



METHODOLOGY TOOL

GS4GG PAA MT400-10

TECHNICAL ADDENDUM TO THE A6.4 GRID EMISSION FACTOR TOOL

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Summary

This methodology tool establishes a mandatory technical overlay for activity developers applying the UNFCCC Article 6.4 Methodological Tool “[Emissions from electricity generation and consumption](#)” (A6.4-AMT-007) under the Gold Standard for the Global Goals (GS4GG).

To balance stringent environmental integrity with the practical realities of activity validation in developing regions—such as structural data scarcity or administrative reporting lags—this document introduces three provisional exemptions to the application of the [A6.4-AMT-007](#) Tool:

1. **Data-Readiness Waiver & Intermittency Discount:** A transitional pathway utilizing annual data with a scientifically bounded conservativeness discount (10%) for regions lacking hourly dispatch APIs.
2. **Infrastructure Inertia Cap & Lag Buffer:** A temporal safeguard imposing a 5% technical ceiling and a 24-month administrative lag buffer on vintage decay factors i.e. factor accounting for the likely annual decrease of the BM (F_{BM}) to prevent physically improbable baseline outcomes.
3. **BESS:** A definitional clarification establishing conditions under which intermittent activities integrated with adequately sized Battery Energy Storage Systems (BESS) shall be treated as “non-intermittent” generation sources.

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1| INTRODUCTION AND SCOPE

- 1.1.1 | This methodological tool establishes a mandatory technical overlay for activity developers applying the UNFCCC Article 6.4 Methodological Tool “Emissions from electricity generation and consumption” ([A6.4-AMT-007](#)) under the Gold Standard for the Global Goals (GS4GG).
- 1.1.2 | This document introduces three targeted exemptions to the [A6.4-AMT-007](#) Tool:
- a. A Data-Readiness Waiver using annual data with a standardized conservativeness discount.
 - b. An Infrastructure Inertia Cap and Lag Buffer applied to vintage decay calculations.
 - c. A BESS Safe Harbor and technical eligibility criteria for hybrid systems.
- 1.1.3 | Outside these specific exemptions, all unmodified provisions of [A6.4-AMT-007 Tool](#) shall apply.
- 1.1.4 | **Mandatory Application:** In alignment with the GS4GG Paris Agreement Alignment (PAA) requirements, the application of the [A6.4-AMT-007](#) Tool—inclusive of the provisional exemptions outlined in this document—is mandatory for any issuance requested for emission reductions of vintage 2026 and onwards. Activity developers transitioning existing registered activities to 2026+ vintages, or submitting new activities for Preliminary Review, shall apply the provisions outlined in this document.

2| DEFINITIONS

- 2.1.1 | In addition to the terms defined in the GS4GG Glossary and the [A6.4-AMT-007](#) tool, the following definitions shall apply for the application of this tool:

Table 1. Terms and definitions

TERM	DEFINITION
Tier 2 and Tier 3 Data Markets	Host countries or regional electricity systems where high-resolution, hourly dispatch data or hourly curtailment logs are not publicly available via standardized reporting.
Intermittent Electricity Generation Sources	Electricity generation facilities whose output depends on natural, uncontrollable, and variable inputs (e.g., wind and solar).

3| Applicability

3.1 | General Applicability & Mandatory Implementation

- 3.1.1 | This technical addendum applies to grid-connected electricity generation activities—particularly intermittent renewable energy sources and hybrid systems—calculating a Grid Emission Factor (GEF) under GS4GG.

3.1.2 | In alignment with GS4GG Paris Agreement Alignment (PAA) requirements, the application of [A6.4-AMT-007](#), modified exclusively by the provisions of this tool, is **mandatory** for any issuance requested for emission reductions of **vintage 2026 and onwards**. Activities undergoing Preliminary Review, Validation, Crediting Period Renewal, or verification for 2026+ vintages shall apply this tool. In the event of a conflict regarding parameters addressed herein, this GS4GG overlay shall supersede [A6.4-AMT-007](#).

