Gold Standard
for the Global Goals

Validation and Verification Requirements
GS4GG PAA VVS 100-01

PAA VALIDATION AND VERIFICATION REQUIREMENTS – METHODOLOGIES UPDATE

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Applicability:	All GS4GG Activities transitioning to Paris Agreement Aligned (PAA) Methodologies
Status:	Mandatory normative requirement for Validation and Verification Bodies (VVBs) and Activity Developers
Related Standards:	Requirements for Paris Agreement Alignment, GS4GG Principles & Requirements, PAA methodologies

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1| GENERAL TRANSITION PATHWAYS & PRINCIPLES

1.1 | Introduction and Purpose

1.1.1 | As Gold Standard for the Global Goals (GS4GG) systematically updates its methodologies to align with the requirements of the Paris Agreement (PAA), Activity Developers and Validation and Verification Bodies (VVBs) require standardised, predictable procedures for transitioning legacy projects. These methodology updates shift frameworks to Paris Agreement alignment ensuring increasing climate ambition, embed rigorous empirical safeguards, and align with host country decarbonization trajectories.

1.1.2 | In the event of any inconsistency between this framework and the applicable PAA methodology, the applicable PAA methodology shall prevail. For inconsistencies involving the other governing standard documents, the following order of precedence applies, highest first: (1) the applicable PAA methodology; (2) this document; (3) the Paris Agreement Alignment Requirements; (4) the GS4GG Principles & Requirements. This document provides transition procedures and validation and verification instructions and shall be applied together with the GS4GG Principles & Requirements, the Paris Agreement Alignment Requirements, and the applicable PAA methodology.

1.2 | Scope and Applicability

1.2.1 | The general transition principles and cross-cutting rules defined in the main body of this document apply to all activities transitioning from a legacy GS4GG approved methodology to a Paris Agreement Aligned version (e.g., Reduced Emissions from Cooking and Heating (RECH) V5.0)). Activities registering directly under a PAA methodology without a legacy predecessor shall comply with the PAA methodology and the immediate requirements of section 1.4.4 in full; the transition-pathway and grandfathering provisions of this document (section 1.3–1.4.2) do not apply to such activities.

1.2.2 | Methodology-specific technical parameters, thresholds, deviation limits, and calculation formulas (e.g., precise capping values, specific default factors, or baseline consistency thresholds) are housed in the respective Methodology Annexes appended to this document.

1.3 | Transition Pathways

1.3.1 | To facilitate a smooth transition, two distinct compliance pathways are established based on the timing of an activity's transition to a new PAA methodology version:

1.3.2 | **Pathway A: Mid-Crediting Period (Mid-CP) Transition (Gap Validation):**

a|. **Applicability:** Activities transitioning to a PAA methodology during an active, ongoing crediting period. For such activities the PAA requirements are assessed at the first verification covering Vintage 2026 or later, or at an earlier design-change validation where one is submitted (the "Mid-CP validation").

b|. **Scope of VVB Audit:** The VVB is not required to conduct a full re-validation of the entire registered Project Design Document (PDD). Validation is strictly limited to a "Gap Validation" focusing on the "PAA Delta"—the specific new requirements introduced by the PAA methodology update (e.g., Ambition/DAF, Leakage, Lock-in Risk, updated default factors). To explicitly delineate what is included in the gap validation, VVBs shall refer strictly to the Matrix (titled "Summary of PAA Changes Matrix" or "Technical Requirements Matrix") provided in the respective Methodology Annex.

c|. **Effective Date:** PAA requirements apply prospectively to all emission reductions and removals generated for Vintage 2026 and onward). The previous version of the methodology (e.g., TPDDTEC V4.0) may be applied to verifications of vintages 2025 and earlier, and to design change validations for all crediting periods that contain vintages 2025 and earlier; provided that the immediate must-have requirements in section 1.4.4 apply to all emission reductions/removals of Vintage 2026 and onward regardless of the methodology version applied to the design change. Further changes may be made to these previous methodology versions through rule updates, if necessary. Where a monitoring period spans both pre-PAA (2025 and earlier) and post-PAA (2026 and onwards) dates, the monitoring period shall be split, or the PAA version of the methodology shall be applied to the entire monitoring period. The Activity Developer shall select the approach, subject to VVB confirmation; where no selection is made, the monitoring period shall be split.

1.3.3 | Pathway B: Crediting Period Renewal (CPR) Transition (Full Validation)

a|. **Applicability:** Activities transitioning to a PAA methodology at the exact time they are applying for their next 5-year Crediting Period Renewal.

b|. **Scope of VVB Audit:** Full validation and compliance against all ex-ante and ex-post requirements of the updated PAA methodology version is mandatory. The "Baseline Flexibility Rule" (Grandfathering) expires at this stage. The full validation includes – guided by the PAA methodology version, but is not limited to:

i.| **Additionality Assessment:** The scope of which is defined in the applicable methodology and further elaborated herein. The approach itself may change if, for example, the activity previously relied on a positive list that is no longer applicable, or

if a barrier analysis was used but the activity is now classified as large-scale.

ii.| **Baseline Determination:** Including the application of the new baseline approach of the methodology, if applicable. This may require a departure from the original baseline scenario set at the time of initial validation. Furthermore, the baseline shall be adjusted for uncertainty and net-zero ambition (downward adjustment).

iii.| **Leakage Emissions:** The updated approach to leakage defined in the PAA methodologies shall be applied independently of the approach with which the project was initially validated.

1.4 | Principles of Transition & Grandfathering

1.4.1 | **Forward-Looking Compliance:** Methodological changes—particularly those affecting emission reduction/removal calculations, leakage deductions, and ambition adjustments—are entirely prospective. Legacy credits issued or to be issued for vintage 2025 or earlier under previous methodologies are not subject to retroactive adjustment, penalisation, or cancellation. All new mathematical adjustments shall apply strictly to emission reductions/removals verified for periods for 2026 vintages and onwards.

1.4.2 | **Grandfathering of Fixed Ex-Ante Parameters**: For activities undergoing a Mid-CP Transition (Pathway A), parameters that were fixed ex-ante in the originally registered PDD (e.g., historical baseline surveys, initial fuel mixes, demographic profiles, and historical baseline fuel consumption values) are grandfathered only where the applicable Methodology Annex expressly permits. Where so permitted, they remain valid until the end of the current crediting period unless the Annex states a shorter duration.

1.4.3 | **Mandatory PAA Rule:** *Crucially*, the grandfathering of historical data does not exempt an activity from PAA ambition requirements. All grandfathered baseline data shall be mathematically overlaid with the new PAA empirical safeguards immediately upon transition. VVBs shall ensure that:

a|.Methodological Caps: Where applicable, grandfathered baseline consumption values shall be strictly capped as per applicable methodology (e.g., specific per-capita limits defined in the Annexes). If a historical baseline exceeds the cap, the cap value automatically overwrites the historical mean in the emission reduction calculation prior to applying the DAF. Refer to the methodology specific details for applicability.

b|.Ambition Deductions: The resulting (capped) baseline shall subsequently be multiplied by the **Downward Adjustment Factor (DAF)** corresponding to the Host Country and monitoring period vintage (i.e., vintage 2026 and afterwards) to align with national decarbonisation trajectories, already during Mid-CP validation.

1.4.4 | **Immediate Implementation:** Regardless of the transition pathway (Mid-CP or CPR), certain methodological updates reflect structural corrections to carbon accounting and dynamic performance safeguards. These "must-haves" shall be implemented immediately upon transition to the PAA version at Mid-CP validation, except where an item below expressly permits methodology-annex grandfathering. VVBs shall verify immediate compliance for the following; the complete and authoritative set of immediate requirements for each methodology is defined in that methodology's Annex matrix:

a|. **Leakage Accounting:** Methodologies apply an updated approach to leakage, e.g. standardised LCA defaults for embodied emissions and market leakage penalties. Most methodologies require these adjustments already during Mid-CP transition. Where the applicable methodology requires these adjustments, they apply from the Mid-CP validation.

b|. **Observer Bias adjustments:** Some methodologies apply staged discount factors (e.g., Hawthorne effect penalty) to account for behavioural changes during manual testing (unless explicitly exempted via digital monitoring). These may only be grandfathered if allowed in the guidelines presented in the specific methodology annex in this document.

c|. **Updated Default Conversion Factors:** Immediate transition to newly mandated regional default ratios (e.g., updated biomass-to-charcoal conversion ratios). *Note:* Activity-specific overrides for these defaults are strictly prohibited under PAA Methodology rules to maintain standardisation and auditability.

a. **Eligibility & Lock-In Risk:** Immediate verification that the project technology does not represent an infrastructural lock-in risk incompatible with host-country Net Zero targets. Some methodologies conduct lock in analysis at the methodology level. For all other projects, the analysis shall be conducted at Mid-CP validation.

ANNEX - 1: RECH V5.0 (FORMERLY TPDDTEC) – PAA SPECIFIC TECHNICAL GUIDELINES

A 1.1 | Scope, Applicability, & Transition Timing

A 1.1.1 | **Superseded Versions:** This Annex applies to all activities transitioning from *Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC)* V4.0 and all previous versions.

A 1.1.2 | **Target Methodology:** Reduced Emissions from Cooking and Heating (RECH) V5.0.

A 1.1.3 | **Effective Timing:** For Mid-Crediting Period (Mid-CP) Gap Validations, the requirements defined herein apply prospectively to all emission reductions generated for 2026 vintages and onwards. For Crediting Period Renewals (CPR), full compliance with RECH V5.0 or the latest available version is mandatory immediately from the start date of the new crediting period.

A 1.1.4 | **Scope Clarification:** Fully metered devices (e.g., induction stoves, metered biogas, metered LPG) are explicitly excluded from RECH V5.0 and shall transition to the *Metered & Measured Energy Cooking Devices (MECD)* methodology as clarified in the methodology.

A 1.2 | SUMMARY OF PAA CHANGES MATRIX

A 1.2.1 | Validation and Verification Bodies (VVBs) and Activity Developers shall use the following matrix to assess compliance based on the Activity's specific Transition Pathway.

Requirement Area	Specs V5.0 Section	Pathway A: Mid-Crediting Period (Mid-CP) (Gap Validation)	Pathway B: Crediting Period Renewal (CPR) (Full Validation)
Technology (Thermal Efficiency)	3.2.1.2 & 3.2.2	**Grandfathered if Distributed Pre-2028:** Devices distributed before 01/01/2028 are exempt from V5.0 efficiency thresholds. They may continue to follow the design certified PDD specifications. **Mandatory from 01/01/2028:** The VVB shall verify that the Activity Developer has updated the technology specification in the PDD to compliant models for all future distributions. This information may be updated in the PDD at any time prior to the submission of the issuance	**Grandfathered if Distributed Pre-2028:** Devices distributed before 01/01/2028 are exempt from V5.0 efficiency thresholds. **Mandatory from 01/01/2028:** All new distributions shall meet V5.0 efficiency thresholds.

		request for the newly distributed devices.	
Regulatory Surplus	6.3	**Mandatory.** Full new analysis.	**Mandatory.** Full new analysis.
Lock-In Risk Analysis	6.4	**Mandatory Assessment.** *Note:* Devices with a verifiable operating life under 10 years, or zero-emission solar, are conditionally exempt. If High-Risk technologies (e.g., Fossil Fuels) fail the PAA exemption criteria (6.4.3), - — which for fossil fuels require explicit NDC/LT-LEDS alignment, they may continue only until the end of the current crediting period and are ineligible for renewal.	**Mandatory.** Activities failing Lock-in Risk assessment are ineligible for renewal.
Common Practice	6.7	**Exempt** (Grandfathered). Existing assessment remains valid until CPR	**Mandatory.** Full reassessment using current market data and the 25% threshold.
Ongoing Financial Need	6.8	**Exempt** (Grandfathered). Existing assessment remains valid until CPR	**Mandatory.** Shall prove continued need for carbon finance.
Baseline Scenario Data	7.3	**Grandfathered.** Existing historical survey data, baseline fuel mix, and efficiencies are retained until the end of the current crediting period.	**Mandatory Update.** New Baseline Scenario Survey (BSS) and testing demonstrating compliance with latest version of RECH is required.
Baseline Consistency Check	7.3.2	**Mandatory Check for new cohorts.** If a retrospective survey shows average household size or primary fuel use deviates by **> 20%** from the grandfathered baseline, a new baseline shall be tested for that segment. Deviations **≤ 20%** require cumulative adjustments.	Applies to each newly enrolled cohort. There is no grandfathered baseline to test at renewal, so the check is run against the newly established baseline. .
Uncertainty (90/10 Rule)	7.4.1	**Grandfathered if data is available:** Legacy 90/30 baseline data is grandfathered for Mid-CP transitions. If historical stats (SD/Mean) are unavailable to prove legacy	**Mandatory.** New testing shall strictly meet 90/10 precision or the lower/upper bound is applied.

		precision, Conservative Defaults (Lower Bounds) shall be applied.	
Baseline Caps (P_{CAP})	7.4.2 & ICS 15	**Mandatory:** The grandfathered baseline fuel consumption shall be assessed against the threshold. If found breaching the threshold, third-party justification is required. In all cases, it must be explicitly capped at a maximum of 1.25t (wood) or 0.40t (charcoal) per capita/year.	**Mandatory.** Apply caps to newly surveyed data.
DAF ($DAF_{NetZero}$)	7.4.6 & ICS 25	**Mandatory.** Apply the DAF factor for 2026 vintage and onwards.	**Mandatory.** Apply DAF for 2026 vintage and onwards. .
Charcoal Ratio (WCCF)	ICS 17	**Mandatory (Immediate).** Apply **6:1** (Sub-Saharan Africa/LDCs) or **4:1** (Other regions). Activity-specific overrides are strictly prohibited.	**Mandatory Update.** Apply 6:1 or 4:1 default as per methodology requirements.
Activity Emissions (P-KPT)	8.2	**Mandatory.** Initiate biennial re-testing (P-KPT) immediately if >2 years since last test. Shall capture total fuel use (stove stacking) and comply with 90/10 rules.	**Mandatory.** Follow biennial schedule and compliance with 90/10 and minimum sample size.
Hawthorne Effect (HE_{ind})	10.1.2 & ICS 26	**Mandatory.** Apply staggered observer bias penalty to Net Emission Reductions (Phase 1: **10%**; Phase 2: **15%**; Phase 3: **25%**) unless utilizing continuous digital monitoring.	**Mandatory.** Apply staggered observer bias penalty to Net Emission Reductions (Phase 1: **10%**; Phase 2: **15%**; Phase 3: **25%**) unless utilizing continuous digital monitoring.
Embodied Emissions	9.2	**Mandatory.** Apply default deduction (**0.017 tCO_2e/device**) or verified LCA to all new units distributed on and after 01/01/2026. Deduct 100% in Y1 for <5 yr lifespans, or amortise for lifespan equal to or more than 5 yrs.	**Mandatory.** Apply default deduction (0.017 tCO_2e/device) or verified LCA to all units distributed in the future. Deduct 100% in Y1 for <5 yr lifespans or amortise for lifespans equal to or more than 5 yrs.
Market Leakage	9.3	**Mandatory (Immediate).** Apply 2% deduction or provide	**Mandatory.** Apply 2% deduction or provide rigorous "De Minimis" justification.

		rigorous "De Minimis" justification.	
Permanence (Reversal Risk)	12.1 & 12.2	**Mandatory Overlap Check:** Check REDD+ registries for areas that could be a source of fuelwood. If fuelwood is a forest degradation driver, obtain a Letter of No Objection from a **"Relevant Authority"** (sub-national/regional accepted) as required by the methodology. **Mandatory Stability Check:** Conduct Qualitative Disturbance Check for the supply area.	**Mandatory Reassessment:** Update fNRB. If fNRB value decreases, the lower value shall be applied automatically. Increases require strict geographic justification.

