# Errata & Clarifications

## *Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from Landfill Gas Destruction and Beneficial Use Projects (v.2.0)*

March 17, 2023

This is a supplemental document to the ACR Methodology *for the Quantification, Monitoring, Reporting and Verification of the Greenhouse Gas Emissions Reductions and Removals from Landfill Gas Destruction and Beneficial Use Projects (v.2.0)*, posted for use in April 2021 ("the Methodology"). It is intended that topics in this document will be incorporated into the updated ACR Methodology v 3.0. As supplemental information or clarifications are needed on future versions of this methodology, updates may be found in this document.

## 1. Erratum (March 25, 2022): Historical Landfill Data

For projects that install automated collection system (ACS), this methodology requires historical landfill data for three years preceding the installation of ACS, to quantify baseline emissions.

Per this Erratum, projects may use historical data (for the three preceding years) that is reported to, verified by, and made public by the United States Environmental Protection Agency (USEPA) under the Greenhouse Gas Reporting Program (GHGRP) following 40 CFR 98, Subpart HH reporting requirements.

The Validation and Verification Body (VVB) will validate/verify the historical data directly from the information made public by the EPA.

## 2. Erratum (June 7, 2022): Equation 8

The following sentence is added to the description for Equation 8.

Following the installation of the automated collection system, the calibrated collection efficiencies are updated annually to reflect changes in the landfill's cover and collection system. The cover system in place in each area at the end of the year shall apply to the entire year being quantified. If updated more frequently than annually, the changes in landfill's cover (A2T, A3T and A4T) and collection system shall be determined either monthly or quarterly and applied to those periods of change.

## 3. Erratum (June 7, 2022): Equation 9

The term CCH4Total is incorrect, and the equation is missing the multiplier of 100 to yield a unit of %; therefore, Equation 9 and the terms are revised to the following:

$$\mathbf{ACSI} = [\left(\mathbf{CH_{4Collected,Meas,T}} - (\mathbf{UCCE} \times \mathbf{G_{CH4}})\right) \div (\mathbf{UCCE} \times \mathbf{G_{CH4}})] * 100$$

**WHERE**

| | |
|---|---|
| **ACSI** | Incremental collection efficiency attributable to automated collection system (%) |
| $\mathbf{CH_{4Collected,}}\boldsymbol{Meas,T}$ | Measured, collected methane in period T (annual or shorter as available) |
| **UCCE** | Updated Calibrated Collection efficiency (%) – as calculated in Equation 8 |
| $\mathbf{G_{CH4}}$ | Modeled methane generation rate in period T (metric tons) – calculated for the current reporting year based on Equation 2 |

## 4. Clarification (June 7, 2022): Equation 11, Footnote 9

Footnote 9 does not provide instruction for calculations including multiple devices with differing destruction efficiencies. Therefore, Footnote 9 is revised to the following:

In lieu of the default 95% destruction efficiency, project proponents may apply the results of a third-party source test conducted by an organization meeting or exceeding the USEPA's Minimum Competency Requirements for Air Emission Testing rule to determine the actual destruction efficiency of the device. "When there is more than one device, for example a plant and a flare, the destruction efficiencies, either default 95% or third-party source test results, must be applied only to increment of gas that passed through that destruction method. The multiple destruction efficiencies should be averaged proportionally the flow destroyed by each device."

## 5. Erratum (June 7, 2022): Bioreactor Landfills

Section 1.2 contains the following applicability condition: "The project is not located at a bioreactor landfill or a landfill that recirculates leachate."

Per this Erratum, the text is revised to: "The project is not located at a bioreactor landfill, per the USEPA's definition.[1]"

[1] https://www.epa.gov/landfills/bioreactor-landfills#whatis

## 6. Clarification (October 25, 2022): Project Location

Section 1.3 contains the following applicability condition: "The project is located in the United States."

Because U.S. territories (e.g., Puerto Rico, Guam, and U.S. Virgin Islands) are part of the United States and because U.S. territories were included in the 2015 USEPA LMOP dataset reviewed in Appendix A as part of the location-based performance standard, the location-based applicability condition in Section 1.3 is revised – for greater clarification – to the following: "The project is located in the United States or U.S. territories."

## 7. Clarification (October 25, 2022): Offset Ownership

The footnote shown below is added after the following sentence in Section 5: "Each project shall include a GHG project plan sufficient to meet the requirements of the *ACR Standard*."

> "Because landfill gas (LFG) destruction and beneficial use projects involve complex interest management frameworks, the ownership to the title of CO2-equivalent credits associated with the project's emission reductions must be clearly defined. This can be done through contracts amongst the parties in which one of the companies has clear ownership of the credits. Alternatively, through contract, title to the credits can be transferred to an outside third party, who will be the responsible party to ACR.
>
> "Owners of CO2 credits shall provide assurances that they have the legal right to fulfill project commitments. The documentation associated with ownership and legal rights shall be maintained by the Project Proponent and provided during verification. The documents shall be retained for a minimum period of three years following the end of the crediting period."

