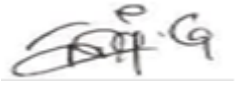
Verification and certification report form for CDM project activities

(Version 04.0)

BASIC INFORMATION			
Title and UNFCCC reference number of the project activity	Central de Resíduos do Recreio Landfill Gas Project (CRRLGP) UNFCCC reference number 0648		
Scale of the project activity	☒ Large-scale ☐ Small-scale		
Version number of the verification and certification report	1.0		
Completion date of the verification and certification report	14/09/2021		
Monitoring period number and duration of this monitoring period	19th monitoring period 01/01/2020 to 02/03/2020		
Version number of the monitoring report to which this report applies	2.0		
Crediting period of the project activity corresponding to this monitoring period	2nd 7-year renewable crediting period (period from 01/12/2014 to 30/11/2021)		
Project participants	Companhia Riograndense de Valorização de Resíduos S/A Biogas Riograndense Ltda. Belektron d.o.o.		
Host Party	Brazil		
Applied methodologies and standardized baselines	ACM0001 - “Flaring or use of landfill gas” (version 15.0)		
Mandatory sectoral scopes	13 - Waste handling and disposal		
Conditional sectoral scopes, if applicable	1 - Energy industries (renewable - / non-renewable sources) (project’s electricity generation component)		
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	94,008 tCO_2e		
Certified amount of GHG emission reductions or GHG removals for this monitoring period	Amount before 1 January 2013	Amount from 1 January 2013 until 31 December 2020	Amount from 1 January 2021
	-	43,183 tCO_2e	-
Name and UNFCCC reference number of the DOE	EPIC Sustainability Services Pvt. Ltd. (EPIC) UNFCCC reference number E-0062		
Name, position and signature of the approver of the verification and certification report	 G.T.Kumar (Director)		

SECTION A. Executive summary

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Brief summary of the project activity and performed verification assessment:

EPIC Sustainability Services Pvt. Ltd. (EPIC) has performed the 19th periodic verification assessment for the registered CDM project activity titled "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". The project activity was previously registered by the UNFCCC on 31/12/2006 as CDM project activity with registration no. 0648 and it is currently under its 2nd 7-year renewable crediting period (period from 01/12/2014 to 30/11/2021). The performed verification assessment encompassed the monitoring period from 01/01/2020 to 02/03/2020 (including both days) and it was performed on the basis of (i) document comprehensive review of the Monitoring Report + the latest version of the registered Project Design Document (PDD) valid for the 2nd 7-year renewable crediting period of the project activity (PDD version 9.2 dated 16/06/2017) /2/ + supporting documents; (ii) conducted interviews with representatives of the host-country project participant and project owner/operator Companhia Riograndense de Valorização de Resíduos S/A; (iii) use other standard auditing techniques for validation or verification, as referred to in section 9.1.3 of the CDM Validation and Verification Standard for Project Activities (CDM-VVS-PA) /1/, in light of the decision agreed by the CDM Executive Board (CDM-EB) (in December/2020) to relax mandatory site visits by DOEs for an additional period (from 31/12/2020 to 31/12/2021) because of COVID-19 pandemic /43/; (iv) resolution of all identified outstanding issues (Corrective Action Requests (CARs) and Clarification Requests (CLs)) and finally (v) issuance of the Verification Report.

The project design encompasses (i) collection and destruction of landfill gas (LFG) at the Central de Resíduos do Recreio (CRR) landfill through combustion under efficient and controlled conditions landfill in an installed high temperature enclosed flare and (ii) utilization of collected LFG as gaseous fuel for electricity generation in the project's electricity generation infrastructure.

During the whole considered monitoring period, the project activity thus promoted reduction of emissions of methane (CH_4) into the atmosphere (that would otherwise occur in the absence of the project activity (baseline scenario)) and also promoted carbon dioxide (CO_2) emission reductions resulted from the displacement of CO_2 emission intensive electricity (under an equivalent amount to the amount of electricity generated by the project activity) which would otherwise be generated by existing grid-connected power plants, including fossil-fuel fired power plants (and addition of new power generation units) within the National Electricity Grid of Brazil) also in the absence of the project activity (baseline scenario).

LFG (which is rich in CH_4) has been historically generated at the CRR landfill as result of the anaerobic decomposition of municipal solid waste (MSW) disposed in the site using appropriate MSW landfilling techniques and procedures.

During the considered monitored period, the electricity demand of the project activity was met by (i) electricity generated in the project's electricity generation infrastructure and by imports of grid-sourced electricity (for time periods when the project's electricity generation component is not under operation). No electricity was generated by the installed backup captive off-grid electricity generator (fuelled by diesel) for meeting the project's electricity generation demand during the considered monitoring period. As per the project design, such backup electricity generation is to be used for meeting the project's electricity demand during time periods when there is an interruption on supply of grid-sourced electricity to the project activity.

The CRR landfill is located in Municipality of Minas do Leão that is located in the Rio Grande do Sul State in the Southern Region of Brazil. The geographical coordinates of the project site are as follows:

- 30°8'49" S (-30.1469)
- 52°1'33" W (-52.0258)

Scope of the verification:

The verification assessment shall ensure that reported GHG emission reductions are deemed complete and sufficiently accurate in order to be certified. The verification assessment, as an independent and objective review, shall assess and verify whether the implementation of the project activity and the measures taken to monitor and report emission reductions achieved during a considered monitoring period fully comply with the CDM criteria and relevant guidance provided by the CMP and the CDM Executive Board (CDM-EB). The verification assessment of the registered CDM project activity is based on comprehensive and detailed review of information and data made available in (i) the registered PDD /2/, (ii) the Monitoring Report /3/ (incl. emission reduction calculation spreadsheets that are enclosed to the Monitoring Report) /5/ and (iii) all other supporting documents made available to the EPIC verification team + review of information collected through performance of interviews.

Furthermore, as part of the verification assessment, publicly available information is considered and reviewed as far as available and required.

The verification assessment was carried out on the basis of the following rules and requirements that are applicable for the CDM project activity:

- Article 12 of the Kyoto Protocol /9/
- Guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1 /9/ and subsequent decisions made by the Executive Board and COP/MOP
- Other relevant rules, including applicable and valid host country legislation/regulations,
- The CDM Validation and Verification Standard for Project Activities (CDM-VVS-PA) (version 02.0) /1/
- The monitoring plan of the registered PDD applicable for the 2nd 7-year renewable crediting period (PDD version 9.2, dated 16/06/2017) /2//
- The CDM baseline and monitoring methodology ACM0001 “Flaring or use of landfill gas” (version 15.0) /7/,
- The Monitoring Report for the considered monitoring period (all versions) /3/ /4/
- The following methodological tools, which are referred in the Monitoring Report /3/:
    - “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (version 01) /13/
    - “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (version 02) /15/
    - "Tool to calculate the emission factor for an electricity system” (version 04.0 /17/)
    - "Project emissions from flaring" (version 02.0.0) /12/
    - "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) /14/
- Decision agreed by the CDM Executive Board (CDM-EB) (in March/2020) to relax mandatory site visits by DOEs for a 3-month period (from 23/03/2020 to 23/06/2020) because of COVID-19 pandemic (+ decision also agreed by the CDM-EB to extend the relaxation of mandatory site visits until 31/12/2021) /43/

Verification process:
The verification process is based on the consideration of applicable verification guidelines as described in the latest version of the CDM Validation and Verification Standard (CDM-VVS-PA) /1/. In addition to that, for the performed verification assessment, standard auditing techniques were also applied by the appointed EPIC verification team [1]. As part of the performed verification assessment, the EPIC verification team initially performed a desk review on all verification related documents, followed by interviews with representatives of the project participant Companhia Riograndense de Valorização de Resíduos S/A. in order to review the project implementation and its operation.

For all identified inconsistencies and lack of clarity, related findings (list of outstanding issues) are raised. The next steps are to close out the findings through direct communication with the project participant representatives and, if applicable, receipt of updated version of the Monitoring Report /3/ + supporting documents and finally preparing the Verification Report. Also, as part of the EPIC working procedure, the draft version of the Verification Report undergoes a technical review by EPIC prior to its approval and submission to the CDM-EB.

