Gold Standard for the Global Goals

METHODOLOGY STANDARD
GS4GG PAA MS400-05

REQUIREMENTS FOR ADDRESSING LEAKAGE IN METHODOLOGIES

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SUMMARY

This document outlines the requirements for identifying and addressing leakage emissions in Gold Standard for Global Goals (GS4GG) methodologies. It aligns with the key principles outlined in GS4GG Methodology Standards - Procedure for development, revision, and clarification of methodologies and methodological tools and requirements set by the Requirements for methodology development. Key requirements for addressing leakage emissions include:

- Identifying potential leakage sources
- Avoiding or minimising leakage by applying appropriate approaches, including addressing any remaining leakage by discounting credited volumes when necessary;
- Requiring activity developers to list and address all potential leakage sources, justifying any exclusions.

This document specifically:

- Sets overarching requirements and guidance for identifying leakage sources and addressing leakage emissions.
- Aligns with the Methodology Requirements released by Gold Standard.
- Provides details on the implementation of general approaches of identification of potential leakage sources, avoidance and minimisation of negative leakages.
- Covers other methodological requirements related to the Methodology Standard.

TABLE OF CONTENTS

1| SCOPE AND ENTRY INTO FORCE

1.1 | Scope

1.1.1 | The Gold Standard for Global Goals (GS4GG) Methodology Standard - Requirements for Methodology Development mandates that methodologies include comprehensive monitoring plans for baseline, activity, and leakage emissions. This document operationalises Section 5.9 of that Standard, setting out specific requirements to address and mitigate leakage.

1.1.2 | This document outlines the requirements for identifying potential leakage sources and addressing leakage emissions in developing methodologies, aligning with key international frameworks, including the GS4GG core principles, the A6.4 rules, modalities, and procedures (RMPs), and the A6.2 guidance under the Paris Agreement.

1.1.3 | This standard document outlines the requirements for addressing leakages in GS4GG approved methodologies. It serves as a guide for:

a. Methodology developers, host countries, and other stakeholders developing methodologies.
b. GS4GG Secretariat, Methodology Expert Groups (MEG), and the Technical Advisory Committee in assessing methodologies for approval.

1.1.4 | It specifies the criteria that methodologies shall meet for approval under GS4GG, including:

a. identifying potential sources of leakage
b. avoiding wherever feasible, or to minimise any negative leakage
c. to calculate and subtract any remaining negative leakage

1.2 | Entry into force

1.2.1 | This document enters into force on 22/12/2025.

2| DEFINITIONS

2.1.1 In addition to the terms and definitions listed in GS4GG Glossary, the following definitions apply for this standard.

Table 1 Terms and Definitions

Term	Definition
Activity boundary	The boundary that encompasses the greenhouse gas (GHG) sources, sinks and reservoirs that are controlled or related. The activity boundary may also include GHG sources, sinks or reservoirs that are otherwise affected

	by the activity[1];
Applicability conditions	Conditions that specify contexts, configurations and cases in which methodologies can be applied to mitigation activities while ensuring environmental integrity
Baseline geographical reference area	The geographical area assessed for setting the crediting baseline.
Controlled sources, sinks and reservoirs	GHG sources, sinks and reservoirs that are under the direction and influence of the activity developer through financial, policy, management or other instruments.
Leakage	Leakage refers to anthropogenic GHG emissions occurring outside the activity boundary that are attributable to the activity including those resulting from changes in market demand or supply for associated outputs. Leakages could be negative or positive. i. **Positive leakage:** Leakage where the implementation of a GS4GG activity results in a decrease in emissions and/or an increase in removals. ii. **Negative leakage:** Leakage where the implementation of a GS4GG activity results in an increase in emissions and/or a decrease in removals.
Legal requirements	Laws, statutes, regulations, court orders, decrees, consent agreements, executive orders, permitting conditions or any other legally binding mandates.
Level of service	The quality, reliability and scale of an output provided by a mitigation activity and/or in the baseline scenario.
Output	Each good or service provided by the mitigation activity and/or in the baseline scenario (for example, efficient appliance, electricity, cooking energy, municipal waste management, and so forth), as specified in the GS4GG methodology.
Remaining lifetime	The period during which an equipment would continue operating and/or a certain practice would remain in place

[1] For example, for activities that provide renewable electricity to the grid and thereby affect electricity generation by power plants in the grid, the emissions from power plants in the grid may be treated as a baseline emission source within the activity boundary. Furthermore, note that in the case of activities implemented at activity-scale, the activity boundary is equivalent to the activity boundary.

	without undergoing major repair or overhaul as specified in the GS4GG methodology, given limitations such as technical lifetime, economic lifetime, requirements of laws or regulations, or any other factor which would lead to the discontinuation of the use of the equipment and/or practice.

