply in the host country (FAOSTAT food balance sheets) multiplied by 0.16 kg N per kg protein.
Source of data:	2006 IPCC Guidelines, Volume 5, Chapter 6, Equation 6.8 and Table 6.11 (fraction of nitrogen in protein, 0.16); FAOSTAT food balance sheets.
Choice of data or measurement methods and procedures:	Applied to the population whose sanitation waste is treated, stored or applied to land (Sections 8.7.1, 8.8.1(b) and 9.2.2(a)).
Treatment of uncertainty	Protein supply is used without deduction for food not consumed, which does not underestimate nitrogen.
Comments:	Fixed for the crediting period; not used where Equation 9b applies (Section 8.8.3).

14.3 | Data and parameters monitored

Parameter ID	SASS 6
Data/parameter:	$P_{i,y}$
Description:	Total population relying on baseline pathway i that is served by the activity in monitoring period y .
Data unit:	Number of persons
Equations referred:	1, 1a, 9a
Purpose of data:	☒ Baseline emissions; Activity and Leakage emissions
Measurement and updating frequency	Continuous update of the activity database (deployment, maintenance, replacement, removal).
Measurement methods and procedures:	The served population shall be determined by a census of enrolled units using the Unique Identifiers (UIDs); average household size shall be taken from official statistics or from the Baseline Scenario Survey. For institutions where access is restricted to a defined population, the population may instead be determined from active enrolment records combined with an attendance or occupancy survey meeting the 90/10 precision rule, the conservative bound being applied where that precision is not met. For shared or public facilities, the population shall be determined by the auditable user-count method required under Section 3.2.3(a)(iv). The served population shall not be derived from facility-gate mass records, the population and the Collection Compliance Factor being separate multiplicative terms that are required to remain independent. The register shall record the number of persons served per pit for each pit-latrine baseline pathway, which is the basis on which the methane conversion factor is selected under Section 7.3.4. The register shall also record, for each served household, whether it is connected to a sewer network, as observed during the Operational Fraction survey or register updates. A household connected to a sewer whose receiving works meets Section 17.2.1(b)(ii) shall be removed from the served population from the date of connection. In a displacement setting, Section 3.2.9(d) applies.
QA/QC procedures:	The VVB shall perform randomised existence checks on a sub-sample of the database to identify phantom registrations, duplicate UIDs or data-entry errors.
Treatment of uncertainty	Where a census is used, no statistical discount applies. Where a survey is used, the 90/10 rule applies and, where the precision target is not met, the one-sided 90% lower bound shall be used.
Comments:	Cross-referenced to SASS 9 (compliance).

Parameter ID	SASS 7
Data/parameter:	$Days_y$
Description:	Number of days in monitoring period y
Data unit:	days
Equations referred:	1, 1a, 9a
Purpose of data:	☒ Baseline emissions; activity and leakage emissions
Measurement and updating frequency	Determined once for each monitoring period.
Measurement methods and procedures:	Calendar days in the monitoring period, counted per containment unit or centralised plant from its commissioning date where it is commissioned within the period.
QA/QC procedures:	N/A
Treatment of uncertainty	N/A
Comments:	

Parameter ID	SASS 8
Data/parameter:	OF_y
Description:	Operational Fraction: fraction of containment units verifiably active, functional and in use by the population. A unit formally decommissioned and withdrawn from service leaves the sampling frame prospectively from the date of withdrawal, provided that the withdrawal is logged against the Unique Identifier with date and reason, and that the served population is removed from $P_{i,y}$ for the corresponding period. Units abandoned, destroyed or non-functional while enrolled remain in the frame and are recorded as zero. A shared or public facility is recorded as operational only where it is found at inspection to satisfy Sections 3.2.3(a)(i) to (iii).
Data unit:	Fraction
Equations referred:	6
Purpose of data:	☒ Emission reduction
Measurement and updating frequency	Each monitoring period, at least annually.

Measurement methods and procedures:	Determined through a statistically representative field survey of distributed containment units (or digital collection logs for CBS). The survey shall visually confirm functionality and signs of regular use. Units abandoned, destroyed, or where users have reverted to open defecation, count as non-operational (0).
QA/QC procedures:	Survey records retained per Unique Identifier and reconciled with the activity database.
Treatment of uncertainty	90/10 rule: where the sampling precision target is not met, the lower bound of the one-sided 90% confidence interval shall be used.
Comments:	

Parameter ID	SASS 9
Data/parameter:	<i>CCy</i>
Description:	Collection Compliance Factor: Fraction of faecal sludge generated at the containment level that is safely collected, transported, and delivered to the treatment facility without informal dumping.
Data unit:	Fraction
Equations referred:	6
Purpose of data:	☒ Emission reduction
Measurement and updating frequency	Continuous tracking; aggregated each monitoring period, at least annually.
Measurement methods and procedures:	Mass-balance chain-of-custody assessment. The volume or mass of sludge removed from households (from emptying logs, or volume estimates based on collection frequencies) shall be reconciled against the intake volume or mass recorded at the centralised or decentralised treatment facility (by weighbridge or intake tank gauge). Where weighbridge or gauged intake measurement is not available, the Collection Compliance Factor may be determined from calibrated container counts multiplied by a standard fill weight, or from validated volumetric emptying logs. The fill-weight assumption shall be established with a sample size sufficient to meet the 90/10 precision rule, re-established in each monitoring period, and re-established whenever the container type, service area or emptying method changes. The calibration protocol shall be set out in the Monitoring Plan.
QA/QC procedures:	Collection, transport and treatment records shall be cross-checked and received-versus-treated loads reconciled. Where the safely-collected-and-treated fraction is quantified by mass balance, the result is reflected in <i>CCy</i> and no additional market-

	leakage deduction is applied. Where the Collection Compliance Factor cannot be quantified for a stream in a monitoring period, the lowest value measured for comparable streams in the preceding 12 months shall apply or, where no such value exists, zero.
Treatment of uncertainty	90/10 rule: where the sampling precision target is not met, the lower bound of the one-sided 90% confidence interval shall be used.
Comments:	No reduction in claimed emission reductions caused by collection or treatment failure shall be counted more than once. The following hierarchy applies: (a) The Collection Compliance Factor (<i>CCy</i>) is the primary mechanism. Where the safely-collected-and-treated fraction is quantified by the mass-balance chain-of-custody assessment, <i>CCy</i> applies and no separate informal-dumping leakage deduction is made for that stream. (b) Where the Collection Compliance Factor cannot be quantified for a stream, the missing-data rule in the QA/QC procedures above applies; no separate deduction for informal dumping is made.

Parameter ID	SASS 10
Data/parameter:	Equity of service coverage indicator
Description:	Fraction of vulnerable or hard-to-reach households served, supporting the equitable-sharing principle and safeguards.
Data unit:	Fraction
Equations referred:	None (safeguarding and SDG reporting)
Purpose of data:	☒ Safeguarding
Measurement and updating frequency	Each monitoring period.
Measurement methods and procedures:	From the activity database and served-population records, disaggregated by the Benefit-Sharing Plan and stakeholder categories.
QA/QC procedures:	Cross-checked against the Benefit-Sharing Plan targets.
Treatment of uncertainty	N/A
Comments:	Supports SDG reporting and equitable sharing; not used in emission quantification.