Verification assessment conclusion and summary of the verification opinion:
As part of the conducted verification assessment, the EPIC verification team identified outstanding issues that were appropriately/sufficiently addressed and resolved by the host-country PP Biogas Riograndense Ltda. (*inter alia* through revision of the Monitoring Report and supporting documents) as part of the performed verification assessment. As an outcome of the performed assessment, the EPIC verification team was able to confirm that GHG emission reductions achieved by the project activity during the considered monitoring period are correctly calculated and reported in the latest version of the Monitoring Report (version 2.0, dated 31/08/2021). Reported emission reductions are correctly determined and are in accordance with applicable monitoring requirements and GHG calculation approaches as per both the registered PDD valid for the 2nd 7-year crediting period of the project activity and applied CDM baseline and monitoring methodology + applicable methodological tools.

Therefore, EPIC confirms and certifies that achieved GHG emission reductions for the monitoring period from 01/01/2020 to 02/03/2020 (including both days) are correctly determined and reported as 43,183 tCO_2e.

EPIC thus requests the CDM Executive Board (CDM-EB) to issue equivalent amount of CERs for the project activity.

[1] Section D.2 includes details for additional checking's/assessments (complementary auditing measures) which were performed as per applicable guidance of the Decision agreed by the CDM Executive Board (CDM-EB) (in March/2020) to relax mandatory site visits by DOEs for a 3-month period (from 23/03/2020 to 23/06/2020) because of COVID-19 pandemic (+ decision also agreed by the CDM-EB to extend the relaxation of mandatory site visits until 31/12/2021).

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader / Technical Expert	EI	Ratton	Marco	EPIC- Central Office	X	-	X	X

EI: External individual

Demonstration how the appointed verification team meets the competence required for the performance of the verification assessment is included in Appendix 2.

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	R.	Vijayaraghavan	EPIC - Central office
2.	Approver	IR	G.T.	Kumar	EPIC -Central office

IR: Internal resource

Demonstration how the appointed technical reviewer and approver of the Verification Report meet the competence required for the performance of the verification assessment is included in Appendix 2.

SECTION C. Application of materiality

C.1. Consideration of materiality in planning the verification

By acknowledging that an individual or an aggregation of undetected errors, omissions and misinterpretations could potentially undermine the possibility of achieving a verification opinion under reasonable and fair level assurance as an outcome of the verification assessment, aspects of the concept of materiality were thus considered in the context of the verification assessment in line with the requirements of both the "Guideline - Application of materiality in verification" (version 02.0) /81/ and the CDM Validation and Verification Standard (CDM-VVS-PA) version 02.0 /1/.

In the context of the verification planning, while aiming to minimize the risk of having material discrepancies not being detected (detection risk) in the course of the verification assessment, EPIC performed an identification of risks that could lead to quantitative material errors, omissions and misstatements in its verification opinion.

Furthermore, the identification of actions to be performed by the appointed EPIC verification team during the verification assessment as responses to such identified risks were also included/considered in both the verification planning and later performed in the subsequent phases of the verification assessment (document desk review, interviews with representatives of the project participant, identification/addressing of findings and reporting).

In order to ensure a deemed complete, transparent and timely execution of the verification assessment, the appointed EPIC verification team (that holds sufficient experience and expertise in CDM verification assessments for project activities encompassing LFG collection and destruction/utilization) planned a complete sequence of assessment events that were regarded as necessary to detect potentially existent major potential material errors, omissions and discrepancies and, upon addressing of such outstanding issues, arrive at a substantiated and reasonable final verification opinion (with the risks that could lead to quantitative material errors, omissions and misstatements in its verification opinion being thus sufficiently identified and addressed).

By taking into account applicable guidance from both the "Guideline - Application of materiality in verification" (version 02.0) /81/ and the CDM-VVS-PA version 02.0 /1/, the threshold of materiality for the performed verification assessment was evaluated and it was concluded that the materiality threshold applicable to the project activity (based on actual emission reductions reported as achieved during the considered monitoring period as per the initial version of the Monitoring Report and the length of the considered monitoring period) is 0.5%[2].

[2] As indicated in the registered PDD valid the 2nd 7-year renewable crediting of the project activity, emission reductions to be achieved by the project activity within the whole year of 2020 was previously ex-ante estimated as 554,952 tCO_2e. A threshold of materiality of 0.5% is thus selected (resulting from the ex-ante estimations of emission reductions for the year of 2020 (value is greater than 500,000 tCO_2e/year)). This assumption is in accordance with applicable guidance of the CDM-VVS-PA.

As part of the verification planning, no sampling approach was considered as required for monitoring and cross-checking of data against primary data source (no sampling based-monitoring or no data cross-checking based on sampling)[3].

While it was later confirmed that no sampling approach was required in the context of assessment of monitoring data, risks related to sampling for these particular aspects were thus not identified and, therefore no design of sampling plan for addressing such aspects was considered in the context of the verification planning.

The table below summarizes the following elements of the verification planning:

- Identified risks that could lead to material errors, omissions or misstatements (including their assessment details)

- Summary of the responses/actions to such identified risks that were later considered during the performance of the verification assessment.

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Inadequate installation/configuration or malfunction in measuring instruments/equipment (e.g. insufficient accuracy or inappropriateness of installed equipment/instruments)	High	Potential generation of measurement and data errors/inconstancies due to inappropriate installation/configuration or malfunction in related measuring instruments/equipment. This risk might lead to material error in calculation and reporting of achieved emission reductions.	The EPIC verification team shall confirm whether modern/state-of-the art and/or best-practice monitoring instruments/equipment are appropriately installed/configured as part of the implementation and operation of the project activity. By taking into account the significantly rate of monitoring data being recorded (LFG and LFG flaring/utilization related measurements being recorded/reported with an every-minute frequency), ideally, it is expected that a reliable process control automation is in place for typical CDM project activities encompassing LFG collection and destruction/utilization. Moreover, it should be confirmed whether trained personnel staff are in charge of

[3] The EPIC verification team was also able to confirm that no sampling approach for monitoring and cross-checking of data against primary data source was applicable/required for the verification assessment covered by this Verification Report since:

- (i) as per the monitoring and GHG calculation approaches applied for the project activity (as established in the registered PDD and applied CDM baseline and monitoring methodology + applicable methodological tools) no sampling procedure and no sampling-based monitoring are valid/required for the determination of emission reductions achieved by the project activity during a given monitoring period;
- (ii) there is a possibility for cross-checking/reproducing all reported continuous measurement records valid for the considered monitoring period against the related primary data sources (with all reported related monitoring data being cross-checked/reproduced instead of having selected samples of data being cross-checked/reproduced). Further related assessment details valid for the performed verification assessment encompassed by this Verification Report are included in Section E.6.2, under *Data authenticity checking*.