A 1.3 | Baseline Overlays, Caps, and Consistency Thresholds

A 1.3.1 | VVBs shall rigorously enforce the following mathematical ceilings and consistency thresholds when evaluating both Grandfathered Baselines (during a Mid-Crediting Period Transition) and newly established baselines.

A 1.3.2 | **20% Baseline Consistency Threshold:** For activities transitioning mid-crediting period that rely on grandfathered baseline data, the VVB shall audit the retrospective surveys conducted on newly enrolled household cohorts to ensure demographic consistency. Consistent with A1.3.1, the same thresholds apply where a baseline is newly established, tested against that newly established baseline.

a. **Assessment Rule:** The VVB shall compare the average household size and the proportion of primary high-emitting fuel use in the new cohort against the originally registered PDD baseline.

i. **Deviation > 20%:** If the variance exceeds 20%, the grandfathered baseline is deemed statistically invalid for that specific new cohort. The VVB shall issue a Corrective Action Request (CAR) requiring a new Baseline Kitchen Performance Test (B-KPT) for that segment.

ii. **Deviation ≤ 20%:** If the variance is 20% or less, the grandfathered baseline remains valid but shall be cumulatively adjusted downward by the exact percentage of the deviation to prevent over-crediting.

A 1.4 | Mandatory Methodological Caps (P_{CAP})

A 1.4.1 | Before the Downward Adjustment Factor (DAF) is applied, the baseline fuel consumption—whether grandfathered or newly tested—shall be mathematically converted to a per-capita equivalent and checked against absolute methodological caps.

a. **Wood / Woody Biomass:** Threshold for Substantiation: 0.75 tonnes/capita/year. (If exceeded, independent third-party literature/data shall be provided). Absolute *Cap:* 1.25 tonnes/capita/year.

b. **Charcoal:** Threshold for Substantiation: 0.20 tonnes/capita/year. Absolute Cap 0.40 tonnes/capita/year.

A 1.4.2 | If the calculated or grandfathered historical mean exceeds the Absolute Cap, the VVB shall ensure the cap value overwrites the historical mean in the unadjusted baseline calculation prior to applying the DAF.

A 1.5 | Standardized Defaults & Lifecycle (LCA) Values

A 1.5.1 | RECH V5.0 overrides for the parameters below are strictly prohibited unless otherwise specified.

A 1.5.2 | **Wood-to-Charcoal Conversion Factor (WCCF):** VVBs shall verify that baseline and activity emissions calculations utilizing charcoal have adopted the following universally locked regional defaults:

a. **6:1 Ratio (approx. 17% kiln efficiency):** Mandatory default for Sub-Saharan Africa (SSA) and Least Developed Countries (LDCs). This reflects the dominance of less efficient, traditional earth-mound kilns.

b. **4:1 Ratio (approx. 25% kiln efficiency):** Mandatory default for all other regions globally.

A 1.5.3 | **Audit Instruction:** Any emission reduction claims utilizing legacy project-specific WCCF assessments, unless conservative shall be rejected and recalculated using these ratios.

A 1.6 | Embodied Emissions (LCA Accounting)

A 1.6.1 | Emissions embedded within the manufacturing and upstream transport of the activity devices shall be quantified and deducted as leakage.

a. **Default vs. Custom Value:** VVBs shall verify a mandatory deduction of 0.017 tCO_2e per device OR accept a project-specific Lifecycle Assessment (LCA) provided the developer utilised standard, verified LCA methodologies (e.g., ISO 14040/14044).

b. **Amortization Rule:** The VVB shall check the verified technical lifespan of the device to confirm the deduction schedule:

i. Lifespan < 5 years: 100% of the embedded emissions are deducted during the first year of the monitoring period for that unit.

ii. Lifespan ≥ 5 years: The embedded emissions deduction may be distributed evenly (amortized) over up to 5 years.

A 1.7 | *Ex-Post* Monitoring, Uncertainty, & Observer Bias

A 1.7.1 | RECH V5.0 structurally accounts for the bias associated with manual monitoring.

A 1.7.2 | **Statistical Precision (90/10 Rule):** All new ex-post sampling (e.g., Project KPTs, Usage Surveys) shall target a 90% confidence interval and a 10% margin of error.

A 1.7.3 | **Audit Instruction:** If the 90/10 precision target is not met upon completion of the sampling, the VVB shall ensure the developer applies the Upper Bound of the confidence interval for Activity Emissions (AEy). For any newly conducted Baseline tests (BEy), the Lower Bound shall be applied.

A 1.7.4 | Legacy Precision: Legacy 90/30 baseline data is grandfathered for Mid-CP transitions. Where historical statistics (SD/Mean) are unavailable to demonstrate the legacy precision, conservative defaults (lower bounds) shall be applied.

A 1.8 | Hawthorne Effect Penalty (HE_{ind})

A 1.8.1 | To account for observer bias—a staggered penalty shall be applied to the calculated Net Emission Reductions (ER_y). Phase 1 (vintages 2026–2027) — 10%; Phase 2 (vintages 2028–2029) — 15%; Phase 3 (vintages 2030 onward) — 25%. Activities utilising continuous digital monitoring (dMRV/SUMs) are exempt from this penalty.

A 1.9 | Summary of Changes: Rech V5.0 Vs. Legacy TPDDTEC

A 1.9.1 | The following matrix provides full details on the material deviations between the legacy TPDDTEC methodology and the new PAA RECH V5.0.

Thematic Area	Legacy TPDDTEC (V4.0 & Previous)	New PAA RECH V5.0 & V&V Guidelines
~~1.~~ Structure & Nomenclature	**Name:** TPDDTEC. **Structure:** 4 basic sections focusing on ex-ante surveys and back-calculation formulas. **Scope:** Broad inclusion of all decentralized thermal energy devices.	**Name:** Reduced Emissions from Cooking and Heating (RECH). **Structure:** 17 modular sections mapped to PAA requirements (explicit sections for Normative References, Reversals, Ambition). **Scope Exclusions:** Fully metered devices (electric/biogas/metered liquids) are explicitly excluded and moved to the *MECD* methodology.
~~2.~~ Additionality & Common Practice	Relied on standard CDM tools (Tool 01, Tool 21) or basic GS activity requirements.	**PAA Additionality Mandates:** • **Lock-In Risk:** Mandatory assessment (exempt only for devices with proven <10-year life or zero-emission solar). Fossil fuels (e.g., LPG) require

		explicit NDC/LT-LEDS alignment and Board approval. • **Regulatory Surplus:** Shall prove activity is not mandated by enforced local laws. • **Common Practice:** A flat 25% penetration threshold applies universally. Developers may define assessment boundaries flexibly at the district/administrative level to reflect local realities. Interventions already supported by carbon finance are strictly excluded from the baseline count.
~~3.~~ Baseline Setting & Ambition	Fixed baseline for the 5-year crediting period.	**5-Step Baseline Approach with DAF:** • **Ambition Setting:** Mandatory application of the Downward Adjustment Factor ($DAF_{NetZero}$) to the crediting baseline. This structurally aligns the project's emission reductions with the Host Country's decarbonization pathway over time.
~~4.~~ Baseline Consistency & Retroactive Checks	*Ex-ante* baseline fuel mix and household size parameters were largely accepted as static for the crediting period.	**Baseline Consistency Check (20% Threshold):** Mandatory retrospective survey for newly enrolled households. If actual household size or primary fuel use deviates by **>20%** from the ex-ante baseline assumptions, the original baseline is invalidated for that specific segment, triggering a mandatory recalculation. Deviations ≤20% require downward mathematical adjustments.
~~5.~~ Uncertainty & Conservativeness	Allowed the 90/30 statistical precision rule for field tests (KPTs) with thresholds for baseline consumption figures, with absolute hard caps.	**Strict Caps & 90/10 Precision Rule:** • **Mandatory Precision:** Transitioning to the 90/10 precision rule for parameter means. If unmet, statistical lower bounds (for baseline) or upper bounds (for activity emissions) shall be applied.

		• **Baseline Fuel Caps (P_{CAP}):** Absolute ceilings applied to back-calculated fuel use. **1.25 t/capita/year** for wood (Threshold: 0.75t); **0.40 t/capita/year** for charcoal (Threshold: 0.20t).
~~6.~~ Charcoal Conversion Ratio (WCCF)	Mandatory default emission factors	**Standardized Regional Defaults:** Project-specific overrides are strictly prohibited. • **6:1 Ratio** (~17% kiln efficiency): Default for Sub-Saharan Africa and Least Developed Countries (LDCs) to accurately reflect less efficient traditional kilns. • **4:1 Ratio** (~25% kiln efficiency): Default for all other regions.
~~7.~~ Activity Emissions (Observer Bias)	Handled via Project KPTs (P-KPTs) every 2 years.	**Staggered Hawthorne Effect Penalty (HE_{ind}):** To mitigate observer bias during manual P-KPTs, a staged penalty applies to the Net Emission Reductions: • **10% penalty (Phase 1: 2026-2027)** • **15% penalty (Phase 2: 2028-2029)** • **25% penalty (Phase 3: 2030+)** *Exemption:* Activities utilizing continuous digital monitoring (dMRV/SUMs) are entirely exempt from this penalty.
~~8.~~ Leakage (Market & Embodied)	Addressed via an optional generic 0.95 default discount factor or subjective detailed assessments. Embodied emissions were rarely quantified directly.	**Standardized LCA & Market Leakage:** • **Embodied Emissions:** Mandatory accounting. Developers may use a verified project-specific LCA or the default (0.017 tCO2e/device). **<5-year life:** 100% deducted in Year 1. **≥5-year life:** Amortized evenly across up to 5 years. • **Market Leakage:** Default **2%** market leakage deduction

		enforced unless strict "De Minimis" (e.g., total internalisation of stacking in P-KPTs) is proven.
~~9.~~ Permanence, fNRB & REDD+ Overlap	Implicit permanence for avoidance. Double-counting with forestry projects was assessed generically.	**Dynamic Baseline & REDD+ Guardrails:** • **Buffer Pools:** "No Control" exemption explicitly removes buffer pool requirements. • **Dynamic fNRB:** If fNRB decreases, the lower value applies automatically at renewal. Increases require strict geographical justification. • **REDD+ Overlap:** Projects shall check against REDD+ registries. If overlapping, developers shall obtain documentation from a "relevant authority" (sub-national or regional letters are acceptable; national DNA is not strictly required) confirming household subsistence fuelwood is *not* a quantified driver of degradation in the REDD+ baseline.
~~10.~~ Data Privacy & SDG Claims	Required exact household GPS logging.	**Privacy:** • **Data Privacy (GPS):** Exact GPS collection is restricted where it conflicts with local privacy laws (e.g., GDPR). VVBs will validate via unique digital/serial relational IDs mapped to the lowest permissible administrative unit.

ANNEX - 2: SMEC V4.0 – PAA SPECIFIC TECHNICAL GUIDELINES

A 2.1 | Scope, Applicability, & Transition Timing

A 2.1.1 | **Superseded Versions:** This Annex applies to all activities transitioning from the Simplified Methodology for Clean and Efficient Cookstoves (SMEC) V3.0 and all previous versions.

A 2.1.2 | **Target Methodology:** Simplified Methodology for Clean and Efficient Cookstoves (SMEC) V4.0.

A 2.1.3 | **Effective Timing:** For Mid-Crediting Period (Mid-CP) Gap Validations, the requirements defined herein apply prospectively to all emission reductions generated for 2026 vintages and onwards. For Crediting Period Renewals (CPR), full compliance with SMEC V4.0 or the latest available version is mandatory immediately from the start date of the new crediting period.

A 2.1.4 | **Scope Clarification:** This methodology is strictly limited to micro-scale activities (≤10,000 tCO_2e/yr) where the baseline is unambiguously a traditional stove (e.g., three-stone fire) and the primary baseline fuel (≥90%) is wood or charcoal. If baseline evidence shows heterogeneous or improved devices, the activity shall transition to the RECH methodology. Fully metered devices are explicitly excluded and shall transition to the MECD methodology.

A 2.2 | Summary of PAA Changes Matrix

A 2.2.1 | VVBs and Activity Developers shall use the following matrix to assess compliance based on the Activity's specific Transition Pathway.

A 2.2.2 | *Crucial Transition Note for SMEC:* Because SMEC V4.0 fundamentally shifts the quantification approach from efficiency-based equations to KPT-based (BE-AE) measurement, the baseline fuel consumption from V3.0 cannot be grandfathered in the same manner as other methodologies, unless the KPT approach was already applied under V3.0.