Parameter ID	SASS 11
Data/parameter:	Product safety and discharge compliance
Description:	Compliance with procedures and tests determining the safety of treated outputs (e.g., compost, biochar, briquettes, insect protein), such as pathogen reduction, composting temperature and time, C:N ratio and heavy-metal limits.
Data unit:	Binary (pass/fail) against national standards or WHO limits (e.g., <i>E. coli</i> , helminth eggs).
Equations referred:	
Purpose of data:	☒ Safeguarding
Measurement and updating frequency	Per batch or quarterly, depending on national regulations and WHO guidelines. Partial compliance with the applicable limits does not give rise to partial crediting, pathogen limits being a safeguarding gate rather than a performance measure.
Measurement methods and procedures:	Laboratory testing of end-products (compost, biochar, treated effluent) by an accredited third-party laboratory.
QA/QC procedures:	Safety gate: For this purpose a batch is the quantity of treated product produced under uniform process conditions and sampled as a unit, as defined in the Monitoring Plan. Where a batch fails to meet applicable pathogen limits it may be re-treated, and emission reductions are claimable in respect of that batch where it is re-tested and meets all applicable limits before release. Where a failed batch can be neither re-treated to compliance nor lawfully disposed of, no emission reductions shall be claimed for the sanitation waste in that batch, and its disposal shall be recorded.
Treatment of uncertainty	N/A
Comments:	

Parameter ID	SASS 12
Data/parameter:	DAF _y
Description:	Downward Adjustment Factor to encourage ambition over time.
Data unit:	Fraction
Equations referred:	3
Purpose of data:	☒ Baseline emissions

Measurement and updating frequency	Annually, for the calendar year of the vintage.
Measurement methods and procedures:	Determined under GS4GG PAA MT400-05 according to the host-country classification, for the calendar year of the vintage.
QA/QC procedures:	N/A
Treatment of uncertainty	N/A
Comments:	N/A

Parameter ID	SASS 18
Data/parameter:	$M_{FS,i,y}$
Description:	Mass of faecal sludge removed by the activity from pit latrines of baseline pathway i that remain in use
Data unit:	t (wet basis)
Equations referred:	1a
Purpose of data:	Baseline emissions
Measurement and updating frequency	Continuous; aggregated each monitoring period.
Measurement methods and procedures:	Emptying logs and treatment-intake records used for SASS 9: weighbridge, calibrated container counts multiplied by a standard fill weight, or validated volumetric logs multiplied by a sludge density.
QA/QC procedures:	Reconciled with the SASS 9 mass balance.
Treatment of uncertainty	90/10 rule on any sampled fill weight or density; conservative bound applied where not met.
Comments:	Only for pit latrines emptied by the activity (Section 7.3.6(a)(ii)).

Parameter ID	SASS 19
Data/parameter:	$Q_{eff,y}$
Description:	Volume and BOD of treated effluent discharged to the environment
Data unit:	m ³ ; kg BOD per m ³
Equations referred:	Section 8.7.1

Purpose of data:	Activity emissions
Measurement and updating frequency	Volume: continuous; BOD: at least quarterly.
Measurement methods and procedures:	Flow metering or volumetric records; composite sampling of effluent BOD analysed by an accredited laboratory.
QA/QC procedures:	Meter calibration; laboratory accreditation.
Treatment of uncertainty	Upper bound of the 90% confidence interval of measured BOD.
Comments:	Only where effluent is discharged.

Parameter ID	SASS 20
Data/parameter:	$M_{m,i}$
Description:	Mass of material m in equipment or infrastructure item i (embodied emissions)
Data unit:	kg
Equations referred:	Annex A2.5.4
Purpose of data:	Leakage emissions
Measurement and updating frequency	At installation of each item, and on replacement.
Measurement methods and procedures:	Bill of quantities, supplier records or product specifications.
QA/QC procedures:	Cross-checked against procurement records.
Treatment of uncertainty	Upper bound where a range is given.
Comments:	Applies to each tier at Section 9.2.3 unless a life cycle assessment is submitted under Section 9.2.3(c)(ii).

Parameter ID	SASS 21
Data/parameter:	OC_{FS}
Description:	Measured organic content of faecal sludge removed from pit latrines by the activity
Data unit:	kg BOD per kg of sludge (wet)

Equations referred:	1a
Purpose of data:	Baseline emissions
Measurement and updating frequency	Each monitoring period, and whenever the containment type, emptying interval or service area changes.
Measurement methods and procedures:	Composite samples taken at emptying under the sampling protocol in the Monitoring Plan, stratified by baseline pathway, containment type and emptying interval; BOD5 analysed by an accredited laboratory on a wet-mass basis consistent with SASS 18.
QA/QC procedures:	Laboratory accreditation; documented sample chain of custody, handling and holding times.
Treatment of uncertainty	Lower bound of the one-sided 90% confidence interval of the mean.
Comments:	Optional. Where applied under Section 7.3.6(c), replaces SASS 15 whether higher or lower than the default.

Parameter ID	SASS 22
Data/parameter:	$N_{k,y}$
Description:	Nitrogen content of the sanitation waste or product delivered to treatment, storage or land application k
Data unit:	kg N per t (wet basis)
Equations referred:	9b
Purpose of data:	Activity emissions; leakage emissions
Measurement and updating frequency	Each monitoring period.
Measurement methods and procedures:	Composite samples under the sampling protocol in the Monitoring Plan; total Kjeldahl nitrogen analysed by an accredited laboratory on a wet-mass basis consistent with the mass recorded for k.
QA/QC procedures:	Laboratory accreditation; documented sample chain of custody.
Treatment of uncertainty	Upper bound of the one-sided 90% confidence interval of the mean.
Comments:	Optional. Where applied, Equation 9b replaces Equation 9a for k (Section 8.8.3).

Parameters for activity emissions not listed above are monitored in accordance with the tool applied: GS4GG Methodology Tool 01 (fossil fuel), GS4GG Methodology Tool

02 (transport), A6.4-AMT-007 (electricity, or the default at Section 8.3.3), CDM TOOL13 (composting) and CDM TOOL14 (anaerobic digestion).

14.4 | QA/QC and data management

- 14.4.1 | The activity developer shall implement QA/QC procedures and a data-management system that include: meter accuracy, calibration and maintenance to recognised national or international standards, with records retained; automated and manual data-validation checks for outliers, errors and potential tampering; documentation and VVB validation of any algorithms or scripts used to process raw measurements into reported values; and secure data retention with access controls consistent with applicable data-protection law.
- 14.4.2 | Procedures for handling data gaps shall be specified in the Monitoring Plan. A gap shall not be filled with a period average. Where data are missing, the most conservative value recorded for the parameter in the preceding 12 months shall apply: the highest value for parameters that increase activity emissions or leakage, and the lowest value for parameters whose higher values increase emission reductions, such as the served population, the Operational Fraction and the Collection Compliance Factor. Where no value has been recorded in that period, a parameter whose higher values increase emission reductions shall be set to zero; for any other parameter, no emission reductions shall be claimed for the period affected by the gap.