				operation of the project's monitoring system and that there are related QA/QC procedures in place. Moreover, for minimizing the risk of having incorrect monitoring data (measurement records) being considered in the context of the calculation and reporting of achieved emission reductions (in a way that calculated emission reductions are overestimated), the verification assessment ideally shall encompass a comprehensive and deemed sufficient checking of all reported data (e.g. checking of authenticity of monitoring data). Finally, it shall also be ensured that, in case of identification of uncertainties related to correctness/reasonability of reported monitoring data for a particular time period (e.g. measurements of LFG or flaring/utilization related monitoring for a particular minute), no emission reductions for such particular time period are accounted/claimed under such circumstances (thus minimizing risks of overestimations of claimed GHG emission reductions).
2.	Inadequate accuracy and lack of correctness of monitoring data and or evaluations supplied by independent 3rd parties (e.g. measurements of residual outgoing methane in the flare for the determination of project emissions of methane through the flare; evaluation of the compliance of management practices of the landfill as per previously established design and operation requirements for the landfill)	High	Potential generation of measurement and data errors/inconsistencies due to inappropriate installation / configuration or malfunction in related measuring instruments and/or inappropriate evaluation procedures being applied by company(ies) in charge of related measurements and evaluations to be performed by independent 3rd party inspection service company(ies). These risks might lead to material error in calculation/determination and reporting of baseline emissions.	The EPIC verification team shall confirm whether all measurements performed by independent 3rd parties are performed by company(ies) with required accreditation. It shall also be confirmed whether modern/state-of-the art and/or best-practice equipment/instruments and/or procedures are appropriately applied for related 3rd party measurements and/or evaluations. Moreover, it should be confirmed whether there are related QA/QC procedures in place. Finally, it shall also be ensured that, in case of identification of uncertainties related to correctness/reasonability of reported monitoring data for a particular time period (e.g. measurements of residual outgoing methane in the flare for the determination of project

				emissions of methane through the flare valid for a particular time period); no emission reductions for such particular time period are accounted/claimed under such circumstances (thus minimizing risks of overestimations of claimed GHG emission reductions).
3.	Inadequate installation/configuration or malfunction in installation/configuration of data processing/management equipment such as programmable logic controller unit (PLC unit) and data storage infrastructure (database for monitoring records).	High	Potential recording and reporting of monitoring data with errors and/or inconsistencies due to inappropriate installation/configuration or malfunction in related data management/processing equipment (PLC unit and/or database for monitoring records). This risk might lead to material error in calculation and reporting of achieved emission reductions.	The EPIC verification team shall confirm whether modern, state-of-the art and best practice data management/processing infrastructure (PLC unit and database for monitoring records) is appropriately installed/configured as part of the project activity implementation and operation. By taking into account the significantly rate of monitoring data being recorded (LFG and LFG flaring/utilization related measurements being recorded/reported with an every-minute frequency), ideally, the risk response details included under item 1 above (risk of "*Inadequate installation/configuration or malfunction in measuring instruments/equipment"*) related to process control automation, training of personnel staff in charge of operation of the project's monitoring system and related QA/QC procedures are all also applicable. Moreover, for minimizing the risk of having incorrect monitoring data (measurement records) being considered in the context of the calculation and reporting of achieved emission reductions (in a way that calculated emission reductions are overestimated), the risk response details included under item 1 above (risk of "*Inadequate installation/configuration or malfunction in measuring instruments/equipment"*) related to comprehensive and deemed sufficient checking of all reported data (e.g. checking of authenticity of monitoring data) are also applicable.

				Finally, it shall also be ensured that, in case of identification of uncertainties related to correctness/reasonability of reported monitoring data for a particular time period (e.g. measurements of LFG or flaring related monitoring for a particular minute), no emission reductions for such particular time period are accounted/claimed under such circumstances (thus minimizing risks of overestimations of claimed GHG emission reductions).
4.	Errors and inconsistencies in the procedure(s) of transferring of monitoring data to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions.	High	Potential recording and reporting of monitoring data with errors and/or inconsistencies due to occurrence of errors and inconsistencies in the procedure(s) of transferring of monitoring data to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions. This risk might lead to material error in calculation and reporting of achieved emission reductions.	The EPIC verification team shall confirm whether appropriate and reliable procedure(s) of transferring of monitoring data to monthly and summarized aggregated reporting forms/spreadsheets are in place. By taking into account the significantly rate of monitoring data being recorded (LFG and LFG flaring/utilization related measurements being recorded/reported with an every-minute frequency), ideally, it is expected that a reliable process control automation (or at least a semi-automated procedure(s)) are in place for transferring of monitoring data to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions. Moreover, it should be confirmed whether trained personnel staff are in charge of transferring of monitoring data to monthly and summarized aggregated reporting forms/spreadsheets and that there are related QA/QC procedures in place. Moreover, for minimizing the risk of having incorrect monitoring data (measurement records) being considered in the context of the calculation and reporting of achieved emission reductions (in a way that calculated emission reductions are overestimated), the risk response details included under item 1 above

				(risk of "*Inadequate installation/configuration or malfunction in measuring instruments/equipment"*) related to comprehensive and deemed sufficient checking of all reported data (e.g. checking of authenticity of monitoring data) are also applicable. Finally, it shall also be ensured that, in case of identification of uncertainties related to correctness/reasonability of reported monitoring data for a particular time period (e.g. measurements of LFG or flaring related monitoring for a particular minute), no emission reductions for such particular time period are accounted/claimed under such circumstances (thus minimizing risks of overestimations of claimed GHG emission reductions).
5.	Errors and/or inconsistencies (e.g. human mistakes) in the procedure(s) for entering the values of ex-ante determined parameters and entering/applying calculation formulas to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions + reporting of such information in the Monitoring Report.	High	Potential reporting of monitoring data and GHG calculations with errors and/or inconsistencies due to occurrence of errors and/or inconsistencies (e.g. human mistakes) in the procedure(s) for entering the values of ex-ante determined parameters and entering/applying calculation formulas to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions + reporting of such information in the Monitoring Report. This risk might lead to material error in calculation and reporting of achieved emission reductions.	The EPIC verification team shall confirm whether appropriate and reliable procedure(s) for entering the values of ex-ante determined parameters and entering/applying calculation formulas to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions are in place. The EPIC verification team shall also confirm whether appropriate and reliable procedure(s) for checking the correctness of such data entries and /or application of calculation formulas are in place. This may be checked through evaluation of the project's related working/operational procedures (incl. QA/QC procedures) and through performance of recalculations and detailed inspection in such forms/spreadsheets by the verification team. Moreover, it should be confirmed whether trained personnel staff are in charge of entering the values of ex-ante determined parameters and

				entering/applying calculation formulas to such monthly and summarized aggregated reporting forms/spreadsheets.

C.2. Consideration of materiality in conducting the verification

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By taking into account applicable guidance from the "Guideline - Application of materiality in verifications" (version 02.0) /81/, materiality was considered in conducting the verification.

As part of the performance of the verification assessment, the previously elaborated verification plan was applied without being revised for having potentially detected errors, omissions or misstatements being addressed through additional (and not previously planned) audit/verification procedures during the sub-sequential phases of the performance of verification assessment (e.g. document desk review, interviews with representatives of the project participant, identification and resolution of outstanding issues (CARs and CLs), etc.).

As per the monitoring and QA/QC procedures adopted as part of operation of the project activity, as confirmed by the EPIC verification team, emission reductions are per se accounted only for monitoring data that is deemed correct, authentic and reliable (based proof of measurements performed by calibrated and well maintained monitoring equipment/instruments, checking of correctness and reasonability in recorded/reported monitoring data (e.g. data values within an acceptable/plausible range)).

In this context it is also crucial to note that, as also confirmed by the EPIC verification team, in case of identification of uncertainties related to correctness/reasonability of reported monitoring data for a particular time period (e.g. continuous measurements related monitoring for a particular minute) as part of the monitoring of the project activity, the monitoring procedure applied by the project participant Biogas Riograndense Ltda. ensures that no emission reductions for such particular time period are claimed/accounted under such circumstances (thus minimizing risks of overestimations of claimed GHG emission reductions).

Furthermore, it is also crucial to note that as per the monitoring and GHG calculation approaches that are valid for the project activity (as established in the registered PDD /2/ and applied CDM baseline and monitoring methodology + applicable methodological tools /13/ /15/ /17/ /12/ /14/) no sampling procedure and no sampling-based monitoring are valid/required for the determination of achieved emission reductions. Finally, it is also relevant to note that, as a response to risks identified during the planning phase of the verification, for minimizing the risks of having incorrect monitoring data (measurement records) being considered in the context of the calculation and reporting of achieved emission reductions (in a way that calculated emission reductions are overestimated), the verification assessment encompassed the performance of a checking of authenticity of all LFG and LFG flaring/utilization related monitoring data.