Requirement Area	Specs V4.0 Section	Pathway A: Mid-Crediting Period (Mid-CP) (Gap Validation)	Pathway B: Crediting Period Renewal (CPR) (Full Validation)
Quantification Approach Shift	7.1 & 8.1	**Mandatory.** Shift from V3.0 efficiency-based formula to V4.0 direct measurement approach.	**Mandatory.** Full implementation of BE-AE quantification.
Technology (Thermal Efficiency)	3.2.3	**Grandfathered if Distributed Pre-2028:** Devices distributed before 01/01/2028 are exempt from V4.0 efficiency thresholds. They may continue to follow the	**Grandfathered if Distributed Pre-2028:** Devices distributed before 01/01/2028 are exempt from V4.0 efficiency thresholds.

		design certified PDD specifications. **Mandatory from 01/01/2028:** The VVB shall verify that the Activity Developer has updated the technology specification in the PDD to compliant models (20% Griddle / 25% Wood / 30% Charcoal) for all future distributions. This information may be updated in the PDD at any time prior to the submission of the issuance request for the newly distributed devices.	**Mandatory from 01/01/2028:** All new distributions shall meet V4.0 efficiency thresholds.
Regulatory Surplus	6.3	**Mandatory.** Full new analysis.	**Mandatory.** Full new analysis.
Lock-In Risk Analysis	6.4	**Mandatory Assessment.** *Note:* Activities deploying devices with a verifiable lifespan of <10 years or zero-emission solar are conditionally exempt from further assessment. (Fossil-fuel devices are outside SMEC's wood/charcoal micro-scale scope; where encountered, apply the RECH fossil-fuel treatment — NDC/LT-LEDS alignment and Board approval.).	**Mandatory.** Activities failing Lock-in Risk assessment are ineligible for renewal.
Common Practice	6.7	**Grandfathered:** Existing assessment remains valid until CPR.	**Mandatory.** Full reassessment using current market data and the 25% threshold.
Ongoing Financial Need	6.8	**Grandfathered:** Existing assessment remains valid until CPR.	**Mandatory.** Shall prove continued need for carbon finance.
Baseline Scenario Data	7.3.6	**Mandatory Update (No Grandfathering):** Because the calculation logic has changed, legacy V3.0 baseline fuel consumption (Bb,y) cannot be mathematically carried forward. The Baseline shall be newly	**Mandatory Update.** New Baseline (Option A or Option B) demonstrating compliance with V4.0 is required.

		established via Option A (B-KPT) or Option B (MSL/Default), unless the KPT approach is applied under V3.0.	
Baseline Consistency Check	7.3.2	**Mandatory Check for new cohorts.** If a retrospective survey shows average household size or primary fuel use deviates by **> 20%** from the baseline scenario in the registered PDD, a new baseline shall be tested for that segment. Deviations **≤ 20%** require cumulative downward adjustments.	**N/A.** Apply to new cohort.
Uncertainty (90/10 Rule)	7.4.1 & 14.5	**Mandatory.** Because the quantification approach shifts to direct measurement (B-KPT and P-KPT), all new testing shall strictly meet 90/10 precision. If not met, Lower Bound (Baseline) or Upper Bound (Activity Emissions) shall be applied.	**Mandatory.** New testing shall strictly meet 90/10 precision or the lower/upper bound is applied.
Baseline Caps ($PCAP$)	7.4.1 & SMEC 11	**Mandatory.** If Option A (B-KPT) is utilised, baseline fuel consumption shall be assessed against the threshold. If found breaching the threshold, third-party justification is required. In all cases, it shall be explicitly capped at a maximum of 1.25t (wood) or 0.40t (charcoal) per capita- equivalent/year.	**Mandatory.** Apply caps to newly surveyed data (Option A).
DAF ($DAF_{NetZero}$)	7.4.3 & SMEC 22	**Mandatory.** Apply the DAF factor starting for monitoring periods with a vintage of 01/01/2026 or later to the capped baseline.	**Mandatory.** Apply DAF for the new period.
Charcoal Ratio (WCCF)	SMEC 15	**Mandatory** Apply **6:1** (Sub-Saharan Africa and LDCs) or **4:1** (Other regions). Activity-specific overrides are strictly prohibited.	**Mandatory Update.** Apply **6:1** (Sub-Saharan Africa and LDCs) or **4:1** (Other regions). Activity-specific overrides are strictly prohibited.

Activity Emissions (P-KPT)	8.1.2	**Mandatory.** V3.0 efficiency monitoring (η_p) is revoked. Initiate biennial re-testing (P-KPT) immediately to directly measure activity fuel consumption (including stove stacking).	**Mandatory.** Follow biennial schedule.
Hawthorne Effect ($HEind$)	10.1.2 & SMEC 23	**Mandatory** Apply staggered observer bias penalty to Net Emission Reductions (Phase 1: 10%; Phase 2: 15%; Phase 3: 25%) unless utilizing continuous digital monitoring.	**Mandatory.** Apply staggered observer bias penalty to Net Emission Reductions (Phase 1: 10%; Phase 2: 15%; Phase 3: 25%) unless utilising continuous digital monitoring.
Embodied Emissions	9.2	**Mandatory** Apply default deduction (**0.017 tCO2e/device**) or verified LCA to all new units distributed after 01/01/2026. Deduct 100% in Y1 for <5 yr lifespans, or amortize over ≤5 yrs.	**Mandatory.** Apply default deduction (**0.017 tCO2e/device**) or verified LCA to all new units distributed after 01/01/2026. Deduct 100% in Y1 for <5 yr lifespans, or amortize over ≤5 yrs.
Market Leakage	9.3 & SMEC 21	**Mandatory** Apply **2%** default deduction. *(Note: V3.0 0.95 adjustment factor for PoAs is superseded by this direct deduction for all activities).*	**Mandatory.** Apply 2% deduction.
Permanence (Reversal Risk)	12.1 & 12.2	**Mandatory Overlap Check:** Check REDD+ registries. If fuelwood is a degradation driver, obtain a Letter of No Objection from a "Relevant Authority" (sub-national/regional accepted) as required by the methodology/ **Mandatory Stability Check:** Conduct Qualitative Disturbance Check for the supply area.	**Mandatory Reassessment:** Update fNRB. If fNRB value decreases, the lower value shall be applied automatically. Increases require strict geographic justification.

A 2.3 | Baseline Overlays, Caps, and Consistency Thresholds

A 2.3.1 | Because SMEC V4.0 fundamentally shifts the quantification mechanism from efficiency-ratios to direct measurement, legacy baseline fuel consumption values from V3.0 cannot be grandfathered, unless the KPT

approach is applied. VVBs shall rigorously enforce the following protocols during Mid-Crediting Period transitions.

a. **Mandatory Baseline Shift**: VVBs shall verify that the Activity Developer has abandoned legacy efficiency-based baseline formulas. The developer shall establish a new baseline using either Option A (Baseline KPT) or Option B (Minimum Service Level / Default), if applicable.

b. **Baseline Option B (Minimum Service Level / Default Simplification)**: To offset the increased MRV rigor of the P-KPT, microscale projects may opt for Option B. If Option B is selected, VVBs shall verify that the Baseline Fuel Consumption is set to the MSL default values: **0.50 tonnes per capita per year (Wood)** or **0.13 tonnes per capita per year (Charcoal)**. This value shall be multiplied by the verified average household size (HN_b) (adjusted for standard adult as per KPT protocol). Because it is a conservative default, 90/10 precision rules do not apply, but a mandatory **5% conservativeness discount** (0.95 multiplier) shall be mathematically applied to the calculated mean prior to the DAF.

A 2.3.2 | **20% Baseline Consistency Threshold:** For newly enrolled household cohorts added after the V4.0 transition, the VVB shall audit retrospective surveys to ensure demographic consistency. Although SMEC re-establishes the baseline fuel consumption (no grandfathering), the demographic profile in the originally registered PDD — average household size and high-emitting fuel-use proportions — is retained as the comparator for this check

A 2.3.3 | **Assessment Rule:** The VVB shall compare the average household size and the proportion of primary high-emitting fuel use in the new cohort against the originally registered PDD demographic baseline.

a. Deviation > 20%: If the variance exceeds 20%, a new Baseline KPT (B-KPT) or adjustment of the MSL calculation is mandatory for that segment.

b. Deviation ≤ 20%: If the variance is 20% or less, the baseline remains valid but must be cumulatively adjusted downward by the exact percentage of the deviation to prevent over-crediting.

A 2.3.4 | **Mandatory Methodological Caps (PCAP) –** For Option A Only: If Option A (B-KPT) is selected, the tested baseline fuel consumption shall be mathematically converted to a per-capita equivalent and checked against absolute methodological caps prior to applying the DAF.

a. **Wood / Woody Biomass:** Threshold for Substantiation: 0.75 tonnes/capita/year. Absolute Cap: 1.25 tonnes/capita/year.

b. **Charcoal:** Threshold for Substantiation: 0.20 tonnes/capita/year. Absolute Cap: 0.40 tonnes/capita/year.

c. **Audit Instruction:** If the calculated historical mean exceeds the Absolute Cap, the VVB shall ensure the emission reduction calculation overwrites the historical mean with the PCAP value prior to applying the DAF.

A 2.4 | Standardized Defaults & Lifecycle (LCA) Values

A 2.4.1 | For SMEC V4.0 overrides for the parameters below are strictly prohibited unless otherwise specified.

A 2.4.2 | **Wood-to-Charcoal Conversion Factor (WCCF):** VVBs shall verify that baseline and activity emissions calculations utilizing charcoal have adopted universally locked regional defaults:

a. **6:1 Ratio (approx. 17% kiln efficiency):** Mandatory default for Sub-Saharan Africa (SSA) and Least Developed Countries (LDCs.

b. **4:1 Ratio (approx. 25% kiln efficiency):** Mandatory default for all other regions globally.

c. **Audit Instruction:** Any emission reduction claims utilizing legacy project-specific WCCF assessments shall be rejected and recalculated using these ratios.

A 2.5 | Embodied Emissions (LCA Accounting)

A 2.5.1 | Emissions embedded within the manufacturing and upstream transport of the activity devices shall be quantified and deducted as leakage.

a. Default vs. Custom Value: VVBs shall verify a mandatory deduction of 0.017 tCO_2e per device OR accept an activity-specific Lifecycle Assessment (LCA) provided the developer utilised standard, verified LCA methodologies (e.g., ISO 14040/14044).

b. Amortisation Rule: The VVB shall check the verified technical lifespan of the device to confirm the deduction schedule. If the lifespan is <5 years, 100% of the embedded emissions are deducted during the first year of the monitoring period for that unit. If the lifespan is equal to or more than 5 years, the embedded emissions deduction may be distributed evenly (amortised) over up to 5 years.

A 2.5.2 | **Market Leakage Default:** Because SMEC V4.0 removes complex, subjective leakage assessments to maintain micro-scale simplicity, VVBs shall ensure a mandatory 2% default deduction is applied to the net emission reductions to account for market and behavioural leakage.

A 2.6 | Ex-Post Monitoring, Uncertainty, & Observer Bias:

A 2.6.1 | SMEC V4.0 aligns MRV rigor with RECH V5.0, requiring strict statistical precision and structural penalties for manual monitoring.

A 2.6.2 | All new ex-post sampling (e.g. Project KPTs, Usage Surveys, and newly required Option A B-KPTs) shall target a 90% confidence interval and a 10% margin of error.

A 2.6.3 | If the 90/10 precision target is not met upon completion of the sampling, the VVB shall ensure the developer applies the Upper Bound of the confidence interval for Activity Emissions (AEy) and Usage Rates. For newly conducted Baseline tests (BEy) under Option A, the Lower Bound shall be applied.

A 2.7 | Hawthorne Effect (HE_{ind}):

A 2.7.1 | To account for observer bias (users artificially inflating clean stove use when enumerators are physically present during manual P-KPTs), a staggered penalty shall be applied to the calculated Net Emission Reductions (ER_y): Phase 1 (vintages 2026–2027) — 10%; Phase 2 (vintages 2028–2029) — 15%; Phase 3 (vintages 2030 onward) — 25%. Activities utilising continuous digital monitoring (dMRV/SUMs) are exempt from this penalty.

A 2.8 | fNRB Updates and Biomass Depletion Safeguards

A 2.8.1 | At the time of Crediting Period Renewal, the Fraction of Non-Renewable Biomass (fNRB) shall be updated using the latest approved standard tools (e.g., MoFuSS).

a. *Automatic Adjustment (Decreases):* If the updated tool calculates a lower fNRB value than the previous crediting period, the VVB shall ensure the lower value is applied automatically.

b. *Justification for Increases:* If the updated tool indicates a higher fNRB value, the VVB shall issue a CAR requiring explicit, rigorous evidence demonstrating that end-users are still physically sourcing their wood from the exact same geographic reservoir.

A 2.9 | Summary of Changes: SMEC V4.0 vs. Legacy SMEC V3.0

~~A 2.8.2 | Summary of Changes: SMEC V4.0 vs. Legacy SMEC V3.0~~The following matrix provides full details on the material deviations between the legacy SMEC V3.0 methodology and the new PAA SMEC V4.0.

~~A 2.8.3 |~~A 2.9.1 | ~~A 2.9.1 | The following matrix provides full details on the material deviations between the legacy SMEC V3.0 methodology and the new PAA SMEC V4.0.~~

Thematic Area	Legacy SMEC (V3.0 & Previous)	New PAA SMEC V4.0 & V&V Guidelines
~~1.~~ **Quantification Approach (Fundamental Shift)**	**Efficiency-Based Calculation:** Calculated fuel savings based on the ratio of baseline and project stove efficiencies measured via WBTs	**Direct Measurement (BE-AE):** Fundamentally shifted to measuring actual field consumption via Kitchen Performance Tests (KPTs) or applying conservative defaults.
~~2.~~ **Additionality & Common Practice**	Relied on older CDM tools or general CSA requirements.	**PAA Additionality Mandates:** Aligns with GS4GG

		Additionality Standard. Introduces mandatory Lock-In Risk assessment, Regulatory Surplus assessment, and 25% Common Practice threshold. Deemed additionality for micro-scale activities in LDCs/rural LMICs without government subsidies.
~~3.~~ Baseline Setting & Ambition	Allowed various sources for baseline fuel consumption. No Downward Adjustment Factor (DAF).	**5-Step Approach with DAF:** Restricts baseline to Option A (B-KPT) or Option B (MSL/Default). Mandates the application of $DAF_{NetZero}$ to encourage ambition over time.
~~4.~~ Baseline Optionality (Simplification)	Required baseline testing or complex justifications.	**Optional B-KPT:** If the conservative Minimum Service Level (MSL) defaults (0.50t wood / 0.13t charcoal per capita) are utilised, conducting a Baseline KPT is optional.
~~5.~~ Uncertainty & Conservativeness	Allowed 90/30 statistical precision.	**Strict Caps & 90/10 Precision:** Mandatory 90/10 precision for KPTs. Absolute fuel caps enforced for Option A: 1.25 t/capita/year (wood); 0.40 t/capita/year (charcoal).
~~6.~~ Charcoal Conversion Ratio (WCCF)	Allowed project-specific assessments or mandatory default emission factors.	**Standardized Regional Defaults:** 6:1 Ratio (SSA/LDCs); 4:1 Ratio (Other regions). Project overrides prohibited.
~~7.~~ Activity Emissions (Observer Bias)	Handled by monitoring project stove efficiency degradation over time. Did not penalize for observer bias.	**Staggered Hawthorne Effect Penalty (HEind):** Direct fuel measurement via P-KPT triggers a staged penalty to mitigate observer bias during manual P-KPTs: 10% penalty (Phase 1: 2026-2027), 15% penalty (Phase 2: 2028-2029), 25% penalty (Phase 3: 2030+). Exempt if utilizing continuous digital monitoring.