3.2 | Exemption Pathways

3.2.1 | This tool introduces three specific provisional exemptions. The activity developer shall determine the applicable exemption based on the activity context:

- 3.2.1.1. **Pathway 1:** Data-Readiness Waiver (Section 5.1): Applicable exclusively to Intermittent Electricity Generation Sources (e.g., wind, solar) acting as Case 2 baseline emission sources, located in Tier 2 and Tier 3 Data Markets where hourly dispatch or curtailment data is unavailable.
- 3.2.1.2. **Pathway 2:** Infrastructure Inertia Cap & Lag Buffer (Section 5.2): Applicable universally to all activities calculating a Build Margin ($EF_{BM,y}$) applying the vintage decay factor (F_{BM}) derived from [A6.4-AMT-007 Tool](#) Appendix 2.
- 3.2.1.3. **Pathway 3:** Technology Classification for Hybrid Systems (BESS Safe Harbor) (Section 5.3): Applicable exclusively to variable renewable energy activities (e.g., wind, solar) integrated with an on-site Battery Energy Storage System (BESS).

3.3 | Sunset Clause for Data-Readiness Waiver

3.3.1 | To incentivize the continuous improvement of global grid digitization and data transparency, the Data-Readiness Waiver (Pathway 1) is valid for a transitional grace period of five years.

- 3.3.1.1. **Validity:** This specific exemption shall automatically expire on 31 December 2030.
- 3.3.1.2. **Limitation:** Any activity seeking validation, crediting period renewal, or issuance after the earlier of (i) the date the host system publishes the required hourly data, or (ii) 31 December 2030, shall not be permitted to use the annual data waiver and shall comply fully with the hourly data requirements of [A6.4-AMT-007](#), unless a subsequent review by the Gold Standard Secretariat formally extends the waiver upon determining that systemic infrastructure barriers persist.

(Note: The Infrastructure Inertia Cap and the BESS Safe Harbor are based on physical asset lifespans and engineering principles, respectively, and are not subject to this 2030 sunset clause.)

4| NORMATIVE REFERENCES

4.1.1 | When applying this tool, the activity developer shall use the most recent, valid versions of the following documents available at the time of validation or crediting period renewal:

- a. UNFCCC Article 6.4 Mechanism: Methodological tool - Emissions from electricity generation and consumption ([A6.4-AMT-007](#)).
- b. GS4GG: Paris Agreement Alignment (PAA) Requirements.
- c. In addition to the standards above, the normative parameters, temporal buffers, and standardized discounts established within this tool are substantiated by the peer-reviewed scientific literature and sovereign data frameworks included in the reference section.

5| METHODOLOGY

5.1 | Data-Readiness Waiver & Intermittency Discount (Operating Margin)

5.1.1 | Intermittent Electricity Generation Sources located in Tier 2 and Tier 3 Data Markets are exempt from the [A6.4-AMT-007](#) restriction on applying the Average OM and Simple Adjusted OM (Option 2) to intermittent sources (Paragraphs 87 and 91).

- a. Evidence Requirement:** To invoke this waiver, the developer shall provide verifiable evidence that high-resolution hourly dispatch or curtailment data is publicly unavailable (e.g., formal sovereign declarations, statements from the national grid operator, or recognized third-party reports like Ember or IEA).
- b. Calculation & Discount:** The developer may calculate the Operating Margin (OM) using the Average OM or Simple Adjusted OM (Option 2) based exclusively on monthly or annual data. To account for temporal correlation errors, a mandatory 10% Standardized Intermittency Discount shall be applied:

$$EF_{OM,applied,y} = EF_{OM,calculated_annual,y} \times 0.90 \quad \text{Eq -1}$$

Where

Parameter	Description
$EF_{OM,applied,y}$	Final Operating Margin emission factor to be applied in the Combined Margin (CM) calculation (tCO ₂ /MWh).
$EF_{OM,calculated_annual,y}$	Operating Margin calculated using the Average OM or Simple Adjusted OM (Option 2) based on annual grid statistics (tCO ₂ /MWh).
0.90	10% standard conservativeness deduction.

(Note: Per Section 3.4, this waiver is valid only for a transitional grace period i.e., monitoring period ending 31 December 2030).