Data authenticity check: As part of the performed verification assessment, the EPIC verification team was able to confirm that the monthly emission reduction calculation spreadsheets /5/ completed by the host country project participant Biogas Riograndense Ltda. are basically MS-Excel spreadsheets that, in theory, could have recorded data being easily edited/modified (intentionally or unintentionally). Thus, these spreadsheets, if inappropriately edited, could potentially tamper reported monitoring records, thus resulting in unreal and incorrect calculation and reporting of emission reductions achieved by the project activity during the considered monitoring period. In order to ensure that all emission reductions calculations are entirely and correctly based on authentic and real monitoring records valid for the considered monitoring period, a *data authenticity check* was performed as part of the verification assessment. Such checking aimed to ensure that only authentic and unmodified monitoring data records were used

by the project participant for performing the emission reduction calculation for the considered monitoring period (thus ensuring that measurement records made available in the MS-Excel format "raw data" input files /6/ and measurement records reported in the monthly emission reduction spreadsheets were not intentionally or unintentionally edited/modified during the generation or handling of these files). Assessment details for the performed data authenticity check are included in Section E.6.2, under *Data authenticity checking.*

SECTION D. Means of verification

D.1. Desk/document review

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The EPIC verification team conducted a comprehensive and detailed desk review of all documents initially provided by representatives of Biogas Riograndense Ltda. + other publicly available documents that are relevant for the verification assessment. The main assessed documents are listed below:

- The registered version of PDD (version 9.2, dated 16/06/2017) /2/ valid for the 2nd 7-year renewable crediting period of the project activity (from now on referred as "PDD")
- The initial version of the Monitoring Report for the 19th verification of the project activity /4/;
- The applied CDM baseline and monitoring methodology ACM0001 "Flaring or use of landfill gas" (version 15.0) /7/ + the following methodological tools:
    - "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01) /13/
    - "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 02) /15/
    - "Tool to calculate the emission factor for an electricity system" (version 04.0 /17/)
    - "Project emissions from flaring" (version 02.0.0) /12/
    - "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) /14/
- The findings from the previous period verifications for the project activity /33/ /29/ /75/ /76/ /77/ /78/ /16/ /28/ /44/ /45/ /88/ /94/ /95/ /27/ /100/;
- Relevant decisions, clarifications and guidance from the CMP of the Kyoto Protocol and the CDM Executive Board[4];
- Any other information and references relevant to the project activity's resulting emission reductions (e.g., IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations).

Besides the above-mentioned documents, the EPIC verification team also assessed other additional documents that were required to assess the accuracy of the emission reduction calculations presented in the Monitoring Report /3/.

A detailed list of all assessed documents is included in Appendix 3 (documents reviewed or referenced) of this Verification Report.

[4] Relevant decisions and guidance from the CDM-EB includes inter alia the the decision agreed by the CDM Executive Board (CDM-EB) (in March/2020) to relax mandatory site visits by DOEs for a 3-month period (from 23/03/2020 to 23/06/2020) because of COVID-19 pandemic (+ decision also agreed by the CDM-EB to extend the relaxation of mandatory site visits until 31/12/2021).

The performed desk review for the initial version of the Monitoring Report for the 19th verification of the project activity /4/ included the following assessments:

- a review of data and information presented in the Monitoring Report to verify their completeness;
- a review of the monitoring plan of the registered PDD and applied CDM baseline and monitoring methodology (ACM0001 /7/) + applicable methodological tools /13/ /15/ /17/ /12/ /14/, paying particular attention to the required frequency for measuring, recording and reporting of monitoring data. Requirements related to the quality of monitoring instruments/equipment (including calibration requirements, and the QA/QC procedures) were also observed.

- an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of ERs.

Through the process of the verification, the latest version of the Monitoring Report /3/ + supporting documents were evaluated to confirm the actions taken by the project participants to address the raised CARs and CLs. EPIC also reviewed the latest version of the Monitoring Report /3/ to confirm that all required corrections and reporting improvements were incorporated.

D.2. On-site inspection

Duration of on-site inspection: N/A				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	N/A			

No physical on-site inspection (with presence of the EPIC verification team) was conducted as part of the performed verification assessment.

By acknowledging that as per the CDM-VVS-PA /1/, an on-site inspection to the project site is required as part of the verification assessment for the project activity, as a result of raised travelling restrictions related to the COVID-19 pandemic, the EPIC verification team proposed to the project participant Companhia Riograndense de Valorização de Resíduos S/A to consider postponing such on-site visit as a result of recently raised travelling restrictions reasons related to the COVID-19 pandemic. Such proposal of postponing the on-site inspection was made by EPIC by taking into account not only raised travelling restriction based on official decisions and recommendations from local authorities (i.e. restrictions and recommendations raised by competent authorities from the Government of Rio Grande do Sul State and from the Federal Government of Brazil), but also related travelling restriction policy recently defined and announced by EPIC's central office.

As an answer to such proposed postponing of on-site inspection, the representatives of Companhia Riograndense de Valorização de Resíduos S/A highlighted to the EPIC verification team that they were not in a position to accept any postponing of on-site visit that would result on delay on submission of CER issuance request for the considered monitoring period since the company has a contractually agreed and valid CER delivery/forwarding commitment for CERs for the considered monitoring period (as reflected in a valid CER delivery/forwarding schedule for the project activity /101/ which is based on a previously established Emission Reduction Purchase Agreement (ERPA) between Companhia Riograndense de Valorização de Resíduos S/A and the company Unicarbo Energia e Biogas Ltda. (contractual agreement dated 31/08/2020)).

The veracity of such previously contractually agreed CER delivery/forwarding schedule and related obligations from Companhia Riograndense de Valorização de Resíduos S/A to achieve delivery/forwarding of CERs for the considered monitoring period (under conformance with a previously defined schedule) was confirmed by the EPIC verification team.

Based on its assessment of such CER delivery/forwarding schedule, the EPIC verification team is of the opinion that, as alleged by Companhia Riograndense de Valorização de Resíduos S/A, the

occurrence of any representative delay on performing and processing the verification assessment (as a result of postponing of the previously considered on-site inspection) would indeed result on this project participant performing related CER forwarding not sufficiently on time for meeting the previously mutually agreed CER delivery/forwarding schedule.

Due to that, for the particular case of the verification assessment for the considered monitoring period of the project activity, by taking into account the existing deadline in terms of delivery/forwarding of issued CERs faced by Companhia Riograndense de Valorização de Resíduos S/A, EPIC thus assumed the received allegations that the previously planned on-site inspection could not be postponed as deemed reasonable and acceptable.

(i) By acknowledging that the previously planned physical on-site inspection could not be performed as part of the verification assessment due to the COVID-19 pandemic; (ii) by also acknowledging as reasonable and acceptable that such on-site inspection could not be postponed (due to the above-summarized reasons of commercial and contractual nature), and (iii) by also taking into consideration all guidance and requirements of the CDM-EB recently agreed relaxing of the rule requiring mandatory on-site inspection by DOEs for an additional period (until 31/12/2021) because of COVID-19 pandemic /43/; the EPIC verification team performed, as part of the validation assessment, document review and interviews with representatives of the project participant Companhia Riograndense de Valorização de Resíduos S/A (steps further detailed in Sections D.1 and D.3 respectively) by incorporating the following additional checking's/assessments as complementary auditing measures:

- *1) Remote (online) watching by the EPIC verification team of live sequential videos (movies) and photographs (pictures) produced by member of project operational staff located on-site (allowing remote complete and comprehensive assessment and observations for the project activity):*

  Upon previous request from the EPIC verification team, the representatives of the project participant Companhia Riograndense de Valorização de Resíduos S/A organized the production of a sufficiently complete set of sequential live videos (movies) and photographs (pictures) /64/ which were filmed online in the project site with the goal of making it possible to have the EPIC verification team remotely assessing and confirming the implementation and operation of the project activity (as if the verification team were actually on-site). The live videos (movies) and photographs (pictures) /64/ were watched/visualized online by the EPIC verification team while being produced/filmed on 10/05/2021 by a representative of the project participant Companhia Riograndense de Valorização de Resíduos S/A. Such live videos (movies) and photographs (pictures) /64/ were later fully made available (in a set of movie format electronic files) to EPIC for further assessment/watching and archiving.

  Through online watching and performed later review of content of the live videos (movies) /64/, the EPIC verification team experienced a sufficient comprehensive and complete remote assessment of the project activity.