~~8.~~ Leakage (Market & Embodied)	Ignored leakage for individual projects. Applied a 0.95 factor solely for PoAs. Embodied emissions ignored.	**Standardized LCA & Market Leakage:** Mandatory deduction for cradle-to-gate embodied emissions (0.017 tCO2e/device). Mandatory default 2% market leakage deduction for all projects and PoAs.
~~9.~~ Permanence, fNRB & REDD+ Overlap	Implicit permanence for avoidance. Generically assessed double counting with forestry projects.	**Dynamic Baseline & REDD+ Guardrails:** "No Control" exemption explicitly removes buffer pools. fNRB decreases apply automatically at renewal. REDD+ overlaps mandate attribution via a "Relevant Authority."

ANNEX - 3: MECD V2.0 – PAA SPECIFIC TECHNICAL GUIDELINES

A 3.1 | Scope, Applicability, & Transition Timing

A 3.1.1 | **Superseded Versions:** This Annex applies to all activities transitioning from the *Methodology for Metered & Measured Energy Cooking Devices (MECD)* V1.2 and all previous versions.

A 3.1.2 | **Target Methodology:** Metered & Measured Energy Cooking Devices (MECD) V2.0.

A 3.1.3 | **Effective Timing:** For Mid-Crediting Period (Mid-CP) Gap Validations, the numerical thresholds and requirements defined herein apply prospectively to all emission reductions generated for 2026 vintages and onwards. For Crediting Period Renewals (CPR), full compliance is mandatory immediately upon the start date of the new crediting period.

A 3.1.4 | **Scope Clarification:** This methodology is strictly limited to activities utilizing Continuously Tracked Energy Consumption (CTEC). 100% of the active devices shall be metered or tracked via comprehensive digital fuel sales records, except where the pre-2030 Revolving Sample Exemption in A3.10 applies

A 3.2 | Technical Requirements Matrix

A 3.2.1 | Validation and Verification Bodies (VVBs) and Activity Developers shall use the following matrix to assess compliance based on the Activity's specific Transition Pathway.

Requirement Area	Specs V2.0 Section	Pathway A: Mid-Crediting Period (Mid-CP) (Gap Validation)	Pathway B: Crediting Period Renewal (CPR) (Full Validation)
Quantification Approach	7.1 & 8.3	**Grandfathered:** Existing legacy formulas are adapted. The core back-calculation logic is maintained but shall be subjected to the new Caps and DAF.	**Mandatory Update.** Full implementation of the V2.0 5-Step Baseline Approach.
Regulatory Surplus	6.3	**Mandatory.** Full new analysis. Shall demonstrate no new laws mandate the activity.	**Mandatory.** Full new analysis.
Lock-In Risk Analysis	6.4	**Mandatory Assessment.** *Note:* EPCs (<10 yr lifespan) and Zero-Emission Solar are	**Mandatory.** Activities failing the Lock-in Risk assessment are ineligible for renewal.

		conditionally exempt. High-Risk fossil fuels (e.g., LPG) failing the PAA exemption criteria may continue only until the end of the current period.	
Common Practice	6.7	**Grandfathered**: Existing assessment remains valid until CPR.	**Mandatory.** Full reassessment using current market data and the 25% threshold.
Ongoing Financial Need	6.8	**Grandfathered**: Existing assessment remains valid until CPR.	**Mandatory.** Shall prove continued need for carbon finance.
Baseline Scenario Data	7.3	**Grandfathered.** Existing historical survey data (fuel mix proportions and baseline efficiencies are retained until the end of the current crediting period.	**Mandatory Update.** New Baseline Scenario Survey (BSS) and testing required.
Baseline Consistency Check	7.3.2	**Exempt for existing cohort. Mandatory Check for new cohorts.** If a retrospective survey shows average household size or primary fuel use deviates by **> 20%** from the grandfathered baseline, a new baseline shall be calculated for that segment. Deviations **≤ 20%** require cumulative downward adjustments.	Applies to each newly enrolled cohort, tested against the registered baseline.
Uncertainty (90/10 Rule)	7.4.1 & 14.5	**Mandatory:** Apply 90/10 logic to grandfathered sampling data (e.g., CCTs/WBTs). If historical stats (SD/Mean) are unavailable to prove precision, apply Conservative Defaults	**Mandatory.** New testing shall strictly meet 90/10 precision or the lower bound is applied.

Baseline Caps (P_{CAP})	7.4.2 & MECD 12	**Mandatory.** The back-calculated baseline energy shall be explicitly capped at **0.0195 TJ** (wood) or **0.0064 TJ** (charcoal) per capita/year.	**Mandatory.** Apply caps to back-calculated baseline energy.
DAF (DAF NetZero)	7.4.4 & MECD 13	**Mandatory.** Apply the DAF factor corresponding to the start date of the current monitoring period (e.g., 01/01/2026 or later) to the capped baseline.	**Mandatory.** Apply DAF for the new period.
Performance Degradation	8.3.2	**Mandatory.** Initiate biennial re-testing (e.g., CCT or WBT) immediately if >2 years since the last test to adjust activity efficiencies/SC.	**Mandatory.** Follow biennial schedule.
Meter Accuracy (MPE)	8.3.3	**Mandatory.** Adjust metered project consumption *upwards* if the Meter's Maximum Permissible Error (MPE) > 2.5%.	**Mandatory Update.** Adjust consumption based on MPE %.
Observer Bias (HEind)	10.1 & MECD 23 (N/A)	**EXEMPT.** Because MECD strictly mandates 100% CTEC digital monitoring, all activities are inherently exempt from the Hawthorne Effect penalty	**EXEMPT.** Digital monitoring remains mandatory.
Embodied Emissions	9.2	**Mandatory.** Apply default deduction (**0.017 tCO2e/device**) or verified LCA to all new units. Deduct 100% in Y1 for <5 yr lifespans, or amortize over ≤5 yrs.	**Mandatory.** Apply to all units distributed in the future.
Market Leakage	9.3	**Mandatory.** Apply **2%** deduction or provide rigorous "De Minimis" justification.	**Mandatory.** Apply 2% deduction or "De Minimis."

Permanence (Reversal Risk)	12.1 & 12.2	**Mandatory Overlap Check:** Check REDD+ registries. If fuelwood is a degradation driver, obtain a Letter of No Objection from a "Relevant Authority" (sub-national/regional accepted) as required by the methodology. **Mandatory Stability Check:** Conduct Qualitative Disturbance Check for the supply area.	**Mandatory Reassessment:** Update fNRB. If fNRB value decreases, the lower value applies automatically. Increases require strict geographic justification.

A 3.3 | Baseline Overlays, Caps, and Consistency Thresholds

A 3.3.1 | MECD uniquely derives its baseline by back-calculating the energy required to deliver the same cooking service measured by the activity device. Validation and Verification Bodies (VVBs) shall rigorously enforce the following protocols during Mid-Crediting Period transitions.

A 3.3.2 | **20% Baseline Consistency Threshold:** For newly enrolled household cohorts added after the V2.0 transition, the VVB shall audit retrospective surveys to ensure demographic and fuel-mix consistency.

A 3.3.3 | **Assessment Rule:** The VVB shall compare the average household size and the proportion of primary high-emitting fuel use in the new cohort against the originally registered PDD baseline. *To eliminate recall bias, this survey shall be conducted within 30 days of installation/onboarding.*

a. Deviation > 20%: If the variance exceeds 20%, the grandfathered baseline is deemed statistically invalid for that specific new cohort. The VVB shall issue a Corrective Action Request (CAR) requiring a new Baseline Scenario Survey for that segment.

b. Deviation ≤ 20%: If the variance is 20% or less, the grandfathered baseline remains valid, but the proportions ($Prop_{i,j}$) shall be cumulatively adjusted downward by the exact percentage of the deviation to match the observed, lower-emitting profile.

A 3.3.4 | Exception: Activities utilizing comprehensive individual household-level baselines mapped at onboarding for 100% of participants are explicitly exempt from this population-level parameter.

A 3.4 | Mandatory Methodological Caps

A 3.4.1 | Before the Downward Adjustment Factor (DAF) is applied, the back-calculated baseline input energy ($EG_{b,back-calc,y}$) shall be mathematically converted to a per-capita equivalent and checked against absolute methodological energy caps (expressed in TJ input energy/person/year).

a. Wood / Woody Biomass: Threshold for Substantiation: 0.0117 TJ/person/year. Absolute Cap (P_{cap}): 0.0195 TJ/person/year.

b. Charcoal: Threshold for Substantiation: 0.0032 TJ/person/year. Absolute Cap (P_{cap}): 0.0064 TJ/person/year.

c. Audit Instruction: The VVB shall multiply the per-capita cap by the monitored number of users ($N_{users,y}$). If the back-calculated baseline energy exceeds the Absolute Cap, the VVB shall ensure the emission reduction calculation automatically overwrites the back-calculated volume with the P_{cap} value (multiplied by the number of active users) prior to applying the DAF.

A 3.5 | Standardized Defaults & Lifecycle (LCA) Values

A 3.5.1 | MECD V2.0 revokes flexibility for macro-parameters in favour of standardized defaults. Project-specific overrides for the parameters below are strictly prohibited unless otherwise specified.

A 3.5.2 | **Wood-to-Charcoal Conversion Factor (WCCF) & Upstream Emissions** VVBs shall verify that baseline calculations utilizing charcoal have adopted universally locked regional defaults. In MECD, Upstream Emission Factors (UEF) for charcoal kilns are strictly integrated into the total Lifecycle Combustion Factors to ensure fNRB applies accurately to all upstream wood harvested:

a. 6:1 Ratio (approx. 17% kiln efficiency): Mandatory default for Sub-Saharan Africa (SSA) and Least Developed Countries (LDCs).

b. 4:1 Ratio (approx. 25% kiln efficiency): Mandatory default for all other regions globally.

A 3.5.3 | **Embodied Emissions (LCA Accounting)** Emissions embedded within the manufacturing and upstream transport of the activity devices shall be quantified and deducted as leakage.

A 3.6 | Market Leakage Default

A 3.6.1 | VVBs shall ensure a mandatory **2% default deduction** is applied to the net emission reductions to account for market leakage, unless the activity developer provides rigorous, evidence-based justification proving "De Minimis" leakage.

A 3.6.2 | Ex-Post Monitoring, Uncertainty, & CTEC Specifics: MECD V2.0 structurally enforces continuous tracking (CTEC) and penalizes data gaps, poor meter accuracy, and low statistical precision in supporting parameters.

a. Meter Accuracy (MPE) Adjustments

b. Uncertainty related to the physical metering hardware shall be assessed.

A 3.6.3 | Audit Instruction: VVBs shall check the Maximum Permissible Error (MPE) specifications of the deployed smart meters (e.g., via OIML or IEC standards). If the MPE exceeds 2.5%, the total metered consumption

($EG_{p,input,y}$) shall be mathematically adjusted upwards by the MPE percentage to ensure activity emissions are not underestimated. (Note: Pure digital fuel-sales tracking systems without hardware meters are exempt).

A 3.7 | Handling of Data Gaps

A 3.7.1 | Strict rules apply when metered data for a specific device is missing due to telemetry failures.

a. Data Gap < 50%: If missing data is <50% for the monitoring period, the VVB shall verify that the developer replaced the missing data using the 25th percentile of the available tracked energy consumption for that specific device.

b. Data Gap ≥ 50%: If 50% or more of the data is missing, the VVB shall ensure that the specific device is entirely excluded from emission reduction calculations for that monitoring period (yielding zero ERs).

A 3.8 | Statistical Precision (The 90/10 Rule) for Testing Parameters

A 3.8.1 | While fuel consumption is metered 100%, parameters derived from ex-ante or periodic sampling (e.g., Efficiencies (η) via WBT, Specific Consumption SC via CCT, or Baseline Emissions Ratios via KPT) shall strictly target a **90% confidence interval and 10% margin of error (90/10 Rule)**.

A 3.8.2 | *Audit Instruction:* If the 90/10 precision target is not met, the VVB shall ensure the developer applies the conservative bound. For Baseline parameters (e.g., η_b or Specific Consumption ratio SC_b/SC_P), the bound that yields the lowest baseline shall be utilised. For Activity parameters (e.g., η_P), the bound that yields the highest project emissions shall be utilised.

A 3.9 | Observer Bias (Hawthorne Effect) EXEMPTION

A 3.9.1 | Unlike manual unmetered methodologies (e.g., RECH or SMEC), MECD structurally relies on 100% continuous digital monitoring (CTEC). Because devices automatically log usage without the disruptive physical presence of enumerators during cooking, activities utilizing MECD are **structurally exempt** from the Hawthorne Effect staggered penalty adjustments.

A 3.9.2 | *Audit Instruction:* VVBs shall ensure that the multiplier for the Hawthorne Effect is explicitly set to **1.0** (or simply not applied) for all activities applying this methodology.

A 3.10 | The Revolving Sample Exemption (Pre-2030)

A 3.10.1 | If a project in an LDC or demonstrably constrained area is utilizing the "Alternative Continuous Monitoring Approach" (revolving sample) instead of 100% metering prior to the 2030 deadline:

A 3.10.2 | Audit Instruction: The VVB shall verify that the continuous monitored sample is ≥ 5% of the total active fleet (or meets 90/10 precision, whichever is greater). Crucially, the VVB shall verify the "revolving cohort" mechanism: a minimum of 20% of the continuously monitored sample cohort shall be randomly rotated out and replaced annually to prevent bias.

A 3.11 | Summary of Changes: MECD V2.0 vs. Legacy MECD V1.2

~~A 3.10.3 | Summary of Changes: MECD V2.0 vs. Legacy MECD V1.2~~The following matrix provides full details on the material changes between the legacy MECD methodology and the new PAA MECD V2.0.

~~A 3.10.4 |~~A 3.11.1 | ~~A 3.11.1 | The following matrix provides full details on the material changes between the legacy MECD methodology and the new PAA MECD V2.0.~~

Thematic Area	Legacy MECD (V1.2 & Previous)	New PAA MECD V2.0 & V&V Guidelines
~~1.~~ Scope & CTEC Requirement	Defined generally for metered devices. Allowed loose interpretations of sampling.	**Strict CTEC Mandate:** Mandates 100% continuous census monitoring. Sampling for activity energy consumption is prohibited. *(Exception: LDCs or areas with prohibitive data barriers may use a revolving representative sample, but this expires strictly on Dec 31, 2030).*
~~2.~~ Additionality & Common Practice	Relied on older CDM tools or general CSA requirements.	**PAA Additionality Mandates:** Aligns with GS4GG Additionality Standard. Introduces mandatory Lock-In Risk assessment (with fossil fuel high-burden-of-proof), Regulatory Surplus assessment, and a flat **25%** Common Practice threshold.
~~3.~~ Baseline Setting & Ambition	Fixed baseline for the 5-year crediting period. No Downward Adjustment Factor (DAF).	**5-Step Approach with DAF:** Mandates the application of DAF NetZero to the back-calculated crediting baseline to ensure ambition aligns with Host Country decarbonization trajectories.
~~4.~~ Uncertainty & Conservativeness	Basic conservative assumptions.	**Strict Caps & 90/10 Precision:** Mandatory 90/10 precision for parameters derived from sampling (CCTs/WBTs). Absolute

		back-calculation energy caps enforced.
~~5.~~ Activity Emissions & Metering	Basic monitoring requirements.	**Degradation & MPE:** Introduces biennial re-testing of project performance (SC_p or η_p) to capture degradation. Introduces mandatory upward adjustment of activity consumption if meter MPE > 2.5%. Introduces strict data gap rules (<50% = 25th percentile replacement; ≥50% = device excluded).
~~6.~~ Stacking & Rebound Effects	Handled subjectively in leakage.	**Internalized:** Explicitly clarifies that because the baseline is back-calculated solely from the *metered energy delivered*, unmetered stacking bypasses the meter and naturally results in a proportionally lower baseline. Rebound effects are bounded by the absolute Baseline Caps.
~~7.~~ Leakage (Market & Embodied)	Basic generic assessment.	**Standardised LCA & Market Leakage:** Mandatory deduction for cradle-to-gate embodied emissions (0.017 tCO2e/device). Mandatory default 2% market leakage deduction for all projects/PoAs.
~~8.~~ Permanence, fNRB & REDD+ Overlap	Implicit permanence for avoidance. Generically assessed ~~double-counting~~double counting.	**Dynamic Baseline & REDD+ Guardrails:** "No Control" exemption removes buffer pools. fNRB decreases apply automatically at renewal. REDD+ overlaps mandate attribution via a "Relevant Authority" (sub-national allowed).