## 8. Erratum (October 25, 2022): Flow Meter Location

Section 5.2.1 contains the following flow meter requirement: "The flow meter shall be located downstream of the blower and upstream of the destruction device."

Per this Erratum, the text is revised to the following: "The flow meter shall be located upstream of the destruction device."

## 9. Erratum (October 25, 2022): Flow Meter Data Substitution

Section 5.2.1 contains the following flow meter requirements.

> "Landfill gas flow shall be continuously monitored using an adequate flow meter. Continuous monitoring is defined as one data point recorded at least every 15 minutes."

Per this Erratum, the text is revised to include the following additional requirements, where further details on "missing data substitution procedures for this methodology" are found in a subsequent erratum.

> "Data substitution is allowed for limited circumstances where a project encounters flow rate data gaps. Project Proponents may apply the missing data substitution procedures

for this methodology. No data substitution is permissible for data gaps resulting from inoperable equipment that monitors the proper functioning of destruction device(s) and no emission reductions will be credited under such circumstances."

## 10. Erratum (October 25, 2022): Methane Analyzer Data Substitution

Section 5.2.2 contains the following flow meter requirements.

> "The methane fraction in the landfill gas shall be continuously monitored using a methane analyzer. Continuous monitoring is defined as one data point at least every 15 minutes."

Per this Erratum, the text is revised to include the following additional requirements, where further details on "missing data substitution procedures for this methodology" are found in a subsequent erratum.

> "Data substitution is allowed for limited circumstances where a project encounters flow rate data gaps. Project Proponents may apply the missing data substitution procedures for this methodology, except as follows. That is, when methane analyzer data are missing (including when the continuous methane analyzer fails or is being serviced) for more than one week but less than two (2) months, weekly readings may be taken using a handheld gas analyzer with a 10% discount for the duration of the weekly readings. The discount shall be applied in Equation 1 only for the period in which weekly readings were taken in place of continuous readings. Handheld gas analyzers shall meet the calibration and maintenance requirements of Section 5.2.3.
>
> "No data substitution is permissible for data gaps resulting from inoperable equipment that monitors the proper functioning of destruction devices and no emission reductions will be credited under such circumstances."

## 11. Erratum (October 25, 2022): Missing Data Substitution Procedures

With respect to Sections 5.2.1 and 5.2.2, the following missing data substitution procedures apply.

- ACR expects that LFG projects will have continuous, uninterrupted data for the entire reporting period. However, ACR recognizes that unexpected events or occurrences may result in brief data gaps.
- These data substitution procedures may be applied to the calculation of GHG emission reductions for LFG projects when data integrity has been compromised due to missing data points.
- These procedures are applicable to monitored parameters used to quantify emission reductions such as gas flow metering and methane concentration parameters. Data substitution is not allowed for equipment that monitors the proper functioning of destruction devices such as thermocouples.
- These procedures may be used for missing temperature and pressure data used to adjust flow rates to standard conditions.

- The procedures may be used only for flow and methane concentration data gaps that are discrete, limited, non-chronic, and due to unforeseen circumstances.
- Substitution may only occur when two other monitored parameters corroborate proper functioning of the destruction device and system operation within normal ranges. These two parameters must be demonstrated as follows:
    - Proper functioning can be evidenced by thermocouple readings for flares or engines, energy output for engines, etc.
    - For methane concentration substitution, flow rates during the data gap must be consistent with normal operation.
    - For flow substitution, methane concentration rates during the data gap must be consistent with normal operations.
- If corroborating parameters fail to demonstrate any of these requirements, no substitution may be employed. If the requirements above can be met, the substitution procedures based on data gap duration consistent with the following table may be applied.

| | |
|---|---|
| **Less than six hours** | Use the average of the four hours of normal operation immediately before and following the outage or a more conservative value. |
| **Six to 24 hours** | Use the 90% upper or lower confidence limit (whichever is more conservative) of the 24 hours of normal operation prior to and after the outage or a more conservative value. |
| **One to seven days** | Use the 95% upper or lower confidence limit (whichever is more conservative) of the 72 hours of normal operation prior to and after the outage or a more conservative value. |
| **Greater than one week** | No data may be substituted, and no credits may be generated |

## 12. Clarification (October 25, 2022): Frequency of Field Checks

Section 5.2.3 contains the following requirements for maintaining monitoring equipment quality assurance (***emphasis*** added):

> "To ensure proper equipment function, ***annual field checks for flow meter and methane analyzer accuracy shall be performed*** by a qualified third-party. Annual field checks must meet the following conditions:
>
> - "Field checks must be performed in accordance with manufacturer's specifications and methodologies …