5.2 | Infrastructure Inertia Cap & Lag Buffer (Build Margin)

5.2.1 | For all activities calculating a Build Margin ($EF_{BM,y}$) or Simple Operating Margin ($EF_{OM,simple,y}$) applying the vintage decay factor derived from [A6.4-AMT-007](#) Appendix 2, the following safeguards shall apply:

- a. **Technical Ceiling:** The applied annual decay factor (F_{BM} or $F_{OM,simple}$) shall be the lower of the country-specific value in Appendix 2, OR **0.05 (5%)**¹.
- b. **Sovereign Lag Buffer:** To structurally account for the standard sovereign administrative delay in compiling, verifying, and publishing national grid statistics, the temporal parameter representing the elapsed time from the reference period to the activity operation start year shall be reduced by a fixed buffer of 2 years (24 months). This period represents administrative processing lag, not physical grid decarbonization. When calculating the time multiplier (e.g., n , representing years elapsed), the applied value shall be adjusted as:
$$n_{applied} = MAX(0, n_{actual} - 2).$$
- c. **Mathematical Floor:** The application of the decay factor shall never result in negative emission ($EF_{BM} \geq 0$). Where application of the adjusted decay factor results in a value less than zero, the developer shall apply a value of exactly zero).

5.3 | Technology Classification for Hybrid Systems (BESS Safe Harbor)

5.3.1 | An intermittent electricity generation facility that integrates a BESS shall be classified as a "Non-Intermittent Generation Source" for the strict purposes of applying [A6.4-AMT-007](#), provided the activity developer demonstrates in the PDD that the BESS meets the mandatory sizing or performance thresholds.

5.3.2 | To qualify for this BESS classification, and to determine the overall eligibility of the BESS for GS4GG certification, the activity SHALL demonstrate eligibility through Option A (Standard) OR Option B (Performance):

- a. **Option A: Physical Asset Benchmarks (Standard Path):**
Applicable to standard battery technologies (e.g., Lithium-Ion). The activity shall meet BOTH of the following physical characteristics:
 - i. **Power Capacity Ratio:** The BESS Rated Power (MW) shall be at least 20% of the Renewable Energy plant's total AC nameplate capacity. AND

¹ The 5% technical ceiling serves as a structural safeguard against physically improbable baseline outcomes caused by applying unconstrained linear regressions over administrative data reporting lags. It is empirically rooted in the physical lifespan of thermal power generation assets (approximately 40 years), which corresponds to a natural capital turnover rate of ~2.5% per annum (Smil, 2017). A maximum cap of 5% conservatively accommodates jurisdictions undergoing rapid structural transitions while ensuring the vintage decay function remains bounded by physical engineering plausibility.

- ii. **Discharge Duration:** The BESS shall have a rated discharge duration of at least 2 hours (i.e., $\text{Energy Capacity [MWh]} \geq 2 \times \text{Power Capacity [MW]}$).
 - b. **Option B: Performance Benchmark (Alternative Path):**
Applicable for activities utilizing non-standard storage technologies (e.g., flow batteries, thermal storage) that do not meet the Power/Duration ratios above.
 - i. **Energy Shifting Capability:** The activity shall demonstrate via technical design documents that the storage system is capable of shifting a minimum of 15% of the activity's average daily renewable generation to non-generation hours.
 - ii. **Calculation:** $\text{"BESS Usable Energy (MWh)" / "Average Daily RE Gen (MWh)" } \geq 15\%$
- 5.3.3 | **Ongoing Operational Performance and Degradation:** The qualifying capability of the BESS (as established under Option A or B) shall be demonstrated ex-ante at validation and shall be physically maintained and monitored throughout the crediting period.
- 5.3.4 | When calculating Energy Capacity (MWh) (Option A) or BESS Usable Energy (MWh) (Option B) to qualify for this Safe Harbor, the activity developer shall account for and deduct auxiliary parasitic consumption, round-trip efficiency (RTE) losses, and projected battery degradation over the crediting period. Nameplate capacity cannot be used to satisfy the threshold.
- 5.3.5 | **Continuous Monitoring and Performance Testing:** The activity's monitoring plan shall include parameters to continuously monitor the available energy capacity, round-trip efficiency (RTE) and dispatch performance of the BESS. Furthermore, to definitively demonstrate that the system's usable energy has not degraded below the minimum qualifying threshold established under Option A or Option B, the activity developer shall demonstrate the qualifying capability annually utilizing continuous operational telemetry (e.g., dMRV/SCADA logs proving the system successfully dispatched the required energy capacity during standard operation). Where continuous operational data is insufficient or unavailable to prove the threshold was met for a given year, the activity developer shall conduct a physical capacity performance test at least annually. This test shall be executed in accordance with original equipment manufacturer (OEM) specifications or recognized industry engineering standards.