ANNEX - 4: AWMS V2.0 – PAA SPECIFIC TECHNICAL GUIDELINES

A 4.1 | Scope, Applicability, & Transition Timing

A 4.1.1 | **Superseded Versions:** This Annex applies to all activities transitioning from the *Methodology for Animal Manure Management and Biogas Use for Thermal Energy Generation* V1.1 and all previous versions.

A 4.1.2 | **Target Methodology:** Animal Manure Management and Biogas Use for Thermal Energy Generation (AWMS) V2.0.

A 4.1.3 | **Effective Timing:** For Mid-Crediting Period (Mid-CP) Gap Validations, the numerical thresholds, leakage penalties, and DAF requirements defined herein apply prospectively to all emission reductions generated for 2026 vintages and onwards. For Crediting Period Renewals (CPR), full compliance with AWMS V2.0 is mandatory immediately upon the start date of the new crediting period.

A 4.1.4 | **Scope Clarification:** This methodology integrates two distinct mitigation components: **Methane Avoidance (AWMS)** and **Biogas Utilization (Thermal Application)**. PAA rules (such as Reversals and Hawthorne penalties) may apply exclusively to one component and not the other. Validation and Verification Bodies (VVBs) shall ensure the PAA overlays and caps are applied accurately to their respective calculation branches.

A 4.2 | Technical Requirements Matrix

A 4.2.1 | Validation and Verification Bodies (VVBs) and Activity Developers shall use the following matrix to assess compliance based on the Activity's specific Transition Pathway.

Requirement Area	Specs V2.0 Section	Pathway A: Mid-Crediting Period (Mid-CP) (Gap Validation)	Pathway B: Crediting Period Renewal (CPR) (Full Validation)
AWMS Method Selection (Tier 1 vs 2)	3.2.5.2	**Mandatory:** If the ex-ante emission reduction from the methane recovery component alone exceeds **5 tCO_2e/yr per digester**, the activity *shall* immediately switch to AWMS Method 2 (IPCC Tier 2) for calculations.	**Mandatory.** Shall apply Method 2 if > 5 tCO_2e/yr.
Technology (Thermal Efficiency)	3.2.6.2	**Grandfathered if Distributed Pre-2028:** Thermal devices (e.g., biogas stoves) distributed before	**Grandfathered if Distributed Pre-2028:** Thermal devices distributed before 01/01/2028 are exempt

		01/01/2028 are exempt from the V2.0 efficiency thresholds. They may continue to follow the registered PDD specifications. **Mandatory from 01/01/2028:** The VVB shall verify that the Activity Developer has updated the technology specification in the PDD to compliant models (≥ 40% efficiency) for all future installations.	from the V2.0 efficiency thresholds. **Mandatory from 01/01/2028:** All new installations shall meet the ≥ 40% efficiency threshold.
Regulatory Surplus	6.3	**Mandatory.** Full new analysis. Shall demonstrate no new laws mandate the activity (e.g., new manure management regulations).	**Mandatory.** Full new analysis.
Lock-In Risk Analysis	6.4.3	**Deemed Compliant.** Anaerobic digestion systems utilizing organic waste are explicitly exempt from further activity-level lock-in risk assessment (fully compatible with Net-Zero pathways).	**Deemed Compliant.**
Common Practice	6.7.2.3	**Grandfathered:** Existing assessment remains valid until CPR.	**Mandatory.** Full reassessment using current market data and the applicable threshold (**25%** for LDCs/SIDS/low-income; **16%** for others).
Ongoing Financial Need	6.8	**Grandfathered:** Existing assessment remains valid until CPR.	**Mandatory.** Shall prove continued need for carbon finance.
Baseline Scenario Data	7.3.1	**Grandfathered.** Existing historical baseline data (livestock populations,	**Mandatory Update.** New Baseline Scenario Survey (BSS) required

		AWMS practices and Thermal fuel mix) are retained until the end of the current CP.	for both AWMS and Thermal components.
Baseline Consistency Check	7.3.2	**Mandatory check for new cohorts.** If a retrospective survey shows average household size, primary fuel use, or baseline manure practice deviates by **> 20%** from the grandfathered baseline, a new baseline shall be tested for that segment. Deviations **≤ 20%** require cumulative downward adjustments.	**N/A.** Apply to new cohort.
Uncertainty (90/10 Rule)	7.4.1 & 14.4.3	**Mandatory Retrofit.** Apply 90/10 logic to grandfathered sampled data. If historical stats are unavailable to prove legacy precision, apply Conservative Defaults (Lower Bounds).	**Mandatory.** New testing/surveys shall strictly meet 90/10 precision or conservative bound is applied.
Thermal Baseline Caps (P_{cap})	7.4.2	**Mandatory (Immediate).** The grandfathered thermal baseline fuel consumption shall be explicitly capped at **1.25t (wood)** or **0.40t (charcoal)** per capita/year.	**Mandatory.** Apply caps to newly surveyed thermal baseline data.
DAF ($DAF_{NetZero}$)	7.4.5 & BGTA 3	**Mandatory (Immediate).** Apply the DAF factor starting for monitoring periods with a vintage of 01/01/2026 or later to the total capped baseline emissions.	**Mandatory.** Apply DAF for the new period.
Charcoal Ratio (WCCF)	Table 2 & A2.2	**Mandatory (Immediate).** If charcoal is the baseline	**Mandatory Update.** Apply 6:1 or 4:1 default.

		thermal fuel, apply **6:1** (Sub-Saharan Africa and LDCs) or **4:1** (Other regions). Activity-specific overrides are strictly prohibited.	
Digestate Leakage ($LE_{digestate}$)	9.4.3 & BGTA 43	**Mandatory (Immediate).** Verify Tier 1 Best Management Practices (aerobic handling). If failed/unverified, automatically apply the **2.4x conservative leakage multiplier** to calculated CH_4 digestate emissions (Tier 2).	**Mandatory.** Verify BMPs or apply 2.4x multiplier.
Embodied Emissions	9.3	**Mandatory (Immediate).** Apply dual deductions: **2.9 tCO_2e** per biodigester (≤20m³) + **0.017 tCO_2e** per thermal device. Deduct 100% in Y1 for <5 yr lifespans, or amortize over ≤5 yrs.	**Mandatory.** Apply to all units distributed in the future.
Physical Leakage (PE_{pl})	8.2.2.2	**Mandatory (Immediate).** Deduct 10% default for physical biogas leakage from AWMS emissions unless continuously measured via TOOL 14.	**Mandatory.**
Observer Bias (HE_{ind})	10.1.3 & BGTA 28	**Mandatory (Immediate).** Apply staggered penalty (Phase 1: **10%**; Phase 2: **15%**; Phase 3: **25%**) to the *Thermal Component ERs* if Thermal Method 1 (Non-Metered) is used. *(Note: Does not apply to AWMS Methane Avoidance ERs).*	**Mandatory.** Apply penalty to Thermal Method 1 or implement continuous digital monitoring.

Market Leakage (Thermal)	9.4.6 & BGTA 45	**Mandatory (Immediate).** Apply **2%** deduction to the Thermal Component ERs (only) if thermal market effects are not fully internalized.	**Mandatory.** Apply 2% deduction or "De Minimis".
Permanence (Reversal Risk)	12.1 & 12.2	**Mandatory Overlap Check:** Check REDD+ registries. If fuelwood is a degradation driver, obtain a Letter of No Objection from a "Relevant Authority" (sub-national/regional accepted). **Mandatory Stability Check:** Conduct Qualitative Disturbance Check for the thermal supply area. *(Note: Methane Avoidance component has no reversal risk).*	**Mandatory Reassessment:** Update fNRB. If fNRB value decreases, the lower value applies automatically. Increases require strict geographic justification.

A 4.3 | Baseline Overlays, Caps, and Consistency Thresholds

A 4.3.1 | Because AWMS V2.0 integrates two distinct mitigation components, Validation and Verification Bodies (VVBs) shall enforce specific consistency rules for both the Methane Avoidance and Thermal branches when evaluating Grandfathered Baselines during Mid-Crediting Period transitions.

A 4.3.2 | The 5 tCO2e/yr AWMS Method Upgrade Threshold (Tier 1 vs Tier 2): To ensure large-scale manure management systems are not over-credited using simplified defaults:

a. Assessment Rule: The VVB shall calculate the ex-ante emission reduction generated strictly from the Methane Avoidance component per digester.

A 4.3.3 | VVB Action: If ER_{AWMS} > 5tCO₂e/yr per unit, the VVB shall verify that the Activity Developer has transitioned to AWMS Method 2 (IPCC Tier 2) for the monitoring period. If Method 1 was used, a Corrective Action Request (CAR) shall be raised.

A 4.3.4 | 20% Baseline Consistency Threshold: For newly enrolled household/farm cohorts added after the V2.0 transition, the VVB shall audit retrospective surveys to ensure demographic, agricultural, and fuel-mix consistency.

A 4.3.5 | Assessment Rule (AWMS): The VVB shall compare the fraction of manure handled in the primary anaerobic baseline system ($MS\%Bl,j$) of the new cohort against the originally registered PDD baseline.

A 4.3.6 | Assessment Rule (Thermal): The VVB shall compare the primary fuel use and average household size of the new cohort against the PDD baseline. (To eliminate recall bias, this survey shall be conducted within 30 days of installation/onboarding).

A 4.3.7 | Deviation > 20%: If the absolute variance for any of these parameters exceeds 20% (and results in a lower-emitting real-world profile), the grandfathered baseline is deemed statistically invalid for that specific new cohort. A new Baseline Scenario Survey is mandatory.

A 4.3.8 | Deviation ≤ 20%: If the variance is 20% or less, the grandfathered baseline remains valid, but the applicable parameters shall be cumulatively adjusted downward by the exact percentage of the deviation to match the observed, cleaner profile.

A 4.3.9 | Mandatory Methodological Thermal Caps (P_{cap}): Before the Downward Adjustment Factor (DAF) is applied, the baseline thermal fuel consumption shall be mathematically converted to a per-capita equivalent and checked against absolute methodological caps.

b. Wood / Woody Biomass: Threshold for Substantiation: 0.75 tonnes/capita/year. Absolute Cap (P_{cap}): 1.25 tonnes/capita/year.

c. Charcoal: Threshold for Substantiation: 0.20 tonnes/capita/year. Absolute Cap (P_{cap}): 0.40 tonnes/capita/year.

d. Option B/C (Defaults/MSL): If Option B or C is used, no KPT is required. The VVB shall verify the MSL defaults (0.50t wood or 0.13t charcoal) are used, and that a 5% conservativeness discount (0.95 multiplier) is mathematically applied prior to the DAF.

e. Audit Instruction: If the calculated historical mean exceeds the Absolute Cap, the VVB shall ensure the emission reduction calculation automatically overwrites the baseline volume with the PCAP value (multiplied by baseline household size HN_b) prior to aggregating with BEAWMS and applying the DAF.

A 4.4 | Standardized Defaults, Leakage & Lifecycle (LCA) Values

A 4.4.1 | AWMS V2.0 enforces standardized defaults to manage uncertainty around upstream emissions, digestate handling, and embodied emissions.

A 4.4.2 | Animal Mass (TAM) Flexibility

a. **Audit Instruction:** VVBs shall explicitly allow and validate the use of official national/regional livestock census statistics, government

publications, or peer-reviewed literature to define the Typical Animal Mass (TAM) parameter. Activity Developers are *not* strictly restricted to generic IPCC default tables, provided the localized data is verifiable and representative of the project area.

A 4.5 | Digestate Management Leakage (The 2.4x Multiplier)

A 4.5.1 | The storage and handling of digestate pose a massive risk of undocumented CH_4 and N_2O emissions.

a. Tier 1 (Zero Leakage): The VVB shall verify rigorous practical evidence (e.g., visual spot checks, documented user training, system design showing drying beds) of continuous adherence to aerobic Best Management Practices (aerobic handling and no natural water discharge).

b. Tier 2 (Default Penalty): Audit Instruction: If the Activity Developer cannot successfully verify Tier 1 BMPs to the VVB, the VVB shall ensure the developer calculates anaerobic CH4 emissions (e.g., via TOOL 14) and applies a mandatory 2.4x Conservativeness Multiplier (Tier 2) to the resulting CH_4 emissions value.

A 4.6 | Dual Embodied Emissions Deductions (LCA)

A 4.6.1 | Emissions embedded within the manufacturing and upstream transport of BOTH the biodigester, and the thermal devices shall be deducted.

a. Household/Small-Farm Digesters (≤20m³): The VVB shall verify a mandatory deduction of 2.9 tCO2e per digester system.

b. Thermal Devices (Stoves): The VVB shall verify a mandatory deduction of 0.017 tCO2e per stove.

c. Large-Scale Plants (>20m³): The VVB shall verify the use of the "0.6-power rule" scaling an approved LCA baseline literature value (Section 9.3.3).

A 4.6.2 | Amortization Rule: If the verifiable lifespan of the technology is < 5 years, 100% of the emissions are deducted in Year 1. If ≥ 5 years, the deduction may be amortized evenly over up to 5 years. (Activity-specific third-party verified LCAs are permitted in place of defaults).

A 4.7 | Ex-Post Monitoring, Uncertainty, & Observer Bias

A 4.7.1 | AWMS V2.0 aligns MRV rigor with other PAA methodologies, requiring strict statistical precision and structural penalties for manual monitoring.