2.1.2 The document employs specific terms to indicate varying levels of requirements and possibilities: "shall" for mandatory provisions, "should" for recommendations, "may" for options or permissions, and "can" for multiple possible options. These terms are consistently used throughout the document to clearly differentiate between requirements, recommendations, and possibilities.

3| APPLICABILITY

3.1.1 | This standard applies to methodologies submitted for GS4GG approval and may undergo periodic amendments for further refinement. This standard applies to mechanism methodologies related to both emission reductions and net removals.

3.1.2 | The methodology developer shall apply the most recent version of this document available when submitting the methodology draft for review, following the procedure outlined in Procedure for Development, Revision, and Clarification of Methodologies and Methodological Tools.

3.1.3 | The standard applies to GS4GG methodologies and methodological tools. For simplicity, only the term methodology is used in this standard.

4| NORMATIVE REFERENCE

4.1.1 | This standard refers to the latest approved versions of A6.4-STAN-METH-005 Addressing leakage in mechanism methodologies, V. 1.0

5| GENERAL REQUIREMENTS

5.1 | Methodology Requirements

5.1.1 | All leakage sources shall be included when calculating emission reductions or net removals, unless omitting one makes the result more conservative (for example, leaving out a positive leakage source). If the methodology developer can demonstrate that specific positive leakage sources consistently exceed certain negative ones, these leakage sources may be excluded from the calculation of emission reductions and/or net removals.

5.1.2 | Methodology developers shall evaluate whether applying the mitigation activities could alter the kinds or amounts of outputs or level(s) of service provided as compared to the baseline scenario. If the output or level(s) of service differ as compared to the baseline scenario, it may result in leakage—

for example, installing a renewable power plant on farmland could change the type or volume of agricultural production; or if a degraded pasture is converted to a tree-planting activity, the available grazing area shrinks. Ranchers may then clear nearby forest land to maintain their herd sizes, causing deforestation leakage.

5.1.3 | Such leakage shall be addressed in the following manner:

a. Prevented by designing the activity in such a way that the same type(s) of output or level(s) of service is provided in the activity scenario as in the baseline scenario (e.g., by providing respective applicability conditions or expanding the geographical activity boundary).
b. Any negative leakage attributable to changes in type(s) of output or level(s) of service shall be quantified and the resulting amount deducted from the total emission reductions or net removals.

5.1.4 | The relevant geographical area for leakage assessment is not confined to national boundaries and shall encompass any international leakage (i.e., leakage occurring beyond national borders) wherever relevant.

5.1.5 | If the aggregate of all identified leakage sources result in a net decrease in GHG emissions or a net increase in GHG removals, the quantified leakage shall be deemed zero for the purposes of calculating emission reductions or net removals.

6| PROCEDURES TO ADDRESS LEAKAGE

6.1 | Requirement

6.1.1 | Methodologies shall contain a three-tiered approach to address leakage:

a. identify all potential sources of leakage;
b. implement measures to avoid such leakage or, where avoidance is impracticable, to minimize any resultant negative leakage; and
c. quantify and deduct any residual negative leakage in accordance with the specifications set forth below.

6.2 | Identification of leakage sources

6.2.1 | The methodology developer shall identify all potential sources of leakage associated with the activities covered by the methodology. Such sources shall include, *inter-alia*, the following:

6.2.2 | **Baseline equipment transfer**: Leakage shall be accounted for where all of the following conditions are met:

a. Equipment that was operational within the activity boundary prior to the implementation of the activity—and that would remain in use under the baseline scenario— is displaced by new equipment introduced under the mitigation activity scenario; and
b. The displaced equipment retains operational functionality and residual economic value for third parties, such that it may be used outside the

activity boundary in a manner that could displace processes with lower GHG intensity[2].