14.5 | Sampling requirements

- 14.5.1 | Where parameters are determined by survey or sampling (e.g., the served population, baseline pathway proportions or the safe-management compliance parameters), sampling shall follow A6.4-AMT-010 (Sampling and surveys) and the GS4GG sampling requirements. Notwithstanding the default in that tool, a precision of 10% at a 90% confidence level shall be achieved for each sampled parameter; where it is not achieved, the conservative bound of the 90% confidence interval shall apply, as the corrective action under that tool.
- 14.5.2 | Sampling shall use stratified random sampling representative of the served population, geography and system types, and the selection process shall be auditable. The Baseline Scenario Survey shall meet the 90/10 precision requirement.
- 14.5.3 | The sample frame shall include all distributed units on record, not just active users. Units that cannot be located, or whose households refuse to respond, shall be coded as non-operational ($OF_y = 0$).

15 | MONITORING REQUIREMENTS FOR ACTIVITIES WITH REVERSAL RISKS

- 15.1.1 | As established in Section 12, safe sanitation activities avoid the biological generation of methane in anaerobic environments. Because methane that

was not generated in the baseline cannot be re-emitted at a later date, they are avoidance activities.

- 15.1.2 | Physical reversal of credited mitigation outcomes is not possible. Reversal risk monitoring, buffer pool deductions and compensation mechanisms therefore do not apply to this methodology. Performance risks (such as hardware breakdown or user abandonment) are managed through the ex-post compliance parameters (*OFy, CCy*) defined in Section 14.
- 15.1.3 | Changes in the counterfactual at a wider scale are addressed at renewal rather than through continuous monitoring. At each renewal (Section 17), the activity developer shall reassess the baseline scenario and pathway proportions, update parameters (including the DAF), and determine whether an independent regional basic service has become available, in which case the activity shall not be renewed. This keeps the crediting baseline in line with developments in the sector and prevents over-crediting.

16| APPLICATION TO PROGRAMME OF ACTIVITIES

16.1 | General requirements

- 16.1.1 | This methodology is applicable to standalone activities and to a Programme of Activities (PoA), including its component Voluntary Project Activities (VPAs).
- 16.1.2 | The PoA shall comply with the latest GS4GG Principles & Requirements and the requirements governing PoAs. A technology or service provider may act as the Coordinating/Managing Entity (CME). The CME is responsible for implementing the Monitoring Plan and maintaining the centralised activity database across all VPAs, and shall define clear, methodology-consistent eligibility criteria for the inclusion of VPAs.

16.2 | Baseline and additionality demonstration

- 16.2.1 | Additionality shall be demonstrated such that each included VPA meets the requirements of Section 6 (regulatory surplus, lock-in risk and common practice and, where the activity-specific assessment is used, investment or barrier analysis). The CME may define distinct baseline scenarios for different geographies or user groups within the PoA boundary, provided homogeneity within each group is demonstrated. A baseline pathway profile and the associated baseline parameters, once established for a given technology or user type and region, may be applied to subsequent VPAs sharing the same characteristics for a maximum of three years after the first VPA that established them; thereafter they shall be updated (including a new Baseline Scenario Survey) for newly included VPAs. For VPAs already included, the baseline remains fixed for their respective crediting periods.

16.3 | Monitoring and quantification

- 16.3.1 | Monitoring requirements (Section 14) apply to all VPAs, and the CME shall aggregate the data. Pooled sampling may be applied across VPAs where

homogeneity in technology, geography and system age is justified by the CME and validated by the VVB. In the absence of such justification, pooled sampling shall not be applied across groups larger than ten VPAs.

17 | RENEWAL OF CREDITING PERIOD

17.1 | Crediting period renewal requirements

17.1.1 | The crediting period is five years, renewable twice, for a maximum of 15 years. At renewal, the activity developer shall comply with the GS4GG Validation and Verification Body (VVB) Requirements in force at the time of the request and shall apply the latest version of this methodology.

17.2 | Reassessment of the baseline scenario (municipal sewerage check)

17.2.1 | At renewal, the activity developer shall reassess the baseline scenario. The following apply:

- a|. Sewer expansion trigger: Where a state-funded, centralised municipal sewer network has expanded into the activity boundary during the preceding crediting period, providing safely managed, waterborne sanitation to the target dwellings, the baseline has shifted to a zero-methane, safely managed standard.
- b|. Emission reductions shall not be renewed for any household or institution where both of the following are demonstrated:
 - i. the dwelling or institution is verifiably connected to a municipal sewer network; and
 - ii. the receiving treatment works is operational during the period and delivers treatment meeting the WHO/UNICEF JMP definition of safely managed sanitation. Where condition (i) is satisfied but condition (ii) is not, the population remains eligible and the sewerage-without-adequate-treatment baseline pathway at Section 7.3.4 applies. Connection to a sewer network that discharges without adequate treatment does not of itself terminate eligibility.

17.3 | Update of baseline parameters

17.3.1 | All parameters used to calculate the crediting baseline shall be updated to the latest science, as follows:

- a|. IPCC defaults: Any updates to the B_0 , BOD and MCF parameters shall be applied where a new IPCC Guideline or Refinement has been published since the last crediting period.
- b|. Ambition (DAF): The Downward Adjustment Factor (DAF_y) shall be recalibrated to the specific calendar years of the renewed crediting period under GS4GG PAA MT400-05.

- c|. Regulatory surplus: National and local laws shall be re-evaluated to confirm that new sanitation regulations have not mandated and funded the service provided by the activity developer.
- d|. The activity developer shall also repeat the consistency check between the baseline scenario and the served population (Section 7.3.2) using the new Baseline Scenario Survey, and apply the same threshold-based adjustment or redefinition where a material discrepancy is found.

17.3.2 | Reassessment of additionality and ongoing financial need (OFN)

- a|. The additionality of the activity shall be reassessed at renewal in accordance with Section 6.
- b|. Ongoing financial need (OFN): The activity developer shall provide updated financial evidence (e.g., operating expenditure ledgers, tariff collections, transport fleet maintenance costs) demonstrating that the activity continues to require revenue from emission reductions to sustain the sanitation service chain and prevent the population from reverting to open defecation. The activity developer shall also demonstrate, on audited accounts, operating ledgers and tariff records, that withdrawal of that revenue would make the service loss-making or cause it to cease. Growth in the scale of the service attributable to carbon revenue does not of itself defeat ongoing financial need.

Annex -1| Monitoring schedule and requirements

This Annex consolidates the monitoring obligations at Section 14 and the parameter cards. Where this Annex and a parameter card in Section 14 differ, the parameter card prevails.

A 1.1| Ex-ante parameters — fixed at validation

- A 1.1.1| SASS 1, the baseline pathway set, from the Baseline Scenario Survey and the pathway categories at Section 7.3.1(b), reviewed at crediting period renewal.
- A 1.1.2| SASS 2, the global warming potential of methane, AR5 100-year value of 28, fixed.
- A 1.1.3| SASS 3, B0, 0.6 kg CH₄ per kg BOD from the IPCC 2019 Refinement, Volume 5, Chapter 6, reviewed at renewal.
- A 1.1.4| SASS 4, BOD per capita, the regional default or a value measured under the protocol at Annex A2.2, reviewed at renewal or on measurement.
- A 1.1.5| SASS 5, the methane conversion factor, from Annex A2.3 under Section 7.3.4, reviewed at renewal or on a Section 17.2 trigger.
- A 1.1.6| SASS 13, the Uncertainty Adjustment Factor, per Section 7.4.1(a) and Annex A2.6, fixed for the crediting period.
- A 1.1.7| SASS 14, the suppressed-demand deduction, 0.05, fixed.
- A 1.1.8| SASS 15, the organic content of faecal sludge from pit latrines, default value, fixed for the crediting period. A measured value may replace it under Section 7.3.6(c) (SASS 21).
- A 1.1.9| SASS 16, the default electricity emission factor, 1.3 tCO₂e/MWh, where the simplified option is elected.
- A 1.1.10| SASS 17, nitrogen in excreta per person, from host-country protein supply, fixed for the crediting period.