> "Projects may choose to conduct more than one field check to ensure that the monitoring equipment continuously meets the requirements of Section 5.2.3. If a project elects to conduct more frequent field checks, they must adhere to the requirements of Section 5.2.3. Additionally, manufacturer specifications regarding instrument calibration shall be followed. ***No ERTs will be granted for periods where the flow meter or gas analyzer have not been maintained in accordance with manufacturer calibration requirements.***"

In considering the minimum frequency that a field check for the flow meter(s) and methane analyzer(s) at a potential LFG offset project must be performed, ACR defines that minimum frequency as either annually or more often than annually (e.g., quarterly) if required by the monitoring equipment manufacturer. Furthermore, if the monitoring equipment manufacturer recommends but does not require calibrations, field checks, etc. to occur more often than annually, adherence to Section 5.2.3 does not require the calibrations, field checks, etc. to occur any more frequently than annually.

## 13. Erratum (March 17, 2023): Baseline Emissions

Section 3.1 contains the following applicability condition: "Emission reductions resulting from ineligible project activities shall be accounted for in Equation 2 as $NE_{device}$."

Per this Erratum, the referenced "Equation 2" is corrected to "Equation 11."

## 14. Erratum (March 17, 2023): Emission Factors for Fossil Fuel Use

Equation 13 includes the parameter "$EF_y$" defined as the "Fuel-specific emission factor for $Fuel_y$ (tCO2/fuel quantity) – See Appendix B," where Appendix B includes the following text: "To calculate $Dest_{CO2}$, project proponents shall use the below emission factors for EFy which will be revised periodically based on updated information."

Per this Erratum, the parameter "$EF_y$" is redefined as the "Fuel-specific carbon dioxide emission factor for $Fuel_y$ (MTCO2/fuel quantity) – See Appendix B," and the text in Appendix B is revised as follows:

> "To calculate $Dest_{CO2}$ from Equation 13, project proponents shall for EFy use the $CO_2$ emission factors from the USEPA GHG Mandatory Reporting Rule (Title 40, Code of Federal Regulations, Part 98, Subpart C, Table C-1), accessible at https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-C.

## 15. Erratum (March 17, 2023): Emission Factors for Grid Electricity Use

Equation 14 includes the parameter "$EF_{EL}$" defined as the "Carbon emission factor for grid electricity (lbCO2/MWh) – See Appendix B," where Appendix B include the following text: "Project proponents shall use the current version of the U.S. Environmental Protection Agency's Power Profiler (http://oaspub.epa.gov/powpro/ept_pack.charts) to determine what regional emission factor should be used in accordance with the Emissions & Generation Resource Integrated Database (eGRID) for $EF_{EL}$. eGRID emission factors are available at http://www.epa.gov/en-ergy/egrid.

Per this Erratum, the parameter "$EF_{EL}$" is redefined as the "Carbon dioxide emission factor for subregion-specific grid electricity (MT CO2/MWh) – See Appendix B," and the text in Appendix B is revised as follows:

> "Project Proponents must use the carbon dioxide emission factor for total output electricity (lb CO2/MWh) used in the USEPA eGRID subregion where the offset project is located. The eGRID subregion corresponding to a project's location can be determined from https://www.epa.gov/egrid/power-profiler#/.
>
> "In addition, Project Proponents must the USEPA eGRID subregion total output carbon dioxide emission factor corresponding to the calendar year for when the project activity emissions occurred (e.g., eGRID2019 for CY20219 project activity emissions and eGRDI2020 for CY2020 project activity emissions). Should eGRID data be unavailable for the calendar year when project activity emissions occurred, then Project Proponents must use the latest published eGRID data (e.g., eGRID2021 for CY2022 project activity emissions because eGRID2022 is not yet available). The eGRID datasets may be found at https://www.epa.gov/egrid/download-data.
>
> "Upon selecting the eGRID correct emission factor (lb CO2/MWh), Project Proponents must apply a conversion factor (i.e., 1 MT / 2,204.62 lb) to yield an adjusted eGRID correct emission factor (MT CO2/MWh)."

## 16. Clarification (March 17, 2023): Equation 13

When fossil fuels are burned continuously as part of an LFG fuel mix to achieve optimal destruction and the methane emissions are being reduced by use of an automated collection system, Project Proponents must calculate the Project Emissions by Equation 13 as follows:

> Project Emissions from Fossil Fuel Combustion = ACSI from Equation 9 * Total fossil fuel use during the reporting period in units of the fossil fuel in Appendix B * Appendix B Emission Factor for fossil fuel (kilograms of CO2 per units of the fossil fuel in Appendix B) * 1 metric ton per 1,000 kilograms = metric tons of CO2.

As an alternative to using Equation 13 as described above, Project Proponents may submit to ACR for review and potential approval a proposed method for quantifying project emissions from the incremental fossil fuels combusted due to the automated collection system.