6.2.3 | **Resource competition**: Leakage attributable to competition for resource use[3] shall be assessed where all of the following conditions are met:

a. the activity, as compared to the baseline scenario, induces an increased demand for resources that are also employed in competing applications;
b. the availability of those resources is limited within the relevant geographical area; and
c. the reallocation of resources from alternative uses to the activity may give rise to higher GHG emissions or reduced GHG removals outside the activity boundary.

6.2.4 | **Diversion of existing production processes or outputs**: Leakage attributable to the diversion of existing production processes or outputs[4] shall be considered where the following conditions are met:

a. the types of outputs or levels of service delivered under the activity scenario deviate from those established in the baseline scenario; and
b. such deviation may give rise to an increase in greenhouse-gas emissions or a decrease in GHG removals outside the activity boundary.

6.2.5 | **Increases in environmental greenhouse-gas releases:** Leakage shall be assessed for any release of GHG emissions from natural reservoirs directly attributable to the implementation of the mitigation activity[5].

6.2.6 | Changes in upstream and downstream processes related to materials and services used by the activity, or products and services it provides, compared to the baseline, unless accounted for as activity emissions.

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[2] For example, this may occur as a result of replacing a fossil-fuel boiler with a biomass boiler where the fossil-fuel boiler is re-used in another location

[3] For example, this may happen where biomass is used to replace fossil fuel but the resulting scarcity in biomass leads current biomass users to switch to fossil-fuels. Another example is the use of agricultural by-products as fuels or feedstocks, where the diversion of biomass from application on fields to alternative uses may result in an increased use of synthetic fertilizer.

[4] For example (synthetic fertilizer supply diversion): Under the mitigation activity scenario, an agricultural operation replaces all or part of its commercial synthetic-nitrogen fertilizer procurement with on-site compost produced from organic residues, thereby reducing its demand for externally sourced fertilizer relative to the baseline. The regional fertilizer manufacturer, confronted with surplus production capacity, reallocates the excess synthetic fertilizer to off-site agricultural markets, where its application on additional croplands yields increased nitrous-oxide emissions beyond the activity boundary, constituting leakage attributable to diversion of existing production outputs.

[5] For example, this may consist of an increased carbon dioxide emissions from soils in a wetland if the water level is lowered due to the implementation of an activity on a neighboring land.

6.2.7 | The potential leakage source 'Resource competition' (Section 6.2.1.2.b) shall not be considered applicable to fossil fuels or mineral products, as the availability of such resources may be increased through additional extraction in response to increased demand.

6.3 | Avoidance or minimisation of leakage

6.3.1 | Methodologies shall incorporate provisions to avoid or prevent, or where avoidance is not feasible, to minimise, all identified sources of negative leakage. To that end, the methodology shall, inter alia, apply sector- and activity-specific measures. Such avoidance or minimisation may, for example, be achieved by restricting the scope of the methodology's applicability conditions, as follows:

a. Where baseline equipment transfer is identified as a potential source of leakage, the methodology can incorporate the applicability conditions in the methodology that all displaced baseline equipment is decommissioned, destroyed, or otherwise irreversibly disposed of; and verifiable evidence[6] demonstrating that such decommissioning, destruction, or disposal is in place.

b. Where competition for resource use is identified as a potential source of leakage, the methodology shall require the activity developer to demonstrate that the resource in question is sufficiently abundant and would not have been consumed under the baseline scenario. Such demonstrations of abundance can be conducted in accordance with the criteria set forth in the methodology and shall include a comprehensive assessment of the economic and environmental consequences of diverting the resource from its prior uses, including effects on the sustainable management of natural and human-managed ecosystems.[7]

c. Where changes in the nature or scale of outputs or services constitute a potential leakage risk, the methodology can impose applicability conditions obligating the developer to demonstrate that, notwithstanding any alterations, the outputs delivered, and/or services rendered, as applicable, under the mitigation activity, are functionally equivalent in type, quality, and performance to those provided in the baseline scenario.[8]

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[6] For example, methodologies can establish applicability conditions to require baseline refrigeration equipment to undergo refrigerant recovery and destruction as well as scrapping of the equipment

[7] For example, methodologies can establish applicability conditions to prevent soil depletion by requiring that a minimum amount of biomass shall be retained per unit of land.