A 1.2| Monitored parameters

- A 1.2.1| SASS 6, served population. Method: census of enrolled units by Unique Identifier for household deployments; active enrolment records with an attendance or occupancy survey for institutions; the auditable user-count method under Section 3.2.3(a)(iv) for shared and public facilities; not derivable from facility-gate mass records. Frequency: continuous register, reconciled each monitoring period. Precision: 90/10 on any surveyed component, with the conservative bound applied on failure.
- A 1.2.2| SASS 7, days in the monitoring period. Method: calendar days, counted from commissioning where a unit or plant is commissioned within the period. Frequency: each monitoring period.
- A 1.2.3| SASS 8, Operational Fraction. Method: sample survey of enrolled units, with decommissioned units leaving the frame prospectively only where logged against the Unique Identifier and the served population is removed from Pi,y

for the same period; abandoned or non-functional units recorded as zero; shared and public facilities recorded as operational only where found at inspection to satisfy Sections 3.2.3(a)(i) to (iii). Frequency: each monitoring period, at least annually. Precision: 90/10, with the conservative bound applied on failure.

- A 1.2.4| SASS 9, Collection Compliance Factor. Method: mass balance from extraction to treatment intake; where weighing is unavailable, calibrated container counts multiplied by a standard fill weight, or validated volumetric emptying logs. Frequency: continuous logging, reconciled each monitoring period, at least annually. Precision: fill-weight assumption established to 90/10, re-established each period and on any change of container type, service area or emptying method.
- A 1.2.5| SASS 10, equity of service coverage. Method: disaggregated register assessed against the inclusivity criteria at Section 3.4.5. Frequency: each monitoring period. Reported; does not enter the quantification.
- A 1.2.6| SASS 11, product safety and discharge compliance. Method: batch sampling against applicable pathogen limits by accredited laboratory, per the Monitoring Plan. Frequency: per batch, or quarterly, depending on national regulations and WHO guidance. Re-treatment and re-test permitted before release; partial compliance gives no partial crediting.
- A 1.2.7| SASS 12, the Downward Adjustment Factor. Method: GS4GG PAA MT400-05 and the host-country classification, for the calendar year of the vintage. Frequency: each monitoring period.
- A 1.2.8| SASS 18, mass of faecal sludge removed from pit latrines that remain in use. Method: SASS 9 records. Frequency: continuous, reconciled each monitoring period.
- A 1.2.9| SASS 19, volume and BOD of treated effluent. Method: metering and accredited laboratory analysis. Frequency: volume continuous; BOD at least quarterly.
- A 1.2.10| SASS 20, material quantities for embodied emissions. Method: bill of quantities. Frequency: at installation and replacement.
- A 1.2.11| SASS 21, measured organic content of sludge removed from pit latrines, where applied. Method: accredited laboratory analysis of composite samples (Section 7.3.6(c)). Frequency: each monitoring period.
- A 1.2.12| SASS 22, nitrogen content of waste or product delivered to treatment, storage or land application, where applied. Method: accredited laboratory analysis of composite samples (Section 8.8.3). Frequency: each monitoring period.

A 1.3| Facility inspection record

- A 1.3.1| Where Section 3.2.3(a)(v) applies, the inspection undertaken during the Operational Fraction sampling shall record, for each facility visited: cleanliness; functional condition; availability of handwashing provision;

containment not overflowing; and the cleaning and inspection log current against the documented operation and maintenance regime. A facility failing any condition is recorded as non-operational for the period.

A 1.4| Quality assurance and quality control

A 1.4.1| Meter accuracy and calibration to manufacturer specification; double entry and reconciliation of registers; retention of raw survey instruments and not only aggregates; segregation of the person recording data from the person verifying it; and documented treatment of missing data, applying the conservative bound where a value cannot be substantiated. Records shall be retained for the crediting period and thereafter in accordance with the GS4GG Principles & Requirements.

Annex -2| Standardised parameters and default values

This Annex sets out the default values for use in Sections 7 to 10. They are binding defaults; a different value may be applied only where it is substantiated under Section 7.8 or where this Annex provides for it.

A 2.1| Global warming potential (AR5, 100-year)

Gas	GWP100 (AR5)
Methane (CH ₄), biogenic	28
Nitrous oxide (N ₂ O)	265

The IPCC AR5 100-year values apply.

A 2.2| Maximum methane-producing capacity and per-capita organic load

Parameter	Default value	Notes
BOD (per-capita load) — Africa	0.037 kg/person·day	Country value where Table 6.4 gives one (Egypt 0.034); otherwise the regional value. A measured value may be applied under Section 7.8.
BOD (per-capita load) — Asia, Middle East and Latin America	0.040 kg/person·day	
BOD (per-capita load) — Canada, Europe, Russia and Oceania	0.060 kg/person·day	
BOD (per-capita load) — United States	0.085 kg/person·day	

The regional default applies unless a measured value is substantiated. Where a measured value falls within the IPCC range for the region (35 to 45 g per person per day for Africa), a documented composite sampling protocol suffices and the measured value applies. Where a measured value exceeds that range, it shall be substantiated by accredited laboratory analysis, composite sampling across a defined minimum number of sampling events, coverage of seasonal and weekday variation, and documented sample handling and holding times, and the lower bound of the 90% confidence interval of the measured distribution shall apply. No value exceeding 150% of the regional default may be applied. Where measurement is undertaken and returns a value below the regional default, the measured value shall be used.

A 2.3| Methane conversion factors (IPCC 2019)

The methane conversion factors below are the discrete categories of IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.3. They are default values and shall be applied as discrete categories, not interpolated, unless a value is substantiated under Section 7.8. Dry pit latrines are classified by the number of persons served per pit recorded in the Baseline Scenario Survey: five or fewer, small-family value; more than five, communal value.

Pathway / system	MCF (IPCC range)	Notes
Open defecation / no facility	0	Not a methane source (IPCC). Suppressed-demand counterfactual: Section 7.3.5.
Dry pit latrine, groundwater below the pit, five persons or fewer per pit	0.1 (0.05–0.15)	Small-family category.
Dry pit latrine, groundwater below the pit, more than five persons per pit	0.5 (0.4–0.6)	Communal category; not applied to a suppressed-demand counterfactual.
Pit latrine, wet climate or flush water, groundwater above the pit	0.7 (0.7–1.0)	
Septic tank, with or without soil dispersal field	0.55 (0.4–0.72)	
Stagnant sewer (open and warm)	0.5 (0.4–0.8)	
Flowing sewer (open or closed)	0	
Discharge to aquatic environments	0.11 (0.004–0.27)	Sewered without adequate treatment (Section 7.3.4), added to the sewer value.
Unknown	0	Persons for whom no information is available (Section 7.3.1(b)).