  The produced live videos (movies) /64/ (recorded as .mp4 video format files) and and photographs (pictures) (recorded as .jpeg format files) include/show the following implementation and operation aspects of the project activity:

  i) Overview and detailed views of the whole project's infrastructure promoting collection and destruction/utilization of LFG (e.g. LFG pipeline, centrifugal blowers, high temperature enclosed flare, engine-generator sets of the project's electricity generation infrastructure, ancillary equipment, etc.);
  ii) Overview and detailed views of all monitoring instruments/equipment (of which the latest version of the Monitoring Report /3/ refers to),
  iii) Detailed view of the implementation and functioning of the project's database and monitoring data gathering and processing infrastructure, etc.

  By watching/visualizing online and by later performing a review of the content of the live videos (movies) and photographs (pictures) /64/, the EPIC verification team sufficiently had the following assessment outcomes:

- The possibility of having a complete and transparent remote visual observation and confirmation of the current implementation and operation of the project activity (as if the EPIC verification team were actually on site), thus making it sufficiently possible to the verification team to (i) confirm the correctness of information included in the Monitoring Report and registered PDD regarding both the implementation of the project activity (project design) and its operation and (ii) keep/maintain related evidences (upon receipt of related digital format files of the live videos (movies) /64/).

- The possibility of having a complete and transparent remote visual observation and confirmation of the current implementation and operation of available data and information flows/procedures for measuring, processing, aggregating, recording and reporting monitoring data for the ex-post determined monitoring parameters (as if the EPIC verification team were actually on site), thus making it possible to the verification team to (i) confirm the correctness of related information included in the Monitoring Report and registered PDD that demonstrates appropriateness of related measurements, data processing/aggregation/recording/recording by available project's monitoring infrastructure[5] and (ii) keep/maintain related evidences (upon receipt of related digital format files of the live videos (movies) /64/).

- The possibility of having the opportunity to perform a reliable and complete cross-checking of information and provided data (as outlined in the Monitoring Report /2/ and emission reduction calculation spreadsheets /3/) vis-à-vis primary monitoring data and information directly retrieved from the project's database physically located in the project site on 10/05/2021 (as if the EPIC verification team were actually on site). As watched online in the live videos (movies) /64/, a set of primary monitoring data valid for the considered monitoring period /22/ was directly retrieved from the project's database and immediately stored/archived in a cloud remote server (with assess being made to the verification team) by the project's operation staff using a PC available on-site. All of such data retrieving/transferring/storing/archiving process was remotely confirmed/watched by the EPIC verification team while watching the live videos (movies) /64/ online and assessing the cloud remote server to where primary monitoring data was archived. In this particular aspect, it is crucial to note that the occurred retrieval of set of primary monitoring data records from the project's database and its immediate transferring/archiving in a remote cloud-based server (which was immediately remotely accessed by the EPIC verification team through PC) were instrumental to ensure the performance of the assessment task termed "*Data authenticity checking*" by the EPIC verification team (of which full description is included in Section E.6.2) as if the team were actually on site.
  By having the possibility of remotely fully reproducing part of the approach, process and assumptions previously applied/considered by the project participants for determining emission reductions achieved by the project activity during the considered monitoring period, the performed "*Data authenticity checking*" task ensures confirmation that only authentic (not edited / not modified) data are used as a basis for the emission reduction calculations, thus sufficiently confirming the overall correctness and appropriateness of the data acquisition process and related procedures (including the process for retrieval of new set of raw data monthly files that are used as input data (raw data) for the calculation of emission reductions) as well as correctness of related information included in the Monitoring Report and registered PDD.

[5] By watching/visualizing online the content of the produced live videos (movies) and photographs (pictures) /64/, the EPIC verification team was also able to remotely visualize monitoring figures displayed in the screen of the project's data supervisory system (in the project activity's control room) and compare displayed values against figures displayed in the displays existent in selected monitoring equipment/instruments (for the same time instant) at the time of its production on 10/05/2021. Such data checking/comparison sufficiently confirmed correct data processing and recording by the project's PLC unit and monitoring equipment respectively (at the time of the production of the live videos (movies)). Further assessment details are included in Section E.6.2.

- The possibility of having a complete and transparent remote related visual observation of all project's monitoring instruments/equipment + performance of a remote (but comprehensive) related checking/confirmation of the appropriateness of performance of related calibration events in such instruments/equipment + effective checking and confirmation of applied monitoring practices vis-à-vis related requirements of the registered PDD, the applied CDM baseline and monitoring methodology + applicable methodological tools (as if the EPIC verification team were actually on site). Such additional checking included the confirmation by the EPIC verification team of the effective and appropriate filling/storing/archiving of original documents (e.g. certificates of calibration, registries of measurements performed by 3rd party, etc.) in the project site [6]. Confirmation by the EPIC verification team of the effective and appropriate filling/storing/archiving of additional documentation used for cross-checking of calculation and information was also made possible.

- The possibility of having a complete and transparent remote visual observation and confirmation of existence and effective implementation of quality control and quality assurance (QA/QC) procedures for the project activity (which aims to prevent and/or identify and/or correct errors or omissions in the reported monitoring parameters) as if the EPIC verification team were actually on site.

Based on its accumulated expertise and experience not only with previous CDM verification assessments for the project activity, but also with CDM assessments for other similar project-based initiatives, it is EPIC opinion that objectives to be expected for a physical on-site inspection to the project site were sufficiently reached by the EPIC verification team through online watching (and later re-watching for further assessment/review) of the live videos (movies) /64/ produced on-site by project operational staff on 10/05/2021.

In summary, by taking the above-presented aspects into account vis-à-vis applicable requirements established in CDM-VVS-PA (version 02.0) /1/ and by also taking into account the CDM-EB recently agreed relaxing of the rule requiring mandatory on-site inspection by DOEs (valid for the period from 23/03/2020 to 23/06/2020 and because of COVID-19 pandemic) (+ decision also agreed by the CDM-EB to extend the relaxation of mandatory site visits until 31/12/2021) /43/; the EPIC verification team judged that performing the above-described additional checking's/assessments (complementary auditing measures) instead of performing the previously planned physical on-site inspection to the project site is deemed acceptable and sufficient to have the overall quality and completeness of the performed verification assessment not being negatively affected.

[6] It is relevant to note that electronic format copies of documents and evidences online watched by the EPIC verification team were made available to the EPIC verification team for further assessment (as part of the performed desk review assessment phase of the verification assessment).

D.3. Interviews

No.	Interviews			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Schumacher	Andressa, (Ms.)	Biotérmica Energia S.A.[7]	10/05/2021	Interviews remotely performed using Google Meet application and encompassing the following topics (+ production of live videos (movies and photographs (pictures)) to allow confirmation/assessment of the EPIC verification team for the topics): - General implementation and operational aspects of the project activity; - Technical equipment and operational issues for installed equipment; - Changes in the project activity since CDM validation and commissioning dates;	Marco A. Ratton
2	Alberto	Carlos, (Mr.)	Biotérmica Energia S.A.	10/05/2021		
3	Somavilla	Ezequiel, (Mr.)	Biotérmica Energia S.A.	10/05/2021		
4.	Antunes	Henrique, (Mr.)	Biogas Riograndense Ltda.	10/05/2021		
5.	Barbosa	Nuno, (Mr.)	UniCarbo - Energia e Biogás Ltda.[8]	10/05/2021		

[7] The following disclaimer in the latest version of the Monitoring Report, of which content was confirmed by the EPIC verification team as being deemed correct, appropriately refers to the role of the company Biotérmica Energia S.A. within the project activity:

> *"(…) the company/enterprise Biotérmica Energia S.A. was established with the goal of implementing and operating such project's electricity generation infrastructure. While playing the role of an Independent Power Producer (IPP) within the Brazilian electricity market, besides of being currently responsible for the day-to-day operation of the project's electricity generation infrastructure, commercialization of generated electricity, the Biotérmica Energia S.A.'s technical staff team is also in charge of supporting the project participant CRVR S.A. with the operationalization of the CDM monitoring plan for the electricity generation infrastructure of the project activity (incl. inter-alia assurance of continuous measurement and data recording of flow of LFG sent to each engine-generator sets, LFG pressure in the LFG pipeline to each engine-generator set and LFG temperature in the LFG pipeline to each engine generator set as well as continuous measurements of net electricity generation and checking of the operational status of each individual engine-generator set). Related supporting activities towards CRVR S.A. also include ensuring performance of calibrations of related monitoring instruments and application of related safety and emergency procedures, etc. Like the host country project participant and project owner CRVR S.A, Biotérmica Energia S.A. is mostly owned by Solvi Group (www.solvi.com)."*

[8] As informed to the EPIC verification team, UniCarbo Energia e Biogás Ltda. is a CDM consulting and advisory service company that has supported the host-country project participant Biogas Riograndense Ltda. with CDM related issues (inter alia completion of the Monitoring Report). This CDM consulting and advisory service company is not a project participant.