[8] For example, if reforestation activities could result in diversion of pre-activity activities such as agriculture, mechanism methodologies can include conditions which limit applicability to activities on degraded lands which do not result in such diversion.

6.4 | Calculation and subtraction of leakage

6.4.1 | When negative leakage cannot be fully avoided by the identified measures, the methodology shall require the calculation of net leakage—defined as the aggregate of all positive and negative leakage effects—and, if that calculation yields a net increase in emissions (negative leakage), mandate the mandate the deduction of the absolute amount of this leakage from the total quantified emission reductions or net removals.

6.4.2 | Where the transfer of baseline equipment cannot be avoided by its destruction, decommissioning or disposal, the methodology shall prescribe procedures for quantifying any resultant negative leakage from its continued operation. Such procedures shall, at a minimum, account for:

a. the equipment’s remaining operational lifetime;
b. anticipated usage scenarios and utilization rates (e.g., annual operating hours);
c. the GHG emission intensity of the transferred equipment; and
d. the type and GHG emission intensity of the equipment being displaced by the transfer.

6.4.3 | Where a demonstration of resource abundance and non-use in the baseline scenario fails to eliminate competition risks, the methodology shall require procedures for quantifying any resulting negative leakage. These procedures shall encompass an assessment of the volume of resources consumed under the activity that are subject to competing uses, the identification of plausible substitute resources, and the estimation of the associated GHG emissions or removals arising from the deployment of those alternatives.

6.4.4 | When the types of outputs or level of services delivered under the mitigation activity scenario differ in type or level from those defined in the baseline scenario—such as through diversion of production processes—the methodology shall set out a provision for calculating the resulting negative leakage and require its deduction from gross emission reductions or net removals. That provision shall ensure that all leakage arising from changes in output types or service levels is fully captured and reflected in the final net benefit calculation.

7| PROVISIONS RELATING TO LEAKAGE SOURCES THAT REQUIRE SPECIAL CONSIDERATION

7.1.1 | **Reduction in service level:** The mitigation activities are ineligible to earn emission reductions where the implementation of the activity leads to a decrease in the type(s) of output and/or level(s) of service relative to the baseline scenario, unless the methodology fully accounts for any negative leakage effects resulting from the decrease in the type(s) of output and/or level(s) of service in the calculation of emission reductions and/or net removals and the proponent of the methodology provides appropriate justifications for the full consideration.

7.1.2 | **Transboundary activities:** For certain activity types, monitoring at a jurisdictional level and using a standardised baseline (or equivalent) is crucial to accurately quantify and account for leakage. Methodologies involving transboundary activities shall include specific provisions for assessing and addressing leakage across jurisdictions.

7.1.3 | **Treatment of upstream emissions:** Methodologies shall systematically identify and quantify indirect GHG emissions associated with the production, processing, transport and delivery of inputs used by the mitigation activity, unless their omission is conservative. To ensure consistency and precision, each methodology shall define clear system boundaries—at minimum adopting a cradle-to-gate approach for major equipment and material inputs—and apply region- and technology-specific emission factors drawn from recognised sources. A transparent allocation rule based on mass, energy content or market value shall govern co-product emissions, and the vintage of upstream data shall be aligned with the activity's crediting period to avoid temporal mismatches. In addition, methodologies shall include a dedicated leakage assessment to capture any market-induced shifts in upstream demand, such as increased steel production displaced outside the activity boundary.

7.1.4 | Methodologies shall further classify major upstream emission sources by activity type—for example, steel and concrete for turbine towers in renewable energy activities; seedling nurseries, fertilizer manufacture and planting-machinery fabrication in forestry initiatives; and Haber–Bosch fertilizer synthesis, pesticide production and farm-equipment lifecycles in agricultural N_2O reduction activities. This requirement also extends to landfill-gas capture systems, industrial carbon capture modules, and transport-mode switching infrastructure. Finally, methodologies shall document data sources, underlying assumptions and detailed calculation procedures to ensure full transparency and enable robust third-party verification.

7.1.5 | Methodologies may apply conservative, sector-specific default deductions to gross emission reductions in order to account for the life cycle emissions of key inputs. Default values should be set high enough to cover typical life-cycle emissions across activities, yet avoid unnecessary penalisation where upstream impacts are minimal.

DOCUMENT INFORMATION

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