Note: The methane conversion factor of 0 for open defecation reflects that excreta exposed in the open decompose largely aerobically and generate negligible methane; this is the population's actual baseline emission level. The suppressed-demand counterfactual is a different quantity: the emission level of the basic-service facility the population would adopt to meet its basic needs (capped under Section 7.3.5(a)(i) and reduced by 5% under Section 7.3.5(b)). Crediting is based on the suppressed-demand counterfactual, not on the near-zero actual emissions, as set out in Section 7.3.5; the two values are not interchangeable.

A 2.4| Other parameters and defaults

Parameter	Value	Source / notes
Uncertainty Adjustment Factor (UAF)	Pathway-specific; 0.57 default	Applied to the unadjusted baseline (Section 7.4.1); sampled parameters use the 90/10 rule instead.
Suppressed-demand conservativeness deduction (ADJSD)	0.05 (5%)	Mandatory deduction on the suppressed-demand counterfactual (Section 7.3.5(b)).

Downward Adjustment Factor (DAF)	Per GS4GG PAA MT400-05	Host-country net-zero classification; not hard-coded.
Process emissions — composting	Per CDM TOOL13	CH ₄ and N ₂ O process defaults from the tool.
Process emissions — anaerobic digestion and biogas	Per CDM TOOL14	Process and fugitive (leak) emissions.
Process emissions — wastewater treatment	Per IPCC 2019 Refinement, Volume 5, Chapter 6, Tables 6.3 and 6.8a	Where decentralised treatment is included.
Faecal sludge treatment units (MCF)	Settling or thickening tanks and ponds: 0.2 (< 2 m deep), 0.8 (≥ 2 m deep); drying beds: 0.2	IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.3 (anaerobic lagoon categories); drying beds by proxy (Section 8.8.1).
Septic tank sludge-removal fraction	0.5	IPCC 2019 Refinement, Volume 5, Chapter 6, Equation 6.3c (Section 7.3.6(a)(i)).
Organic content of faecal sludge from pit latrines	0.0018 kg BOD per kg of wet sludge	Bassan et al. (2013); Heinss et al. (1998) (Section 7.3.6(a)(ii); SASS 15). A measured value may be applied under Section 7.3.6(c) (SASS 21).
Storage before treatment	14 days	Collection interval within which storage methane is not accounted; waste held longer is treated as not safely collected (Section 8.9). Basis: the initial aerobic phase of decomposition, which the 2006 IPCC Guidelines (Volume 5, Chapter 3, p. 3.19) describe as lasting some weeks before methane generation begins.
Electricity emission factor (simplified option)	1.3 tCO ₂ e/MWh	Simplified option (Section 8.3.3); A6.4-AMT-007, Option B (conservative default emission factor, section 5.7.2), for electricity consumed by the activity.

A 2.5| Embodied (life-cycle) emission defaults

A 2.5.1| Scope and approach

Embodied (life-cycle) emissions are the upstream GHG emissions arising from the manufacture of the activity's equipment and infrastructure (e.g., containment units and containers, collection vehicles, digesters, treatment units, pipework and tanks). They are accounted as leakage (Section 9.2). The default factors in this Annex are cradle-to-gate (life-cycle modules A1–A3). The preferred basis is a product-specific Environmental Product Declaration (EPD) or a recognised life-cycle inventory (Ecoinvent, NREL LCI); the values below are conservative fallback defaults for use where product-specific data are unavailable.

The lower end of a range shall be used only where supported by evidence (e.g., documented recycled content or a product EPD); otherwise the upper end of the range shall apply.

Only equipment and infrastructure directly attributable to the activity shall be accounted. End-of-life and operational-energy emissions are not embodied emissions: facility energy and transport fuel are accounted under Section 8 (GS4GG Methodology Tools 01 and 02 and A6.4-AMT-007), and process and fugitive emissions under CDM TOOL13 and TOOL14 and the IPCC 2019 Refinement, Volume 5, Chapter 6 emission factors.

Embodied-emission sources that are demonstrably immaterial (together less than 1% of the activity's emission reductions over the crediting period) may be screened out with justification.

A 2.5.2| **Material-level cradle-to-gate factors**

Embodied emission factors shall be determined in the following order of preference: (a) a product-specific Environmental Product Declaration compliant with ISO 14025 and ISO 21930 or EN 15804; (b) an activity-specific life cycle assessment conducted in accordance with ISO 14040 and ISO 14044 and reported in accordance with ISO 14067, on a cradle-to-gate basis, independently reviewed where the resulting deduction is material; (c) a value from a recognised public life cycle inventory dataset, the dataset and version being cited; or (d) the default factors in Table A2.5-1, applied at the upper bound of the stated range. A factor lower than the Table A2.5-1 default may be applied only under (a) or (b).

Table A2.5-1. Material-level cradle-to-gate embodied emission factors

Material	Factor (kg CO ₂ e/kg)	Notes
Polyethylene (HDPE/LDPE) — e.g., containers, pipe, liners	2.5	Recycled content lowers the factor. ¹⁰
Polypropylene (PP)	3.1–3.4	Containers, fittings.

¹⁰ Polymer factors vary with polymer type, production route and recycled content. Where the production route, recycled content or manufacturing grid intensity is not documented, the upper bound of the stated range applies.

PVC (e.g., pipe)	2.4–3.1	Conveyance pipe, fittings.
Glass-reinforced plastic (GRP/fibreglass)	8.1	Prefabricated tanks/units.
Steel — structural section / sheet	1.5–1.6	Depends on recycled content. ¹¹
Steel — reinforcing bar (rebar)	1.4–2.0	For reinforced concrete.
Stainless steel (grade 304)	6.1	Pumps, fittings in corrosive service.
Reinforced concrete (RC, 32–40 MPa)	0.13–0.18 (300–430 kg CO ₂ e/m ³)	Varies with mix and reinforcement. ¹²
Plain concrete / blockwork	0.10–0.13	Slabs, bases.
Cement (CEM I)	0.9	Mortar, render.
Fired-clay brick / masonry	0.21–0.24	Superstructure, digester walls.
Cast iron	1.9–2.0	Covers, fittings.
Aluminium (general mix)	9.2	Use sparingly; high embodied carbon.

Embodied emissions for an item of equipment are the sum over its materials of mass (kg) × the applicable factor.

A 2.5.3| **Equipment-level default values**

Where a bill of materials is not available, the following equipment-level default values may be applied, and the assumption shall be documented in the design document.

Equipment / component	Default embodied emissions	Basis
Container-based toilet receptacle (HDPE)	2.5 kg CO ₂ e per kg of container	Container mass × HDPE factor (e.g., a 6–12 kg container gives 15–30 kg CO ₂ e).

¹¹ Steel factors depend strongly on recycled (scrap/EAF) content. The lower values reflect typical UK/EU recycled-content sections; primary (blast-furnace) steel is higher. Stainless steel (grade 304) is materially higher (≈ 6 kg CO₂e/kg).

¹² Reinforced concrete varies with strength class, cement type and reinforcement ratio. Cement-replacement materials (GGBS, fly ash) reduce the factor substantially. Per-volume values assume a density of ≈ 2,400 kg/m³.