The documented results of the operational data analysis or physical performance test shall be submitted to the Validation and Verification Body (VVB) at each verification event. If the test results or continuous operational data demonstrate that unmitigated degradation or equipment failure has caused the system's deliverable usable energy to fall below the qualifying threshold, the "non-intermittent" Safe Harbor classification shall be immediately revoked. In such an event, the activity shall strictly revert to intermittent accounting rules under A6.4-AMT-007 for the respective

vintage year and all subsequent vintages, unless the activity developer provides verifiable evidence that the BESS capacity has been physically rehabilitated or augmented to meet the minimum threshold.

5.3.6 | **Methodological Consequence:** If the criteria in Section 5.3 are proven, the activity is officially exempt from the restrictions applied to intermittent sources. Under the [A6.4-AMT-007](#) framework, the activity is fully eligible to utilize:

- a. All Combined Margin (CM) weighting combinations reserved for non-intermittent sources.
- b. All Build Margin (BM) sample pool composition rules for non-intermittent additions.
- c. All Operating Margin (OM) applicability conditions and fallbacks designated for non-intermittent sources.

5.4 | Data and Evidence Quality

5.4.1 | To invoke the Data-Readiness Waiver (Section 5.1), the activity developer shall provide transparent, verifiable evidence. Acceptable evidence confirming that high-resolution, machine-readable hourly dispatch data or curtailment logs are publicly unavailable in the required format includes:

- a. Formal sovereign declarations (e.g., national baseline database user guides).
- b. Official statements or communications from the host country's national grid operator (e.g., National Load Dispatch Centre).
- c. Recognized third-party grid transparency reports (e.g., Ember, IEA).

5.5 | Hierarchy of Acceptable Data Sources:

5.5.1 | Where complete datasets are structurally unavailable to satisfy the requirements of A6.4-AMT-007, activity developers may utilize the best available verifiable data to establish the baseline parameters under this Addendum. The selection of data shall strictly adhere to the following hierarchy, in order of preference:

- a. Official national grid or dispatch data published by the relevant sovereign authority, ministry, or national grid operator.
- b. Official data published by a national or regional regulatory authority, or aggregated utility data.
- c. The underlying parameters (such as actual fuel consumption, plant-level generation, and fuel calorific values) extracted from internationally recognized databases, including the latest International Energy Agency (IEA) database, for applicable calculation in accordance with A6.4-AMT-007 and Section 5.1. Pre-calculated grid emission factors shall not be accepted for direct application.

5.5.2 | The activity developer shall provide transparent, documented justification that higher-tier data is unavailable, outdated, or fundamentally

compromised, for VVB validation. Where uncertainty exists in lower-tier data, conservative assumptions or adjustment factors shall be applied to prevent over-crediting.

6| REFERENCE

Miller, G. J., Novan, K., & Jenn, A. (2022). *Hourly accounting of carbon emissions from electricity consumption*. Environmental Research Letters, 17(4). (Substantiates the statistical error margin bounds for annual versus hourly carbon accounting).

WattTime & Open Energy Transition. (2025). *Impact Accounting and Hourly Matching: A Review of the Research into Outcomes*. WattTime. (Validates the 10% Standardized Intermittency Discount).

Smil, V. (2017). *Energy Transitions: Global and National Perspectives (2nd ed.)*. Praeger. (Establishes the physical capital turnover rates and the infrastructure inertia principle).

Ember. (2024). *Global Electricity Review 2024 & Africa Electricity Data Transparency Review*. (Documents global data infrastructure gaps justifying Tier 2 and Tier 3 categorizations). -----

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