					- Specifications and operation of monitoring and measurement equipment/instruments; Remaining issues from the previously performed validation and verifications assessments; Calibration procedures for installed monitoring instruments/ equipment; - Quality management system and related compliance with valid QA/QC procedures (including the possibility of performing a comprehensive checking of the project's quality control and quality assurance (QA/QC) procedures in place to prevent and/or identify and/or correct errors or omissions in the reported monitoring parameters); Involved operational and management personnel and responsibilities;Training and practice of the operational and management personnel; - Implementation and operation of the project's monitoring plan; - Monitoring data handling and management (incl. data	

					gathering, recording and reporting); - Data uncertainty and residual risks; - Performance of emission reduction calculations; - Procedural aspects of the verification; - Performance of related maintenance and repair events; - Compilation of CDM documentation (incl. the Monitoring Report).	

D.4. Sampling approach

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Not applicable. No sampling approach was applied for the verification assessment[9].

[9] As confirmed by the EPIC verification team, as per the monitoring and GHG calculation approaches that are valid for the project activity (as established in the registered PDD and in the applied CDM baseline and monitoring methodology + applicable methodological tools) no sampling procedure and no sampling-based monitoring are valid/required for the determination of achieved emission reductions. Moreover, as assessed in Section E.6.2 (under *Data authenticity checking*), cross-checking/reproducing for all reported LFG and LFG flaring/utilization measurement records valid for the considered monitoring period against primary data sources was performed (with all reported related monitoring data being cross-checked/reproduced instead of having selected samples of data being cross-checked/reproduced).

D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	CAR 1	-
Compliance of the project implementation and operation with the registered PDD	-	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	CAR 2	-
Compliance with the calibration frequency requirements for measuring instruments	-		-
Assessment of data and calculation of emission reductions or net removals	-	CAR 3 CAR 4 CAR 5 CAR 6	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)	-	-	-
Total	-	6	-

SECTION E. Verification findings

E.1. Compliance of the monitoring report with the monitoring report form

Means of verification	The EPIC verification team has assessed whether the latest and valid version of the Monitoring Report Form (CDM-MR-FORM, version 08.0) /74/ was applied and correctly completed for the elaboration of the Monitoring Report /3/. The EPIC assessment included checking whether the form was not changed in its formatting.
Findings	One (1) CAR was raised regarding the compliance of the initial version of the Monitoring Report with the Monitoring Report form (incl. compliance with guidelines/instructions for the completion of the Monitoring Report form): **CAR 1:** The approval date for the first performed PRC assessment for the project activity (PRC reference number PRC-0648-001) is wrongly indicated in the initial version of the Monitoring Report.
Conclusion	As a conclusion of its assessment, the EPIC verification team confirmed, upon successful closure of the raised related CAR, that the latest version of the Monitoring Report /3/ was correctly completed by applying the latest and valid version of the Monitoring Report Form /74/ and by also sufficiently taking into consideration all applicable requirements and guidance for its completion, including deemed complete and correct description of the project activity and its monitoring aspects.

E.2. Remaining forward action requests from validation and/or previous verifications

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By assessing the previously issued "*Validation Report for Renewal of Crediting Period (RCP)*" for the project activity /10/, the EPIC verification team identified no missing steps or open issues from the validation phase that would need to be addressed in the context of the performed verification assessments within the 2nd 7-year renewable crediting period for the project activity.

Furthermore, through review of the available Verification Reports for the previously concluded 1st to the 18th periodic verifications for the project activity /33/ /29/ /75/ /76/ /77/ /78/ /16/ /28/ /44/ /45/ /88/ /94/ /95/ /90/ /91/ /80/ /100/, the EPIC verification team identified no FARs to be considered/addressed in the context of the 19th and/or future periodic verification assessments.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	During the performed document desk review and while watching/visualizing online (and later further assessing/reviewing (re-watching/re-visualizing)) the live videos (movies) and photographs (pictures) /64/ produced by operational staff of the project activity on 10/05/2021 (that allowed the EPIC verification team performing remote visual assessment and observations of the project activity), the EPIC verification team assessed whether all physical features of the project activity (including, technology, project equipment and monitoring and metering equipment) as described in the registered PDD /2/ were in place and that project activity has been operated by Companhia Riograndense de Valorização de Resíduos S/A. during the considered monitoring period under conformance with its technical design description as outlined in the PDD.
Findings	No related findings (CARs, CLs and/or FARs) were raised regarding the compliance of the occurred project implementation with project design details as per the registered PDD /2/.
Conclusion	As a result of the performed document desk review and watching/visualizing online (and later further assessing/reviewing (re-watching and re-visualizing)) of the live videos (movies) and and photographs (pictures) /64/ produced by operational staff of the project activity on 10/05/2021 (that allowed the EPIC verification team performing remote visual assessment and observations of the project activity), the EPIC verification team was able to confirm, upon closure of the raised related CAR, that all physical features of the project activity (including, technology, project equipment and monitoring and measuring instruments/equipment) as described in the registered PDD /2/ were in place and that project activity has been operated by Biogas Riograndense Ltda. and by Biotérmica Energia S.A. during the considered monitoring period under full conformance with its technical design description as outlined in the PDD. Moreover, the EPIC verification team was also informed in further details about the overall operational performance of the project activity during the latest 10 years (with detailed assessment being performed regarding the project's operational performance during the considered monitoring period). The project activity was temporarily out of operation during different short time periods along the considered monitoring period due to different operational reasons (e.g. scheduled equipment maintenance, performance of calibration events in monitoring instruments/equipment, draining of accumulated condensate in LFG pipeline, electrical and data processing problems in the PLC panel, failure in the project's electricity generation facility, etc.). Such temporary interruptions in the project activity operation were confirmed by the EPIC verification team through assessment of a service and maintenance log books for both the project's LFG flaring facility and electricity generation facility /24/ (with historical of service and maintenance interventions in the project activity infrastructure). In summary, the EPIC verification team was able to confirm that the project activity was implemented and has operated during the considered monitoring period under conformance with project design details as per the registered PDD /2/.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents[10]

>>
The EPIC verification team has confirmed that, as correctly outlined in Section B.2.1. of the Monitoring Report /3/, there are no temporary deviations from the registered monitoring plan and/or applied methodology applicable for the considered monitoring period.

E.4.2. Corrections

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The EPIC verification team has confirmed that, as correctly outlined in Section B.2.2. of the Monitoring Report /3/, there are no Corrections (in information that do not affect the project design) applicable specifically for the considered monitoring period.

For the currently expired 1st 7-year crediting period of the project activity, as confirmed by the EPIC verification team, two previously revised versions of the PDD valid for such expired crediting period were previously approved on 16/04/2013 (under the PRC reference number PRC-0648-001 (PDD version 7.1, dated 27/09/2012)) and on 20/04/2015 (under the PRC reference number PRC-0648-002 (PDD version 8.2, dated 04/08/2014)) addressing Corrections (in information that do not affect the project design).