Household biogas digester (fixed-dome, 8 m ³)	2,300–2,400 kg CO ₂ e (construction)	300 kg CO ₂ e/m ³ of digester; cement, concrete and steel dominate.
Faecal sludge or decentralised treatment works	Compute from bill of materials	Dominated by ready-mix concrete and structural steel; use Table A2.5-1. ¹³
Collection / desludging vehicle (e.g., vacuum truck)	Vehicle mass × steel factor, amortised	Operation (fuel) is accounted under GS4GG Methodology Tool 02 and shall not be double-counted. ¹⁴
Conveyance pipework (PVC/HDPE)	Pipe mass × PVC/HDPE factor	From length, diameter and wall thickness.

A 2.5.4| Quantification and amortisation

Total embodied (life-cycle) emissions of an item are amortised as set out at Section 9.2.3, the share falling within the monitoring period being taken as that period's leakage. For each item of equipment or infrastructure *i*:

$$LE_{embodied,y} = \sum_i \left[\left(\sum_m (M_{m,i} \times EF_{emb,m}) \right) \div (AM_i \times 365) \right] \times D_y \times 10^{-3}$$

where:

Parameter	Description (and unit)
$LE_{embodied,y}$	Embodied (life-cycle) leakage emissions in monitoring period <i>y</i> (tCO ₂ e); the 10 ⁻³ converts kg to t.
$M_{m,i}$	Mass of material <i>m</i> in equipment item <i>i</i> (kg).
$EF_{emb,m}$	Cradle-to-gate embodied factor for material <i>m</i> (kg CO ₂ e/kg; Table A2.5-1, or EPD/inventory value).
AM_i	Amortisation period of item <i>i</i> under Section 9.2.3 (years).
D_y	Number of days in monitoring period <i>y</i> .

Notes on application:

¹³ For a full-scale activated-sludge wastewater plant, ready-mix concrete and structural steel were the dominant embodied-carbon contributors (≈ 397 and ≈ 287 tCO₂e respectively). For decentralised/small treatment, the activity developer shall compute embodied emissions from the bill of materials and the factors in Table A2.5-1.

¹⁴ Collection-vehicle manufacture is dominated by steel (≈ 60–70% of mass). Embodied vehicle emissions are amortised over the vehicle's operational life and throughput; vehicle operation (fuel) is accounted separately under GS4GG Methodology Tool 02 and shall not be double-counted here. Where preferred, a recognised transport life-cycle inventory (e.g., ecoinvent 'transport, freight, lorry', vehicle-production component) may be used.

- Equipment installed mid-period is amortised only from its installation date; equipment is removed from the calculation at the end of the amortisation period unless replaced (a replacement is a new item with its own embodied emissions).
- Recycled content and the regional electricity mix materially affect embodied factors; where the activity uses documented recycled-content materials or local EPDs, the corresponding values shall be used in preference to the table defaults. Because embodied emissions are a deduction, understating them over-credits the activity; where the production route, recycled content or manufacturing grid intensity is not documented, the upper bound of the stated range shall therefore be applied.

A 2.6| Parameter uncertainties for the Uncertainty Adjustment Factor

The default uncertainties apply unless substantiated under Section 7.8; the aggregation and conversion below apply in all cases. The Uncertainty Adjustment Factor is determined by IPCC Approach 1 aggregation (root sum of squares) of parameter uncertainties expressed at 95% confidence, converted to a one-sided 90% lower bound by the factor $1.282/1.960 = 0.6541$. Parameters in scope are B₀, BOD per capita and the methane conversion factor. The served population is excluded, its downside being taken by the 90/10 sampling rule. Where a pathway-specific factor or a substantiated uncertainty is applied, the parameter uncertainties, the error propagation and the confidence-level conversion shall be documented so that the VVB can reproduce them.

- B₀: plus or minus 30%, and BOD per capita: plus or minus 30%, both from IPCC 2019 Refinement, Volume 5, Chapter 6, Table 6.7. Table 6.7 assigns no uncertainty value to latrines or septic tanks, deferring to expert judgement; the methane conversion factor uncertainty is therefore taken from the published range for each pathway at Table 6.3, on the downside arm only, over-crediting arising only where the true value is below that assumed.

Resulting pathway-specific factors: dry pit latrine, small family, downside 50%, factor 0.57; septic tank, downside 27%, factor 0.67; communal dry pit latrine and stagnant sewer, downside 20%, factor 0.69; wet pit latrine, downside nil because the default is published at the floor of its range, factor 0.72; sewerage discharge to aquatic environments, downside 96%, factor 0.31.

A 2.7| Indicative emission reduction intensity by baseline pathway (non-normative)

This table is indicative and does not form part of the applicability test; Section 3.2.4(a) remains the sole test. It states the approximate unadjusted baseline emissions per unit of served population, so that an activity developer may estimate the scale of a proposed activity from its own served population and baseline pathway mix. Figures assume the regional BOD default of 37 g per person per day, B₀ of 0.6 kg CH₄ per kg BOD, and a global warming potential of 28. They do not include the Uncertainty Adjustment Factor, the Downward Adjustment Factor, the Operational Fraction, the Collection Compliance Factor, activity emissions or leakage, each of which is applied by the activity developer under Sections 7 to 9. The sewerage-without-

adequate-treatment pathway is not tabulated, its unadjusted emissions depending on the sewer category and on the chemical oxygen demand conversion at Annex A2.8.

Baseline pathway	MCF	Gross baseline tCO ₂ e/1000 persons/yr
Dry pit latrine, small family	0.10	22.7
Suppressed demand (mix 0.20)	0.20	45.4
Communal dry pit latrine	0.50	113.4
Stagnant sewer	0.50	113.4
Septic tank	0.55	124.8
Wet pit latrine (high water table)	0.70	158.8

A 2.8| Organic load basis

Biochemical oxygen demand is the reference basis of this methodology. Where an emission factor or an imported tool is expressed on a chemical oxygen demand basis, conversion shall use a BOD:COD ratio measured for the activity's wastewater or, in its absence, the default ratio of 0.417 implied by the IPCC default values of 0.6 kg CH₄ per kg BOD and 0.25 kg CH₄ per kg COD. The basis and the ratio applied shall be stated. IPCC notes that biochemical oxygen demand, being an aerobic parameter, may be less appropriate for characterising organic components in anaerobic environments; measurement of the ratio is therefore preferred to use of the default.

Annex -3| Methodology-level additionality and barrier analysis for non-sewered and decentralised sanitation service activities

A 3.1| Purpose and status

- A 3.1.1| This Annex establishes, on documented evidence, that activities providing safely managed non-sewered and decentralised sanitation services within the qualifying class defined at A3.2 face structural barriers that preclude cost recovery in the absence of carbon finance. It is the methodology-level demonstration required to support the Positive List route at Section 6.2.1(a).
- A 3.1.2| An activity within the qualifying class is deemed additional. It shall not be required to perform an investment analysis or a barrier analysis and shall not be required to submit evidence of the barriers set out at A3.3.
- A 3.1.3| The activity developer is required only to evidence membership of the qualifying class, by reference to the published classifications and data sources at A3.2, and to provide the funding statement at A3.2.4. Class membership is an objectively verifiable fact requiring no analysis, judgement or primary data collection; the funding statement is checked by the VVB under A3.2.4.
- A 3.1.4| Every activity, whether or not deemed additional under this Annex, shall complete the regulatory surplus analysis at Section 6.3, the lock-in risk analysis at Section 6.4, and the common practice analysis at Section 6.7. Deemed additionality under this Annex extends only to the investment and barrier demonstration.