A 4.7.2 | **Statistical Precision (The 90/10 Rule):** Parameters derived from ex-ante or periodic sampling (e.g., Livestock Populations NLT, Usage Surveys Up,y, Baseline manure practices MS%, KPT Fuel Consumption Pb and Pp) shall strictly target a **90% confidence interval and 10% margin of error (90/10 Rule)**.

A 4.7.3 | *Audit Instruction:* If the 90/10 precision target is not met, the VVB shall ensure the developer applies the conservative bound: The **Lower Bound**

(LB_{90}) for parameters that increase the baseline (e.g., NLT, Pb), and the **Upper Bound** (UB90) for parameters that increase activity emissions (e.g., Pp, MS% project).

A 4.8 | The Hawthorne Effect Penalty (HEind**) – Thermal Component Only**

A 4.8.1 | To account for observer bias (users artificially inflating clean device usage when enumerators are physically present during manual P-KPTs), a staggered penalty shall be applied to the calculated Net Emission Reductions of the **Thermal Application Component** - : Phase 1 (vintages 2026–2027) — 10%; Phase 2 (vintages 2028–2029) — 15%; Phase 3 (vintages 2030 onward) — 25%.The AWMS (methane avoidance) component is exempt.

A 4.8.2 | *Exemptions:* The VVB shall waive this penalty entirely (Multiplier: **1.0**) ONLY IF the Activity Developer utilizes Thermal Method 2 (continuous metered biogas volume) OR utilizes continuous digital monitoring (e.g., Stove Use Monitors [SUMs]) deployed contemporaneously with the KPT.

A 4.9 | fNRB Updates and Biomass Depletion Safeguards

A 4.9.1 | At the time of Crediting Period Renewal, the Fraction of Non-Renewable Biomass (fNRB) applied to the thermal baseline shall be updated using the latest approved standard tools.

a. Automatic Adjustment (Decreases): If the updated tool calculates a lower fNRB value than the previous crediting period, the VVB shall ensure the lower value is applied automatically.

A 4.9.2 | Justification for Increases: If the updated tool indicates a higher fNRB value, the VVB shall issue a CAR requiring explicit, rigorous geographic evidence demonstrating that end-users are still physically sourcing wood from the exact same reservoir.

A 4.10 | Summary of Changes: AWMS V2.0 vs. Legacy AWMS V1.1

~~A 4.9.3 | Summary of Changes: AWMS V2.0 vs. Legacy AWMS V1.1~~The following matrix provides full details on the material deviations between the legacy AWMS methodology and the new PAA AWMS V2.0.

~~A 4.9.4 |~~A 4.10.1 | ~~The following matrix provides full details on the material deviations between the legacy AWMS methodology and the new PAA AWMS V2.0.~~

Thematic Area	Legacy AWMS (V1.1 & Previous)	New PAA AWMS V2.0 & V&V Guidelines
~~1.~~ **Structure & Nomenclature**	4 Sections. Broad biogas recovery focusing heavily on simple summations of AWMS and Thermal ERs.	**17 modular sections** mapped to PAA requirements (explicit sections for Normative References, Reversals, Ambition). Incorporates strict constraints: Biogas stoves shall have **≥ 40%** rated efficiency,

		and routine venting is explicitly prohibited.
~~2.~~ **Additionality & Common Practice**	Relied on older CDM tools or general CSA requirements. Common practice lacked standardized thresholds.	**PAA Additionality Mandates:** Aligns with GS4GG Additionality Standard. Lock-In Risk is explicitly *deemed satisfied* (Net-Zero compatible). Imposes a **25%** threshold for LDCs/SIDS//low-income communities, and **16%** for other countries.
~~3.~~ **Baseline Setting & Ambition**	Fixed baseline for the 5-year crediting period. No requirement to adjust baseline downward to reflect national climate targets.	**5-Step Approach with DAF:** Mandates the application of DAF NetZero to the combined AWMS + Thermal baseline to ensure ambition aligns with Host Country decarbonization trajectories over time.
~~4.~~ **AWMS Method Limits**	Loose applicability for Tier 1 vs Tier 2.	**Strict Method 2 Threshold:** If AWMS emission reductions exceed **5 tCO2e/digester/year**, the project shall graduate to Method 2 (IPCC Tier 2) requiring more detailed manure characterization parameters.
~~5.~~ **Uncertainty & Conservativeness**	Allowed 90/30 statistical precision with thresholds for baseline consumption figures, but no absolute hard caps.	**Strict Caps & 90/10 Precision:** Mandatory 90/10 precision for parameters derived from sampling. Absolute back-calculation caps (1.25t wood; 0.40t charcoal per capita) enforced on the Thermal component.
~~6.~~ **Charcoal Conversion Ratio (WCCF)**	Allowed project-specific assessments or varying default efficiencies.	**Standardized Regional Defaults:** Project-specific overrides are strictly prohibited. **6:1 Ratio** (~17% kiln efficiency) for Sub-Saharan Africa, LDCs, and low-income communities. **4:1 Ratio** (~25% kiln efficiency) for all other regions.
~~7.~~ **Activity Emissions (Observer Bias)**	Handled via Project KPTs (P-KPTs) without penalizing for observer bias.	**Staggered Hawthorne Effect Penalty (HEind):** A staged penalty applies to the *Thermal Component* Net Emission Reductions derived from manual P-KPTs: **10% penalty**

		(Phase 1: 2026-2027), **15% penalty** (Phase 2: 2028-2029), **25% penalty** (Phase 3: 2030+). Exempt if utilizing continuous digital monitoring.
~~8.~~ Leakage (Digestate, Embodied & Market)	Generic assessments. Subjective assessment of downstream anaerobic emissions.	**Standardized LCA & Tiered Penalties:** • **Digestate:** Mandatory strict verification of aerobic handling (Tier 1 BMPs). If failed, a severe **2.4x multiplier** (Tier 2) is automatically applied to calculated digestate CH4 emissions. • **Embodied:** Mandatory dual-deduction for cradle-to-gate emissions (**2.9 tCO2e per digester** + **0.017 tCO2e per stove**). Large AD plants apply a 0.6 power-rule. • **Market Leakage:** Default 2% market leakage deduction applied to the Thermal component.
~~9.~~ Permanence, fNRB & REDD+ Overlap	Implicit permanence for avoidance. Double counting with forestry projects was assessed generically.	**Dynamic Baseline & REDD+ Guardrails:** "No Control" exemption removes buffer pools. Thermal component fNRB decreases apply automatically at renewal. REDD+ overlaps mandate attribution via a **"Relevant Authority"** (sub-national or regional letters are acceptable).
~~10.~~ Data Privacy & SDG Claims	Required exact household GPS logging. Secondary/indirect SDG impacts were blended directly into core eligibility.	**Privacy & Benefit Sharing:** • **Data Privacy (GPS):** Exact GPS collection is restricted where it conflicts with local privacy laws. VVBs validate via unique relational IDs mapped to the lowest permissible administrative unit.

ANNEX - 5: EMISSION REDUCTIONS FROM SAFE DRINKING WATER SUPPLY (SDWS) V2.0

A 5.1 | Scope, Applicability, & Transition Timing

A 5.1.1 | **Superseded Versions:** This Annex applies to all activities transitioning from the methodology Emission Reductions from Safe Drinking Water Supply (SDWS) V1.0 and all previous versions, including activities that applied "Annex 3 – Application of the methodology to safe water supply project" of the legacy TPDDTEC methodology, which SDWS V1.0 replaced.

A 5.1.2 | **Target Methodology:** Emission Reductions from Safe Drinking Water Supply (SDWS) V2.0 (GS4GG PAA M400-12).

A 5.1.3 | **Effective Timing:** For Mid-Crediting Period (Mid-CP) Gap Validations, the requirements defined herein apply prospectively to all emission reductions generated for 2026 vintages and onwards. For Crediting Period Renewals (CPR), full compliance with SDWS V2.0 or the latest available version is mandatory immediately from the start date of the new crediting period. Where a monitoring period spans both pre-PAA (2025 and earlier) and post-PAA (2026 onwards) dates, the monitoring period shall be split, or the PAA version shall be applied to the entire monitoring period.

A 5.1.4 | **Scope Clarification:** This methodology applies to household (HWT), institutional (IWT), community-level water-treatment (CWT), and community water-supply (CWS) technologies that displace the boiling of unsafe water with non-renewable biomass or fossil fuels. Water pumps powered by dedicated fossil-fuel engines are ineligible; back-up fossil-fuel engines are permitted only where use is restricted to no more than 10% of the total operating hours of the primary technology. The performance-based additionality pathway is not an eligible option under this methodology.

A 5.1.5 | **Overarching Conservativeness Principle (Data Gaps):** Conservativeness governs the application of this Annex and prevails wherever a requirement cannot be met in full. Where, for any key or material parameter, the required data is unavailable, incomplete, of insufficient quality, or cannot be verified to the applicable standard — including where cross-intervention information (e.g. ICS or HWT/IWT overlap, or jurisdictional REDD+ accounting) or age-disaggregated demographic data, baseline-consistency, or usage evidence cannot be established — the gap shall be resolved so as not to overstate emission reductions. The VVB shall ensure the most conservative applicable treatment is applied: the conservative default value; the conservative bound of the confidence interval (the lower bound where the parameter increases the baseline or the emission reductions, and the upper bound where it increases activity or leakage emissions); or exclusion of the affected volume, cohort, or claim where neither can be substantiated. No data gap shall be resolved in a manner that increases credited reductions; where a gap cannot be resolved conservatively, the affected reductions shall not be claimed.

A 5.2 | Summary of PAA Changes Matrix

A 5.2.1 | Validation and Verification Bodies (VVBs) and Activity Developers shall use the following matrix to assess compliance based on the Activity's specific Transition Pathway. Where a conflict arises between this Annex and the SDWS V2.0 methodology, the methodology shall prevail.

A 5.2.2 | **Crucial Transition Note for SDWS:** SDWS V2.0 replaces the single-equation baseline of V1.0 with a five-step baseline approach (unadjusted baseline → downward adjustment for compliance/usage/uncertainty → Downward Adjustment Factor for ambition → conservative BAU ceiling → selection of the lower value). During a Mid-CP transition, the historical baseline data may be grandfathered, but the mandatory caps and the DAF shall be overlaid immediately.

Table A5-1. SDWS V2.0 PAA Changes Matrix by Transition Pathway

Requirement Area	Spec. V2.0 Section	Pathway A: Mid-CP (Gap Validation)	Pathway B: CPR (Full Validation)
Quantification & Baseline Approach	7.1–7.6	Grandfathered (adapted). The legacy V1.0 baseline may be retained for the current CP, but the mandatory water-volume default and caps (section A5.4) and the DAF for ambition (section A5.3) shall be applied immediately to 2026+ vintages.	Mandatory Update. Full implementation of the V2.0 five-step baseline approach, including the conservative BAU ceiling and selection of $BE_y = MIN(BE_{adj}, BAU)$.
Regulatory Surplus	6.3	Mandatory. Full new analysis; shall demonstrate the activity is not mandated or fully supported by enforced local laws or a funded government scheme. Article 6 host-country negative-list check required.	Mandatory. Full new analysis.
Lock-In Risk Analysis	6.4	Mandatory Assessment. • Zero-emission technologies (gravity filters, handpumps, solar pumps): full exemption. • Short-lived (<10 yr) HWT/IWT (e.g. ceramic/membrane/UV, chlorine dispensers):	Mandatory. Activities failing the Lock-In Risk assessment are ineligible for renewal.

		safe-harbour exemption (2030 sunset). • Fossil-fuel backup ≤10% of operating hours does not trigger a full assessment.	
Common Practice	6.7	Grandfathered: existing assessment remains valid until CPR.	Mandatory. Full reassessment using current market data. Uniform 25% penetration threshold (Fmax); interventions supported by carbon/ODA/climate finance are excluded from the similar-activities count.
Ongoing Financial Need	6.8	Grandfathered: existing assessment remains valid until CPR.	Mandatory OFN (regulatory surplus + investment or barrier analysis). Positive-List activities are exempt from the investment/barrier demonstration.
Technology & Water-Quality Performance	3.2.1	Grandfathered if certified pre-transition: units may follow the design-certified PDD. Ongoing water-quality monitoring ($M_{q,y}$, section A5.8) applies to 2026+ vintages.	Mandatory. HWT/IWT shall meet WHO International Scheme 2-/3-star or a national standard; CWT/CWS shall demonstrate microbial + chemical/physical compliance at the PoC.
Baseline Scenario Data	7.3	Grandfathered. Existing historical baseline data (fuel mix, stove efficiencies, demographics) retained until end of current CP.	Mandatory Update. New Baseline Scenario Survey required (drinking-water practice, fuel type, age-disaggregated household size).
Baseline Consistency Check	7.3	Mandatory for new cohorts. Audit retrospective surveys against the registered	N/A for grandfathering; applies to new cohorts.

		demographic baseline (see section A5.3).	
Leakage (Embodied & Market)	9	Mandatory (immediate). Standardised embodied-emissions LCA deductions (section A5.6) and the 2% market-leakage default (section A5.7) apply to 2026+ vintages.	Mandatory. Same LCA and market-leakage treatment applied independently of the original validation.
Activity Emissions & Measurement Integrity	8, 14.5	Mandatory. 90/10 statistical precision on sampled parameters (section A5.8).	Mandatory. Same as Pathway A.
Permanence, fNRB & REDD+ Overlap	12	Mandatory Overlap Check. Check J-REDD+ registries; a Letter of No Objection / attribution agreement is required only where the jurisdictional FREL/FRL explicitly accounts for subsistence fuelwood.	Mandatory Reassessment. Update fNRB (section A5.9); if fNRB decreases, the lower value applies automatically.

A 5.3 | Baseline Overlays, Caps, and Consistency Thresholds

A 5.3.1 | The grandfathering of historical baseline data does not exempt an activity from PAA ambition requirements. All grandfathered baseline data shall be mathematically overlaid with the PAA empirical safeguards immediately upon transition. VVBs shall ensure that:

a | **Methodological Caps:** the per-person drinking-water volume (QPW_p) is capped at the age-specific limits. If a grandfathered or monitored value exceeds the cap, the cap value overwrites the value in the unadjusted baseline calculation prior to applying the DAF.

b | **Ambition Deductions:** the resulting (capped) baseline shall be multiplied by the Downward Adjustment Factor ($DAF_{NetZero}$), sourced from the GS4GG Methodology Tool: DAF Determination, corresponding to the host country and monitoring-period vintage (2026 and afterwards).

A 5.3.2 | **20% Baseline Consistency Threshold:** For newly enrolled cohorts, the VVB shall audit the first usage-survey retrospective questions against the registered Baseline Scenario. The assessment compares the proportion of high-emitting primary-fuel use and the average household size against the registered baseline:

a | **Deviation ≤ 20%:** the baseline remains valid but shall be cumulatively adjusted downward by the exact percentage of the deviation to prevent over-crediting.

b | **Deviation > 20%:** the shift is a fundamental divergence; the original baseline scenario is statistically invalid for that cohort and shall be formally redefined via a new Baseline Scenario Survey.