Moreover, for the 2nd 7-year crediting period of the project activity, as also confirmed by the EPIC verification team, a revised version of the PDD was previously approved on 26/09/2017 (under the PRC reference number PRC-0648-005 (PDD version 9.2, dated 16/06/2017))[11] addressing Corrections (in information that do not affect the project design).

EPIC has confirmed that, as established by the Attachment Instructions for completing the Monitoring Report of the latest and valid version of the Monitoring Report Form (CDM-MR-FORM, version 08.0) /74/, the Monitoring Report correctly refers to Corrections (in information that do not affect the project design) that are applicable/valid for previous monitoring periods within the project's 2nd 7-year crediting period and also for previous monitoring periods of the project activity within its currently expired 1st 7-year crediting period (including indication of PRC references and related approval dates).

E.4.3. Changes to the start date of the crediting period

>>
The EPIC verification team has confirmed that, as correctly outlined in Section B.2.3. of the Monitoring Report /3/, there are no changes to the start date of the crediting period of the project activity.

[10] Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied(selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

[11] It is relevant to note that the same revised version of the PDD (version 9.2, dated 16/06/2017) was confirmed by the EPIC verification team as being previously submitted as part of 3 sequential CER issuance requests (for 3 different monitoring periods). The rationale for that is the fact that the related 3 verification assessments were previously performed simultaneously. While the content of the 3 previously submitted requests of approval for PRCs is confirmed to be exactly the same, the Monitoring Report correctly refers to such 3 PRC references (PRC-0648-003 (approved on 31/08/2017), PRC-0648-004 (also approved on 31/08/2017) and PRC-0648-005 (approved on 26/09/2017)).

E.4.4. Inclusion of a monitoring plan

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The EPIC verification team has confirmed that, as correctly outlined in Section B.2.4. of the Monitoring Report /3/, there is no inclusion of a monitoring plan applicable for the project activity.

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents

>>
The EPIC verification team has confirmed that, as correctly outlined in Section B.2.5. of the Monitoring Report /3/, there are no permanent changes from the registered monitoring plan and/or from the applied methodology applicable specifically for the considered monitoring period.

For the currently expired 1st 7-year crediting period of the project activity, as confirmed by the EPIC verification team, two previously revised versions of the PDD valid for such expired crediting period were previously approved on 16/04/2013 (under the PRC reference number PRC-0648-001 (PDD version 7.1, dated 27/09/2012)) and on 20/04/2015 (under the PRC reference number PRC-0648-002 (PDD version 8.2, dated 04/08/2014)) addressing permanent changes from the registered monitoring plan and/or from the applied methodology.

EPIC has confirmed that, as established by the Attachment Instructions for completing the Monitoring Report of the latest and valid version of the Monitoring Report Form (CDM-MR-FORM, version 08.0) /74/, the Monitoring Report correctly refers to permanent changes to the registered monitoring plan (revision of the monitoring plan) that are applicable/valid for previous monitoring periods within the project's currently expired 1st 7-year crediting period (including indication of PRC references and related approval dates).

E.4.6. Changes to the project design

>>
The EPIC verification team has confirmed that, as correctly outlined in Section B.2.6. of the Monitoring Report /3/, there are no changes to the project design applicable specifically for the considered monitoring period.

For the currently expired 1st 7-year crediting period of the project activity, as confirmed by the EPIC verification team, two previously revised versions of the PDD valid for such expired crediting period were previously approved on 16/04/2013 (under the PRC reference number PRC-0648-001 (PDD version 7.1, dated 27/09/2012)) and on 20/04/2015 (under the PRC reference number PRC-0648-002 (PDD version 8.2, dated 04/08/2014)) addressing permanent changes to the project design.

EPIC has confirmed that, as established by the Attachment Instructions for completing the Monitoring Report of the latest and valid version of the Monitoring Report Form (CDM-MR-FORM, version 08.0) /74/, the Monitoring Report correctly refers to changes to the project design that are applicable/valid for previous monitoring periods within the project's currently expired 1st 7-year crediting period (including indication of PRC references and related approval dates).

E.4.7. Changes specific to afforestation and reforestation project activities

>>
Not applicable.

E.5. Compliance of the registered monitoring plan with applied methodologies, applied standardized baselines, and other applied methodological regulatory documents

Means of verification	As part of both the performed document review and while watching online (and later further assessing/reviewing (re-watching)) the live videos (movies) /64/ produced by operational staff of the project activity on 10/05/2021 (that allowed the EPIC verification team performing remote visual assessment and observations of the project activity), the EPIC verification team has reviewed the application of the implemented monitoring plan along the considered monitoring period vis-à-vis the monitoring requirements of the registered PDD /2/. The application of the monitoring plan during the considered monitoring period was also verified against all applicable requirements of the monitoring methodology ACM0001 /7/ and applied methodological tools /12/ /13/ /14/ /15/ in order to confirm its compliance.
Findings	As part of its verification assessment, the EPIC verification team was able to confirm that the monitoring plan was correctly implemented and was operationalized during the considered monitoring period under full compliance with applicable requirements of the monitoring methodology ACM0001 /7/ and applied methodological tools /12/ /13/ /14/ /15/. Thus, no findings (CARs, CLs and/or FARs) were raised regarding the compliance of the monitoring plan with applied monitoring methodology and applied methodological tools.
Conclusion	Based on the performed document desk review + watching online (and later further assessing/reviewing (re-watching)) the live videos (movies) /64/ produced by operational staff of the project activity on 10/05/2021 (that allowed the EPIC verification team performing remote visual assessment and observations of the project activity), the EPIC verification team confirms that the monitoring plan was applied during the considered monitoring period in conformance with the provisions of the registered PDD /2/. Moreover, the applied monitoring plan also sufficiently meets all applicable requirements of the baseline and monitoring methodology ACM0001 /7/ and applicable methodological tools /12/ /13/ /14/ /15/.

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	The EPIC verification team assessed the Monitoring Report /3/ and emission reduction calculation spreadsheets /5/ in order to confirm whether all ex-ante determined parameters (that are applicable for the calculations of achieved emission reductions by the project activity) were correctly reported in the latest version of the Monitoring Report /3/ and correctly applied/considered (as per the provisions of the registered PDD) in related emission reduction calculations. The following ex-ante determined parameters were correctly applied/considered in the context of emission reduction calculations for the considered monitoring period:

Parameter	Applied value
Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline ($OX_{top\ layer}$)	0.1
Global Warming Potential of CH_4 (GWP_{CH4})	25 tCO_2e/tCH_4
Universal ideal gases constant (R_u)	8,314 $Pa.m^3/kmol.K$
Molecular mass of gas *k* (MM_k) (For the particular case of the project activity, $k = N_2$)	28.01 kg/kmol

Molecular mass of greenhouse gas *i* (MM_i) (For the particular case of the project activity, *i* = CH_4)	16.04 kg/kmol
Total pressure at normal conditions (P_n)	101,325 Pa
Temperature at normal conditions (T_n)	273.15 K
Molecular mass of water (MM_{H2O})	18.0152 kg/kmol
Average technical transmission and distribution losses for providing electricity to the grid and/or for grid sourced electricity consumed by the project activity ($TDL_{grid,y}$)	20% (for grid-sourced electricity consumed by the project activity) and 3% (for electricity generated by the project activity and provided to the grid)
Weighting of build margin emissions factor (w_{BM})	75%
Weighting of operating margin emissions factor (w_{OM})	25%
Build margin CO_2 emission factor in year *y* ($EF_{grid,BM,y}$)	0.2963 tCO_2/MWh
Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval ($SPEC_{flare}$)	

$SPEC_{flare}$	Min.	Max.
Operational LFG flow for each flare (for continuous operation):	300 Nm^3/h	8,100 Nm^3/h
Required temperature of the exhaust gas of the flare (to ensure LFG destruction (combustion) under high CH_4 destruction efficiency):	500 °C	1,000 °C
Required minimum frequency for inspection and maintenance service in each flare (incl. inspection in the	Min. every year	

	conditions of the flare isolation ceramics revetment material):	
	Required/ recommended minimum frequency for replacement of the flare isolation ceramics revetment material in each flare:	After 10 years of regular and appropriate operation
Rated capacity of the installed captive backup electricity generators fuelled by diesel ($PP_{CP,Diesel\text{-}generator}$)	0.144 MW	
Average technical transmission and distribution losses for electricity sourced by the captive electricity generator ($TDL_{captive,y}$)	0	
CO_2 emission factor for electricity sourced by the captive off-grid electricity generators ($EF_{EL,captive,y}$)	1.3 tCO_2/MWh	