A 3.2| Qualifying criteria

- A 3.2.1| An activity is within the qualifying class where all four of the following are satisfied.

Ref	Criterion	Verified against
C1	The host country is classified by the World Bank as a low-income or lower-middle-income economy, or is designated by the United Nations as a Least Developed Country or a Small Island Developing State	Published World Bank income classification; UN LDC and SIDS lists
C2	The target population is recorded as lacking safely managed sanitation services	WHO/UNICEF Joint Monitoring Programme national or sub-national estimates, equivalent national data or, for a displacement setting, the sanitation monitoring data of the authority or agency administering the settlement

C3	The activity provides non-sewered or decentralised sanitation services across the sanitation service chain	Section 3.1.1 and the design document
C4	The activity is micro- or small-scale	Section 3.2.4(a)

- A 3.2.2| Beyond the funding statement at A3.2.4, no further demonstration is required. In particular, the activity developer is not required to establish the absence of a cost-recovery mechanism, the affordability of cost-reflective charges, the absence or non-enforcement of a legal obligation, or the existence of any barrier. Those matters are established for the class at A3.3 and A3.4.
- A 3.2.3| Activities in upper-middle-income economies fall outside the qualifying class unless the country is a designated LDC or SIDS, and shall demonstrate additionality under Section 6.2.1(b).
- A 3.2.4| The design document shall include a funding statement for the first crediting period showing, for the service chain: (a) all public funding, grants, concessional loans and results-based payments, in grant-equivalent terms; (b) the expected revenue from emission reductions, being the ex-ante estimate of emission reductions multiplied by a stated price; and (c) the projected annual operating costs and the non-carbon revenues (tariffs, fees and grants). The VVB shall check the statement against the financial projections and funding agreements of the activity.

A 3.3| Evidence basis

B1 — Willingness to pay

- A 3.3.1| **Systematic evidence:** A scoping review of willingness to pay for on-site sanitation emptying searched six databases, screened 1,846 records after de-duplication and included 14 studies, from which 26 distinct investigation scenarios reporting both willingness to pay and market price were identified. In 77% of those scenarios (20 of 26), willingness to pay was lower than the market price (Tomoi et al., 2024).
- A 3.3.2| This is the central evidentiary finding of this Annex. It establishes that the affordability gap is the normal condition of the sector across the published literature. The six scenarios in which willingness to pay met or exceeded market price are the exception.
- A 3.3.3| **Revealed preference.** In Kisumu, Kenya, surveys of 942 households were combined with a real-money discount voucher trial across 646 households; both stated and revealed demand were low, with fewer than 20% of households willing to pay full market prices, and the authors estimate that closing the gap in those neighbourhoods alone would require annual subsidies of USD 551,000 to 814,000 (Peletz et al., 2020).

A 3.3.4| Magnitude across contexts.

Context	Finding
Bangladesh (rural districts)	Emptying and transport cost approximately USD 13 per event, some 14% of average monthly income; household contributions could cover approximately 47% of cost (Balasubramanya et al., 2017)
Kigali, Rwanda	At USD 79 per pit, approximately 15% of pits would be served — roughly the prevailing manual emptying rate. Full cost coverage requires USD 44 under optimised routing; eliminating pit sealing requires USD 24, implying a subsidy of USD 20 per empty (Burt et al., 2019; Wilcox et al., 2024)
Santa Cruz, Bolivia	72% of households reported maximum willingness to pay of USD 36–51 and only 5% above USD 87 — below the USD 68 average that households had historically paid (Mujica & Sanz Uriarte, 2016)

A 3.3.5| *Why the barrier is structural rather than local.* The gap arises from the ratio of an essentially fixed service cost — a vehicle, an operator, a journey to a disposal point — to household income. The cost of emptying and transporting a given volume of sludge does not scale down with income. Where incomes are low, as they are by definition throughout the qualifying class at C1, the ratio is adverse. The mechanism does not depend on local market conditions and is not correctable by operator efficiency.

B2 — Safe service competes against an unsafe alternative that is structurally cheaper

A 3.3.6| Safe emptying services are inevitably more expensive than informal practices because of licensing requirements, the costs of transporting faecal sludge to designated disposal areas, and dumping fees (Peletz et al., 2020).

A 3.3.7| The asymmetry has been quantified. Informal emptiers pay no value-added or other taxes, because regulation prohibits their methods and they therefore cannot be licensed, and they do not incur the considerable costs of transporting sludge to disposal or treatment (Wilcox et al., 2024). Unregulated manual emptying accordingly remains the cheapest option available to households and is widely practised.

A 3.3.8| *Why the barrier is structural.* The price differential is constituted by the compliance itself. The costs a safe operator bears — licensing, transport to an authorised point, dumping fees, worker protection — are the costs an unsafe operator avoids by being unsafe. No efficiency gain available to a compliant operator removes them, because removing them would mean ceasing to comply. The differential is therefore present in every context in which compliant and non-compliant provision coexist.

A 3.3.9| Enforcement does not close it. Utilities in Kenya and Zambia report that the incentives for emptiers to comply with safe transport and disposal are weak, with serious financial disincentives that may outweigh the income generated by providing the service; that burying on site is low cost and difficult to prevent; and that heavy-handed enforcement risks forcing emptiers out of the market entirely or back into night-time emptying and cheaper informal practice (Grisaffi et al., 2022). A systematic review of emptying across Sub-Saharan Africa, South Asia and South-East Asia covering 37 publications identified cost as among the principal determinants of emptying method choice, and grouped financial, technical and institutional challenges as the most frequently documented categories (Muoghalu et al., 2023).

B3 — No cost-recovery mechanism covers the service chain

A 3.3.10| Systematic evidence. The UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water, drawing on data from 105 countries and territories and 21 development partners, reports that only 15% of countries reporting on urban sanitation, and 9% of those reporting on rural sanitation, had sufficient funding from all sources to meet their national targets (World Health Organization & United Nations Children’s Fund, 2025). The average financing gap between the cost of meeting national targets and available funding is approximately 46%.

A 3.3.11| This establishes the absence of cost recovery as the condition of the overwhelming majority of countries in the qualifying class, on the authority of the sector’s principal global monitoring instrument. It is not necessary for an activity developer to demonstrate the point for its own jurisdiction, because the global assessment has established it for nine countries in ten.

A 3.3.12| Where subsidy exists, it does not reach the target population. Across ten low- and middle-income countries, an average of 56% of piped-water consumption subsidies reached the wealthiest quintile of the population and 6% the poorest quintile (Andres et al., 2019). The existence of a national subsidy instrument therefore does not indicate that the population served by an activity under this methodology is reached by it.

A 3.3.13| The cost of the service chain falls on the household. A systematic review of emptying found that, in the absence of government support in most of the countries studied, households meet the cost (Muoghalu et al., 2023). In Kisumu, Kenya, on-site sanitation is treated as a private good and a household responsibility, and the private sector was found unlikely to meet safe sanitation needs in low-income areas without government investment and coordination (Peletz et al., 2020).