A 5.3.3 | Activity developers shall not arbitrarily exclude non-conforming, lower-emitting households from the monitoring sample solely to force compliance with a higher baseline.

A 5.4 | Water-Volume Default Values and Caps (QPW_p)

A 5.4.1 | The drinking-water volume per person per day (QPW_p) shall be determined by one of two options: Option 1 — application of the tiered default values; or Option 2 — a Water Consumption Field Test (WCFT) conducted per the mandatory guidelines in Annex 2 of the methodology. Under both options the value is subject, in all cases, to the mandatory tiered, age-specific caps in Table 9 of the methodology.

A 5.4.2 | **Mandatory Application of Default Values (Option 1):** Where the tiered default values are applied to claim a suppressed-demand baseline, a mandatory 5% conservativeness deduction (×0.95) shall be applied to the default values before the caps and the DAF ($QPW_p = QPW_{p,default} \times 0.95$). Suppressed demand is restricted to micro- and small-scale activities; large-scale activities may credit only end-users demonstrating boiling in the pre-activity scenario.

A 5.4.3 | **Age-Disaggregation of Default Values:** Where the tiered default values are applied, the number of individuals per premises (SDWS 30) shall be disaggregated by the age bands in (children < 5 years; children & adolescents 5–18 years; adults 19+ years) so that the correct tiered default is applied to each cohort. Institutional users present for less than 12 hours apply the partial-day defaults; full-day boarding students and in-patients apply the residential age-specific values.

A 5.4.4 | **HWT / School Overlap Deduction:** Where an HWT activity overlaps a school (IWT) activity, the on-site (school-hours) volume shall be deducted from the 3.0 L default for the 5–18 year cohort (3.0 − 2.0 = 1.0 L) for the overlapping population, to prevent double counting of the same litres of consumption.

A 5.4.5 | ***Audit Instruction:*** If a calculated, monitored, or grandfathered value of QPW_p exceeds the applicable cap, the VVB shall ensure the cap value overwrites the value in the unadjusted baseline calculation prior to applying the DAF.

A 5.5 | Standardised Defaults & Lifecycle (LCA) Values

A 5.5.1 | Activity-specific overrides for the parameters below are prohibited unless the methodology expressly permits a more conservative value. VVBs shall reject and recalculate any emission-reduction claim that departs from these locked defaults.

A 5.5.2 | **Wood-to-Charcoal Conversion Factor (WCCF):** 6:1 (≈ 17% kiln efficiency) is the default for Sub-Saharan Africa and Least Developed Countries; 4:1 (≈ 25% kiln efficiency) is the mandatory default for all other regions. Developers may adopt the conservative 4:1 ratio in any region. Activity-specific overrides of upstream charcoal emission factors are not permitted.

A 5.5.3 | **Baseline Boiling Energy:** the specific energy to obtain 1 L of safe water is 360.83 kJ/L (first-principles value for 5 minutes of boiling with 1% evaporative loss), divided by the weighted baseline stove efficiency $\eta_{\cdot wb}$ Default stove efficiencies: three-stone fire 15%, other conventional stoves 25%, improved cookstoves (ICS) 30%. Where a household adopts an ICS during the crediting period, the baseline shall be recalculated from the adoption date using the ICS as the reference.

A 5.5.4 | **fNRB:** the fraction of non-renewable biomass shall use the latest approved default tool (see section A5.9).

A 5.6 | Embodied Emissions (LCA Accounting)

A 5.6.1 | Cradle-to-gate embodied emissions from the manufacture and upstream transport of the activity devices shall be quantified and deducted as leakage. This is a mandatory inclusion for all activities from transition onward only for new units/installations disseminated after the transition date.

A 5.6.2 | **Default vs. Custom Value**: VVBs shall verify application of the standardized per-unit / per-system default deduction, OR accept a project-specific Lifecycle Assessment provided the developer used a standard, verified LCA methodology (e.g. ISO 14040/14044).

A 5.6.3 | **Amortization Rule:** the VVB shall confirm the deduction schedule against the verified technical lifetime of the device:

a | Technical lifetime < 5 years: 100% of the embodied emissions are deducted in the first monitoring period for that unit/system (upfront).

b | Technical lifetime ≥ 5 years: the embodied emissions may be amortized evenly over the five-year first crediting period, applied to the cohort commissioned each year for five full years regardless of individual unit dropout.

A 5.6.4 | ***Audit Instruction:*** If an amortising activity ceases verification or terminates before completing the five-year first crediting period, the VVB shall verify a true-up at final issuance deducting in full any remaining

unaccounted embodied emissions for the entire historically disseminated fleet.

A 5.7 | Market Leakage Default

A 5.7.1 | **Default (Option 1):** a conservative 2% market-leakage deduction shall be applied to the net ($BE_y - AE_y$), i.e. $LE_{market,y} = (BE_y - AE_y) \times 0.02$, unless a compliant detailed assessment is provided.

A 5.7.2 | **Detailed Assessment (Option 2):** where a quantitative assessment is used, the monitoring plan shall include the relevant parameters and a leakage investigation shall be conducted every two years. Sources demonstrably negligible (< 2%) may be excluded with substantiated justification.

A 5.7.3 | Compensation for lost co-benefits (e.g. space-heating effect of boiling) is treated as negligible for SDWS activities given the short boiling duration and its concurrency with cooking; no deduction is required for that source.

A 5.8 | Ex-Post Monitoring, Uncertainty & Statistical Precision

A 5.8.1 | **Statistical Precision (90/10 Rule):** sampled parameters — the water-quality modifier ($M_{q,y}$), the usage rate ($U_{p,y}$), the proportion boiling safe water ($X_{cleanboil,y}$), and QPW_p where a Water Consumption Field Test is used — shall target a 90% confidence interval and a 10% margin of error (relative units).

A 5.8.2 | ***Audit*** Instruction***:*** If the 90/10 precision target is not met, the VVB shall ensure the conservative bound is applied: the Lower Bound of the one-sided 90% confidence interval for $M_{q,y}$ and $U_{p,y}$, and the Upper Bound for ($X_{cleanboil,y}$). Where precision is met, the mean is applied.

A 5.8.3 | **Point-of-Use Testing & Proportional Crediting:** $M_{q,y}$ shall be determined by testing at the Point of Use, and emission reductions are credited proportionally to $M_{q,y}$. The first testing round shall be conducted at least six months after the start date, and thereafter annually and following any contamination event.

A 5.8.4 | **Mandatory Corrective Action:** if the sample failure rate exceeds the thresholds (Year 1: 20%, Year 2: 15%, Year 3+: 10%), the developer shall implement a time-bound corrective-action plan and enhanced monitoring. If a subsequent test after the corrective-action plan still exceeds the threshold, crediting shall be suspended for the affected technology type or stratum until compliance is demonstrated.

A 5.8.5 | **Metering (CWT/CWS):** the monitored volume ($Q_{m,y}$) shall be measured by calibrated flow meter or operation sensor, capturing only water dispensed for human consumption (non-eligible uses excluded or sub-metered). Where an alternative proxy is used for handpumps, a coefficient of determination $R^2 \geq 0.80$ and a slope within ±10% of expected yield shall be achieved, revalidated annually or upon material change.

A 5.9 | fNRB Updates and Biomass Depletion Safeguards

A 5.9.1 | At Crediting Period Renewal, the fraction of non-renewable biomass ($fNRB_{f,y}$) shall be updated using the latest approved standard tool (e.g. MoFuSS).

a | **Automatic adjustment (decreases):** if the updated tool yields a lower $fNRB$ than the previous crediting period, the VVB shall ensure the lower value is applied automatically.

b | **Justification for increases:** if the updated tool indicates a higher $fNRB$, the VVB shall issue a CAR requiring rigorous evidence that end-users still source wood from the same geographic reservoir.

A 5.9.2 | **REDD+ Overlap:** where the activity boundary overlaps an implemented Jurisdictional REDD+ programme, overlap is immaterial unless the FREL/FRL explicitly accounts for subsistence household fuelwood. Where a direct conflict exists, the developer shall provide either an accounting-exclusion demonstration or an attribution agreement / Letter of No Objection from the relevant authority.

A 5.10 | Summary of Changes: SDWS V2.0 vs. Legacy SDWS V1.0

A 5.10.1 | The following matrix provides full details on the material changes between the legacy SDWS V1.0 methodology and the new PAA SDWS V2.0.

Table A5-2. Material Changes: SDWS V1.0 → SDWS V2.0

Thematic Area	Legacy SDWS (V1.0 & previous)	New PAA SDWS V2.0 & V&V Guidelines
Structure & Nomenclature	4-section structure (entry into force 2021); replaced TPDDTEC "Annex 3". Focus on ex-ante water-quality and back-calculation formulas.	17 modular sections + 5 annexes mapped to PAA requirements (explicit Normative References, Additionality, Reversals, Uncertainty, Ambition).
Quantification & Baseline	Single baseline equation; Fixed for the 5-year crediting period.	Five-step baseline approach. Downward adjustment for compliance, usage and 90/10 uncertainty. Conservative BAU ceiling; $BE_y = MIN(BE_{adj}, BAU)$. Transparent reporting of the BAU–baseline difference (Δ_y).

Additionality & Common Practice	Basic GS activity requirements / standard CDM tools.	Positive List (deemed) or activity-specific assessment; performance-based pathway not eligible. Mandatory Regulatory Surplus, Lock-In Risk and Common Practice (uniform 25% F_{max}). Article 6 host-country negative-list check.
Consumption Caps	Single cap of 5.5 L/person/day.	Tiered, age-specific caps (Table 9) for children, adolescents, adults and institutional users; non-overridable; cap overwrites excess prior to DAF.
Ambition (DAF)	None — no ambition adjustment.	Mandatory Downward Adjustment Factor ($DAF_{NetZero}$) aligned to the host-country net-zero trajectory, applied to 2026+ vintages.
Suppressed Demand	General suppressed-demand provision.	Restricted to micro/small scale; Minimum Service Quality Standard (at least "Basic" drinking-water service, WHO/UNICEF JMP); mandatory 5% deduction on default values.
Leakage	Non-renewable biomass (market) leakage only; other leakage excluded for simplification; embodied emissions not quantified.	Mandatory embodied-emissions accounting via standardized LCA defaults (Table A5-3) or verified project LCA, with amortization and true-up. 2% market-leakage default (or detailed 2-yearly assessment).
Uncertainty & Monitoring	General data-quality and sampling requirements.	Explicit 90/10 statistical precision with conservative-bound substitution; Point-of-Use water-quality testing; corrective-action thresholds with crediting suspension. No Hawthorne penalty specified.
Permanence, fNRB & REDD+	Implicit permanence; generic double-counting treatment.	Dynamic $fNRB$ at renewal (decreases auto-apply); J-REDD+ overlap guardrails; explicit double-counting rules (ICS, HWT/IWT and jurisdictional-programme overlaps).

ANNEX - 6: PULSE V1.0 – PAA SPECIFIC TECHNICAL GUIDELINES

A 6.1 | Scope, Applicability, & Transition Timing

A 6.1.1 | **Superseded Approach:** This Annex applies to all activities transitioning from the small-scale lighting approach of AMS-III.AR "Substituting fossil fuel-based lighting with more efficient lighting systems" (Version 09 and all previous versions) as applied under GS4GG.

A 6.1.2 | **Target Methodology:** Powering Universal Lighting via Solar Energy (PULSE) V1.0.

A 6.1.3 | **Effective Timing:** For Mid-Crediting Period (Mid-CP) Gap Validations, the requirements defined herein apply prospectively to all emission reductions generated for 2026 vintages and onwards. For Crediting Period Renewals (CPR), full compliance with PULSE V1.0 or the latest available version is mandatory immediately from the start date of the new crediting period. Where a monitoring period spans both pre-PAA (2025 and earlier) and post-PAA (2026 onwards) dates, the monitoring period shall be split, or the PAA version shall be applied to the entire monitoring period.

A 6.1.4 | **Scope Clarification (Charging Source):** PULSE is strictly limited to activity technologies charged by Solar Photovoltaic (PV) systems (PULSE Section 3.1 and 3.2). Technologies charged by the national/regional grid, a mini-grid, or fossil-fuel generators — charging options that were permissible under AMS-III.AR paragraph 3(b)–(d) — are excluded. Legacy activity lamps whose charging architecture cannot be demonstrated to be Solar-PV-only shall not transition under this Annex and shall be retired/excluded from crediting at the end of the current crediting period. All non-residential (community/commercial) baseline claims and emission caps are strictly limited to the residential household equivalent (PULSE section 3.1, section 7.6).

A 6.2 | Summary of PAA Changes Matrix

A 6.2.1 | VVBs and Activity Developers shall use the following matrix to assess compliance based on the Activity's specific Transition Pathway (as defined in section 1.3 of the main body).

Table A6-1: PULSE V1.0 PAA Changes Matrix

Requirement Area	PULSE Section	Pathway A: Mid-CP (Gap Validation)	Pathway B: CPR (Full Validation)
Charging-Source Scope	3.1	Mandatory. VVB shall confirm the fleet is Solar-PV-charged only. Grid-/mini-grid-/generator-charged legacy lamps are ineligible from the	Mandatory. Solar-PV-only eligibility is a condition of renewal.

		transition date and excluded from ER_y.	
Technology (Efficacy & Quality)	3.2	Grandfathered if commissioned pre-publication: design-certified legacy devices may follow the design-certified PDD spec and the transitional 50 lm/W floor. Mandatory from 01/01/2028: new units procured and commissioned on/after 01/01/2028 shall meet full PULSE criteria (≥70 lm/W, ≥5,000 h life, ≤15% lumen decline over 2,000 h, ≥1-yr warranty); VVB verifies the PDD is updated to compliant models before the issuance request. (See A 6.2.3.)	Grandfathered if commissioned pre-publication (50 lm/W floor). Mandatory from 01/01/2028: all new distributions meet full PULSE criteria (≥70 lm/W).
Additionality – Positive List	6.3	Grandfathered: existing qualification valid until CPR.	Mandatory reassessment. Deemed additional only if LDC/SIDS/LLDC (LLDC only where low-/lower-middle-income) or device penetration <5% (stock) / <2.5% (sales).
Additionality – Regulatory Surplus	6.4	Mandatory. Full new analysis: no law mandates solar lighting, bans baseline fossil lighting, or sets an equivalent support scheme; plus, Host-Country Positive/Negative-List check.	Mandatory. Full new analysis.
Additionality – Lock-In Risk	6.5	Deemed Compliant (Methodology-Level). Solar-PV devices are Zero-Emission Technologies, formally exempt from activity-level Lock-In Risk Analysis.	Deemed Compliant.