A 3.3.14| Why the barrier is structural. Safe transport and disposal of faecal sludge is effectively a hidden wholesale service with significant public benefits but private costs. The household bears the cost of safe disposal; the health and environmental benefit accrues to the settlement and the wider public. This distribution of costs and benefits is invariant across contexts, and in the absence of a mechanism internalising it, the service is under-provided as a

matter of economics rather than of local circumstance. The World Bank estimates that, to meet the 2030 targets for drinking water and sanitation, countries would on average need to increase annual spending to between 2.7 and 3.0 times current levels, and low-income countries to between 23.7 and 42.3 times (Joseph et al., 2024). This indicates the scale of the mechanism that would be required.

B4 — Cost structure is capital- and logistics-intensive relative to revenue

- A 3.3.15| At operational scale the cost structure of emptying and transport is dominated by fleet and logistics rather than by sanitation activity. Analysis of a Kigali operator found that at full use of three exhauster trucks, transport-related costs accounted for 68% of direct costs, while costs specific to sanitation — emptying labour, dumping fees, consumables and equipment — accounted for 19%, leading the authors to characterise emptying and transport at scale as primarily a logistics and fleet management industry in which sanitation is secondary (Wilcox et al., 2024).
- A 3.3.16| The settlements in which the target population lives compound this. Many low-income households in dense areas are logistically difficult to access with exhauster trucks because of steep slopes and unpaved, narrow roads; combined with high prices relative to low household incomes, this has resulted in limited formal emptying services being delivered in informal neighbourhoods (Burt et al., 2019).
- A 3.3.17| Why the barrier is structural. The service requires capital deployment on a fleet and treatment-infrastructure basis, recovered household by household in small amounts from a population established under B1 as unable to meet cost-reflective charges. The mismatch between the unit of investment and the unit of revenue is a property of the service, not of any particular market.

B5 — Institutional and tenure barriers

- A 3.3.18| On-site sanitation is generally treated as a private good, with beneficiaries bearing primary responsibility for providing and managing the system. In informal settlements where occupiers rent, that responsibility falls to landlords who are frequently absent, severing the connection between the party responsible for the facility and the party using it (Mallory et al., 2021). In a study of pit latrines in Kampala slums, 30% of users either did not know what they would do when the pit filled or left the matter to their landlord (Nakagiri et al., 2015, as cited in Burt et al., 2019).
- A 3.3.19| The systematic review of emptying across Sub-Saharan Africa, South Asia and South-East Asia identified institutional challenges as among the three most frequently documented categories, alongside financial and technical challenges (Muoghalu et al., 2023). Recent case evidence attributes unsafe emptying to interacting economic limitation, limited access to authorised disposal facilities, weak regulatory enforcement and the predominance of informal service provision, rather than to any absence of desludging technology (Obeng Manu et al., 2026).

A 3.3.20| Why the barrier is structural. The treatment of on-site sanitation as a private good is near-universal in the qualifying class, and the tenure patterns of informal settlement — rental occupancy, absent landlords, insecure tenure — are definitional features of those settlements rather than local variations.

A 3.4| Universality across the qualifying class

A 3.4.1| Deemed additionality requires that the barriers hold for every activity within the class, not merely for those studied. Each barrier at A3.3 has been shown to arise from a structural feature that is present by definition throughout the class:

Barrier	Structural mechanism	Present throughout the class because
B1	Ratio of a broadly fixed service cost to household income	C1 defines the class by income level
B2	The price differential is constituted by compliance cost	Applies wherever compliant and non-compliant provision coexist
B3	Private cost, public benefit; no internalising mechanism	Established by GLAAS for 85–91% of reporting countries
B4	Fleet-scale capital recovered from household-scale revenue	A property of the service, not of the market
B5	On-site sanitation treated as a private good; informal tenure	Near-universal across the class (A3.3.20)

A 3.4.2| The evidence base is concentrated in Sub-Saharan Africa and South and South-East Asia, which is where the qualifying population is concentrated. Latin America is represented by the World Bank Santa Cruz diagnostic. No study within the reviewed literature reports a context within the qualifying class in which safe faecal sludge management achieves cost recovery from household charges without subsidy.

A 3.4.3| The exclusions at A3.6 remove from the class those contexts in which the barriers may not hold.

A 3.5| Barrier magnitude and the role of carbon finance

A 3.5.1| The barriers established at A3.3 are materially larger than the revenue that carbon finance generates for activities of this type.

A 3.5.2| The subsidy requirements documented at B1 are of the order of tens of United States dollars per emptying event and, at city scale, hundreds of thousands of dollars annually. Carbon revenue under this methodology is materially smaller, reflecting the modest methane intensity of the baseline pathways set out at Annex A2.7.

- A 3.5.3| It does not follow that carbon finance is immaterial to the decision to proceed. The test under the GS4GG Requirements for Additionality Demonstration is whether the activity would occur in the absence of the incentive, not whether the incentive is sufficient to fund the sector. Three considerations apply:
- a.| The test is marginal, not total. Where an operator is at or near the margin of viability — which B1 to B4 establish as the characteristic condition of the sector — a revenue stream small in absolute terms may nonetheless determine whether the service is provided, sustained at existing coverage, or withdrawn.
 - b.| The unit of assessment is the operator, not the sector. The figures at B1 express what would be required to serve entire city populations. An activity under this methodology serves a defined enrolled population and is assessed against its own cost base.
 - c.| Ongoing financial need is separately tested. Section 17.3.2(b) requires demonstration, on audited accounts, operating ledgers and tariff records, that withdrawal of revenue from emission reductions would make the service loss-making or cause it to cease. That test operates at the margin, is applied at renewal, and is not displaced by this Annex.
- A 3.5.4| This Annex does not assert that carbon finance closes the sanitation financing gap. It establishes that the sector operates under structural barriers precluding cost recovery, that activities within it are consequently marginal, and that the incentive is therefore capable of determining whether the service is provided.

A 3.6| Exclusions from the qualifying class

- A 3.6.1| The Positive List is not available, and additionality shall be demonstrated under Section 6.2.1(b), where any of the following applies:
- a.| the host country is classified as a high-income or upper-middle-income economy and is not a designated LDC or SIDS;
 - b.| the target population is served by a functioning, regulated faecal sludge management service operating on a cost-recovery basis;
 - c.| the activity is large scale;
 - d.| the target population already receives safely managed sanitation service;
 - e.| public funding for the service chain exceeds the expected revenue from emission reductions, as shown in the funding statement at A3.2.4; or
 - f.| the projected operating costs of the service chain do not exceed its non-carbon revenues, as shown in the funding statement at A3.2.4.
- A 3.6.2| Exclusions (b) and (d) are assessed on the face of the design document, and exclusions (e) and (f) on the funding statement at A3.2.4, checked by the VVB.

A 3.7| Validity and review

- A 3.7.1| This Annex is valid for three years from the date of publication of this methodology. The period reflects the multi-year update cycles of the underlying international survey and academic data.
- A 3.7.2| The Secretariat will review this Annex before expiry, and in particular reassess the GLAAS funding-sufficiency finding at A3.3.10 and the willingness-to-pay finding at A3.3.1, each of which is capable of movement over that period.
- A 3.7.3| Where this Annex expires without review, activities shall demonstrate additionality under Section 6.2.1(b) until a revised analysis is published.

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