Additionality – Common Practice	6.6	Grandfathered: existing assessment valid until CPR.	Mandatory. Count-/stock-based F_{max} = 25% (TMC-3); carbon-finance- and ODA-supported units excluded from P_{sim}
Baseline Approach & Ambition (DAF)	7.2–7.3	Mandatory overlay. Approach (c). Legacy per-lamp baseline retained but recalculated through the 5-step flow: Unadjusted → Uncertainty-Adjusted (UNC default 0.05) → DAF (Tool 05) → Conservative BAU → Crediting Baseline = MIN($BE_{adj}, BAU_{cons,y}$). DAF applies to 2026 vintages onward.	Mandatory. Full re-establishment of the baseline under the 5-step approach with current DAF.
Baseline Consistency Check (20% Rule)	7.3.3	Mandatory for new cohorts. Capture prior lighting source at first interaction. <20% lower-emitting → conservative weighted downward correction; >20% → redefine baseline via new Baseline Scenario Survey. Cherry-picking out non-conforming households is prohibited.	N/A. Apply to new cohort at renewal.
Grid-Transition Reassessment	7.3.3	Mandatory (immediate). A premise moving from Unreliable (Tier <3) to Reliable (Tier ≥3) grid mid-period is re-baselined to the EF_{grid} for the remainder of the crediting period (generally → zero credits) or excluded.	Mandatory Grid-Extension Check across the AGA; grid-reached areas move to grid baseline or are excluded.
Suppressed Demand (Tier-1 MSL)	3.2, 7.3	Mandatory application rules. Option B applies to households only, requires ≥1,000 lm-hr/day (or ≥22 kWh/yr), third-party verified (VeraSol / IEC 62257-9-5), Service-Level-	Mandatory. Re-evaluate the Service-Level-Ratio cap for continued conservativeness.

		Ratio cap (SLR_{cap}) ≤5.0. No sub-threshold interpolation.	
Leakage – Embodied (LCA)	9.3	Mandatory (immediate). Cradle-to-gate embodied deduction (battery + PV) applied to new devices/units distributed in the period, per Table A6-2 defaults or a verified ISO 14025 EPD. (See A 6.6.)	Mandatory. Update embodied defaults to latest LCA/IPCC at renewal.
Leakage – Market	9.4	Mandatory. Default 5% deduction on the Crediting Baseline unless a verified Scrapping Mechanism is implemented (then zero).	Mandatory. Re-evaluate the 5% default against updated displacement evidence.
Monitoring – Asset Census	14	Mandatory (immediate). 100% census of $N_{dist,y}$via the UID Activity Database; sampling for population size prohibited; automated duplicate-ID and Existence checks.	Mandatory.
Uncertainty & Precision	11.2–11.3	Mandatory. OF_y via 90/10 rule (survey) or 100% digital census; Lower-Bound adjustment where 90/10 is missed; Existence-Check >5% → downward $N_{dist,y}$ adjustment. (See A 6.8.)	Mandatory.
DNSH – Battery & PV Waste	3.4.4	Mandatory (immediate). Active Waste Management Plan for battery and PV-panel e-waste; VVB audits recycling agreements, collection logs, and disposal/safe-storage certificates. (See A 6.9.)	Mandatory Renewal Condition. Retrospective DNSH audit; failure to collect/recycle → renewal denied.

A 6.2.2 | **Minimum-Technology-Criteria In-Force Date (New Units in Existing Activities):** For a transitioning (existing) activity that continues to distribute or commission new activity devices, the technology row above operates as a hard cut-over. Devices commissioned before 01/01/2028 are grandfathered to their design-certified specification (transitional 50 lm/W floor). Every device procured and commissioned on or after 01/01/2028 shall meet the full PULSE technology criteria (≥70 lm/W

efficacy, ≥5,000 h rated life, ≤15% lumen decline over 2,000 h, ≥1-yr warranty). The VVB shall verify that the PDD technology specification has been updated to compliant models for all such future distributions, at any time prior to the issuance request for those new devices.

A 6.3 | Baseline Overlays, Caps, and Consistency Thresholds

A 6.3.1 | **Baseline Approach:** PULSE uses Approach (c) — existing/historical emissions adjusted downwards (PULSE Section 7.2). The VVB shall confirm the applicable scenario: Scenario 1 (off-grid / fossil-fuel lighting), Scenario 2 (diesel / generator), or Scenario 3 (unreliable grid).

A 6.3.2 | **Calculation Options:** Option A (Standard Replacement — historical emissions; all eligible premises, non-residential capped to household equivalent) or Option B (Suppressed Demand — households only, Tier-1 service-level equivalence).

A 6.3.3 | **Consistency Threshold (20% Rule):** As per Table A6-1 and PULSE section 7.3.3, a retrospective baseline check is mandatory for new cohorts; a >20% lower-emitting divergence triggers a formal baseline redefinition, ≤20% triggers a conservative weighted downward correction.

A 6.3.4 | **Grid-Transition Overlay:** Premises reaching Tier≥3 grid service mid-period are re-baselined to the EF_{grid} for the remainder of the crediting period (PULSE Section 7.3.3).

A 6.4 | Mandatory Methodological Caps

A 6.4.1 | The VVB shall enforce the following caps at every issuance:

Cap	Value	Basis (PULSE)
Premise device limit	6 units/household (exceptions only via VVB-validated site-specific survey for institutional/commercial/large premises)	Section 3.2
Service-Level-Ratio cap (Option B)	ratio ($L_{activity,i}/L_{baseline,i}$) ≤ 5.0 (≡ max 5 baseline kerosene lamps)	Section 7.3
Suppressed-Demand ceiling	1,000 lm-hr/day or 22 kWh/yr per premise (also the residential-equivalent energy cap for non-residential)	Section 3.2, Section 7.3

A 6.5 | Standardized Defaults & Default-Value Application

A 6.5.1 | **Locked defaults (no activity-specific override):** Except where PULSE expressly permits an activity-specific value, the following standardized defaults shall be applied as written and shall not be overridden:

Parameter	Default	Override permitted?
Daily emissions per kerosene lamp, DV	0.000252 tCO_2e/lamp/day	No
Baseline kerosene-lamp service level, $L_{baseline,i}$	200 lm-hr/day	No
Downward Adjustment Factor, DAF_y	Country value from Tool 05 (A6 MT400-05)	No (published table governs)
Suppressed-demand uncertainty, $UNC_{act/his}$	0.05 (5%)	Yes — lower value only via activity-specific uncertainty analysis
Market-leakage default	0.05 (5%) of $BE_{i,y}$	No (zero only via verified scrapping)
Transport materiality threshold	200 km (below → $AE_{transport,y}$ = 0)	No
Hybrid-charging conservative deduction	flat 5% on ER_y (×0.95)	N/A — alternative is Technical Prevention
Embodied-emission factors	Table A6-2	Yes — only via verified ISO 14025 EPD

A 6.5.2 | **Audit instruction:** The VVB shall confirm, parameter-by-parameter, that no locked default has been silently replaced, and that any permitted override (UNC, embodied EPD) is supported by the required verified evidence.

A 6.6 | Embodied Emissions (LCA Accounting)

A 6.6.1 | **Applies to new devices/units distributed:** The embodied-emission deduction is a mandatory leakage term applied to the new activity devices/units distributed (and eligible for crediting) during the monitoring period (PULSE section 9.3, eq. 11–12; ER_y note, eq. 14). It is not re-applied to devices distributed in prior periods.

A 6.7 | Market Leakage Default

A 6.7.1 | Baseline-equipment-transfer leakage: Addressed under PULSE Section 9.4.

a | **Avoidance (zero leakage):** a verified Scrapping Mechanism — identify, collect, and render permanently inoperative the displaced baseline systems, evidenced by photos/recycling certificates on a sample meeting **90/10, minimum n ≥ 50 per stratum**.

b | Default deduction (no scrapping): $LE_{market} = BE_{i,y} \times 0.05$ (eq. 13).

A 6.7.2 | **Non-renewable-charging cross-check:** Where a grid-capable device operates in an Unreliable-Grid area and Technical Prevention is not demonstrated, the flat 5% (×0.95) ER_y deduction of PULSE Section 8.2 / eq. 15 applies in addition to the market-leakage treatment; the VVB shall confirm the two are not conflated.

A 6.8 | Ex-Post Monitoring, Uncertainty, & Statistical Precision

A 6.8.1 | **Asset census (no sampling for count):** $N_{dist,y}$ is determined by a 100% census of the unique-identifier Activity Database ("Single Source of Truth"); sampling to estimate population size is prohibited (PULSE Section 14). The database shall carry UID, commissioning date, model type, end-user type/location, baseline device, and a dynamic status flag for every unit.

A 6.8.2 | **Operational Fraction ($OF_{i,y}$) options:** Option A — Digital/PAYG census (a unit is Operational if it transmits a valid signal for ≥180 cumulative days/yr); Option B — annual survey stratified by vintage (a single average across vintages is prohibited), with survivor-bias control (frame includes all distributed units; non-respondents / "device not found" = OF 0) and physical functionality verification; Option C — Warranty Proxy (LDC/SIDS/LLDC only, device-years 1–2; $OF_{i,y} = 100\% - (Warranty - Return - Rate + 5\%)$; Option B mandatory from year 3).

A 6.8.3 | **Statistical precision (90/10 rule):** Survey-derived $OF_{i,y}$ (and any triggered baseline-reassessment survey) shall meet a 90% CI with 10% relative precision, minimum n ≥ 50 per stratum. If the precision target is missed, the Lower Bound of the one-sided 90% CI is applied ($OF_{applied} = Mean \times (1 - RP/100)$) (PULSE Section 11.2-11.3).

A 6.8.4 | **Handling of Data Gaps:** For census/digital and survey monitoring, the VVB shall verify the following conservative gap rules and validate the automated gap-management algorithm (PULSE section 11, and 14):

a | **Non-Operational default ("Dead Logic"):** any digital transmission gap → the unit is Non-Operational (status = 0) for the whole gap.

b | **Connectivity Gap Allowance:** a gap of **≤ 30 consecutive days** is treated as presumed-operational only if (a) the area is documented as poor-GSM-connectivity (national/ITU maps) and (b) the last signal before the gap showed normal operation. Gaps > 30 consecutive days revert to Non-Operational for the entire gap.

c | **Cumulative operational threshold:** under Option A, a unit must transmit a valid signal for **≥ 180 cumulative days** in the year to count as operational; otherwise, it is excluded unless the gap is remedied.

d | **Gap recovery:** Non-Operational status may be reversed only by raw on-device logs retrieved via secondary pathways (offline "store-and-forward" sync, Bluetooth/port reads) or other robust supporting evidence proving operation.

e | **Survey-side gaps:** non-response / not-found cases are treated as OF 0 (A 6.8.2).

f | **Existence-Check adjustment:** the VVB shall run a randomised Existence Check on distribution records; if the observed error rate **> 5%** (phantom beneficiaries, non-existent users), N_{dist} is adjusted downwards by that error rate across the whole population.

A 6.9 | Do-No-Significant-Harm Safeguards

A 6.9.1 | **Waste Management (DNSH) — battery and PV e-waste:** The Activity Developer shall maintain and operate a Waste Management Plan for the collection, recycling, or safe disposal/storage of used batteries and PV panels, compliant with national regulations or international best practice (PULSE Section 3.4.4). The VVB shall audit recycling-partner agreements, collection logs, and disposal/safe-storage certificates each period. At CPR, a retrospective DNSH audit is a condition of renewal: failure to implement the required collection/recycling of hazardous battery/PV waste → the renewal request is denied (PULSE Section 17.5).

A 6.9.2 | **Lock-In Risk — methodology-level exemption:** Because the eligible activity devices are Solar-PV zero-emission technologies, activities are formally exempt from activity-level Lock-In Risk Analysis (PULSE Section 6.5); the VVB confirms only that the fleet is exclusively Solar-PV-charged (A 1.1.4).

A 6.10 | Summary of Changes: PULSE V1.0 vs. Legacy AMS-III.AR

A 6.10.1 | The following matrix records the material deviations between the legacy AMS-III.AR approach and the new PAA PULSE V1.0 with these V&V guidelines.

Table A6-3: Material Changes — AMS-III.AR → PULSE V1.0

Thematic Area	Legacy AMS-III.AR (V09 & Previous)	New PAA PULSE V1.0 & V&V Guidelines
Structure & Nomenclature	CDM small-scale category (sectoral scope 01); technology-neutral efficient-lighting focus.	GS4GG PAA methodology "PULSE"; PAA-mapped sections (Additionality, Ambition, Leakage, Uncertainty, Reversals, DNSH).
Charging Source / Scope	Charging by grid, mini-grid, generator, PV,	Solar-PV charging only; grid/mini-grid/generator charging excluded (Section 3.1).

	mechanical, or any combination (Section 3).	
Additionality	TOOL21/TOOL19; automatic additionality where market penetration ≤5%.	Positive List (LDC/SIDS/LLDC or <5% stock / <2.5% sales) plus mandatory Regulatory Surplus, Lock-In Risk (solar = deemed compliant), Common Practice (F_{max}25%, TMC-3); OFN at renewal.
Baseline & Ambition	Fixed baseline; suppressed demand per SD guidelines; no ambition adjustment.	Approach (c) with a 5-step downward-adjustment flow: Uncertainty (5%) → DAF (Tool 05) → Conservative BAU → Crediting Baseline = MIN ($BE_{adj}, BAU_{cons,y}$); mandatory 20% consistency check and grid-transition re-baselining.
Suppressed Demand	SD via replaced lighting service.	Tier-1 MSL (1,000 lm-hr/day / 22 kWh/yr), households only, Service-Level-Ratio cap ≤ 5.0, VeraSol/IEC verified, no sub-threshold interpolation.
Leakage	Not systematically quantified; embodied emissions rarely assessed.	Mandatory cradle-to-gate embodied deduction on new units distributed (Table A6-2, battery + PV) with <5 yr upfront / ≥5 yr annualised + true-up; plus 5% market-leakage default unless scrapping is verified.
Monitoring & Integrity	Sample surveys of installed lamps; unique marking to prevent double counting.	100% asset census (no sampling for count) via UID Activity Database; digital-first MRV; 90/10 precision with Lower-Bound adjustment; Existence-Check (>5% → downward N_{dist}); automated Technical-Life expiry.
Technical Life & Renewal	Lamp effective useful life fixed at 2 yr (Option 1) or 7 yr (Option 2).	Crediting life = battery cycle life; extension only on a verified, UID-logged battery replacement; renewal (max 2, total 15 yr) applies to the activity, not expired assets; mandatory grid-

		extension and OFN reassessment.
Safeguards (DNSH)	Warranty and quality standards; battery-access provisions.	Mandatory battery + PV-panel Waste Management Plan, VVB-audited each period and a condition of renewal under Do-No-Significant-Harm.

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