Moreover, EPIC verification tem has also assessed that the following ex-ante determined parameters (which are also included/listed in the registered PDD) were correctly not considered/used for the purpose of ex-post determination of baseline emissions and/or project emissions achieved by the project activity during the considered monitoring period:

- Efficiency of the LFG capture system that will be installed in the project activity (η_{PJ})
- Default value for model correction factor to account for model uncertainties ($\varphi_{default}$)
- Oxidation factor (reflecting the amount of methane from the considered SWDS that is oxidized in the soil (or other material covering the waste)) (OX)
- Fraction of methane in the SWDS gas (volume fraction) (F)
- Fraction of degradable organic carbon (DOC) in MSW that decomposes in the considered SWDS ($DOC_{f,default}$)
- Methane correction factor ($MCF_{default}$)
- Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j)
- Decay rate for the waste type *j* (k_j)
- Weight fraction of the waste type *j* (W_j)

As also outlined in the Monitoring Report /3/ and in the registered PDD /2/, the above-listed parameters are only used in the context of ex-ante estimation of emission reductions to be achieved by the project activity during the 2nd 7-year renewable crediting period.

Findings	No related findings (CARs, CLs and/or FARs) were raised regarding the reporting and application/consideration (as per related provisions of the registered PDD) of parameters fixed ex-ante:
Conclusion	The EPIC verification team has confirmed that all parameters fixed ex ante (which are applicable for the calculations of achieved emission reductions by the project activity) were correctly applied as per the registered PDD during the considered monitoring period.

E.6.2. Data and parameters monitored

Means of verification

The EPIC verification team has assessed whether all monitoring parameters of which monitoring is required as per the monitoring plan of the registered PDD /2/ and by considering the applied calculation options for the determination of baseline and project emissions achieved during the considered monitoring period.

The following tables include assessment details for parameters monitored ex post during the considered monitoring period:

Assessment details for the monitoring parameter "Management of the SWDS" (Management of SWDS):

Data / Parameter: (as per the monitoring plan of the PDD):	Management of the SWDS (Management of SWDS)
Measuring, recording and reporting frequencies:	The ex-post determination of the monitoring parameter "Management of the SWDS" is not based on measurements. As correctly outlined in the Monitoring Report /3/, management aspects of the CRR landfill are annually compared against defined landfill management practices as per the previously conceived original construction and operational design of the landfill. This comparison aims to confirm that management and operation of the CRR landfill (including relevant aspects related to landfilling practice) were not intentionally modified with the unique aim of increasing generation of methane on site.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. As per the monitoring plan of the registered PDD /2/, monitoring for the parameter "Management of the SWDS" is to be performed on the basis of the performance of a technical evaluation assessment of the overall management and operation of the CRR with an every-year frequency. The performance of two initial evaluation assessments (valid for the considered monitoring period) by the independent 3rd party engineering company "GSA Engenharia" are reported on the technical reports dated 03/06/2019 and 14/01/2020 /66/. A sequential evaluation assessment was performed by the independent 3rd party engineering company "Cepollina engenheiros construtores ltda." (technical report dated 13/01/2021 /63/). These assessments were performed as per the applicable monitoring procedure for the parameter "Management of the SWDS". That sufficiently confirms that the applied monitoring frequency is in accordance with both the monitoring plan from the registered PDD /2/ and ACM0001 /7/.
Type of monitoring equipment/instrument:	Not applicable. While monitoring of the parameter "Management of the SWDS" is not performed based on measurements, there are no monitoring equipment/instruments utilized.
Is the accuracy of the monitoring equipment/instrument as	Not applicable. While monitoring of the parameter "Management of the SWDS" is not performed based on measurements, there are

	stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	no monitoring equipment/instruments utilized.	
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	The outcome of the latest technical evaluation assessments performed by the independent 3rd party engineering companies "GSA Engenharia" and "Cepollina engenheiros construtores ltda." that are valid for the considered monitoring period are reported in the technical evaluation/declaration reports /66/ /63/ issued by these companies that are dated 03/06/2019, 14/01/2020 and 13/01/2021, respectively. These documents were made available and were assessed by the EPIC verification team. The following is appropriately outlined in the latest version of the Monitoring Report /3/: "*(...) As part of the performed evaluation, the current configuration and operational conditions of the CRR landfill were compared against the previously conceived design and operational conditions of the landfill prior of the occurred implementation of the project activity on the basis of different sources and assessments including inter alia:* - *The original design documents of the landfill (as described in the documentation required for all phases of the environmental licensing and operational permitting for the CRR landfill);* - *Applicable local or national regulations;* - *Expertise and experience of the technical team of GSA Engenharia Ltda. and Cepollina with the CRR landfill. Since the start of operation of the CRR landfill members of the technical team of GSA Engenharia Ltda. and Cepollina have been directly involved with performance of regular technical inspections at the CRR landfill as part of different technical evaluations, including the continuously performed assessment of geotechnical stability monitoring for the landfill cells. Such regular assessment of geotechnical stability for the landfill cells are required by the competent environmental authority from Rio Grande do Sul State (Fundação Estadual de Proteção Ambiental - FEPAM) where the demonstration of sufficient geotechnical stability of the landfill cells are regarded as prerequisite for the operational permitting of the CRR landfill.* *(…)"* The EPIC verification team has verified that the	

		issued technical evaluation/declaration reports /66/ /63/ sufficiently confirm that the original conceived design of the CRR landfill has so far not been modified. No changes in the aspects, conditions and circumstances related to management of the landfill (e.g. operations related to waste disposal, waste covering, waste compacting, management of leachate, draining of rainwater, etc.) were promoted with an aim to increase methane generation on the project site.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	The EPIC verification team was able to verify that related information included in the Monitoring Report /3/ is fully in accordance with the content of the evaluation/declaration reports issued by GSA Engenharia dated 03/06/2019 and 14/01/2020 /66/ and the report dated 13/01/2021 issued by Cepollina /63/. These technical reports were made available and were assessed by the EPIC verification team.
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in the end of this Section. In the particular case of the monitoring parameter "Management of the SWDS", there are no monitoring records (figures) to be considered/accounted in the context of emission reduction calculations for the considered monitoring period. However, the annual comparison of applied management aspects of the CRR landfill against the defined landfill management practices (as per the previously conceived original construction and operational design of the landfill) is required in order to confirm that management and operation of the CRR landfill (including relevant aspects related to landfilling practice) were not intentionally modified with the unique aim of increasing generation of methane on site; thus artificially changing baseline emissions for the project site. As required by ACM0001 (version 15,0) /7/, any change in the management of the landfill after the implementation of the project activity is to be justified by referring to technical or regulatory specifications and related impacts of such eventual changes should be addressed in the determination of baseline emissions. In summary, monitoring information for the parameter "Management of the SWDS" is used for the determination/confirmation of baseline emissions and/or confirmation of the project's implementation as per project design descriptions included in the registered PDD (in terms of operation and management conditions of the landfill from which LFG is combusted).

Assessment details for the monitoring parameter "Volumetric flow of LFG stream in time interval t on a wet basis for j (where j is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s))" ($V_{t,wb,j}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Volumetric flow of LFG stream in time interval *t* on a wet basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($V_{t,wb,j}$) (monitored as per Option C of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/).
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuously measurements of the monitoring parameter $V_{t,wb,j}$ were recorded/reported with an every minute frequency. As correctly outlined in the latest version of the Monitoring Report /3/, while measurements for $V_{t,wb,j}$ are performed by 7 installed independent LFG flow meters (one flow meter for the installed flare and one flow meter for each individual engine-generator set of the electricity generation facility), the monitoring parameter $V_{t,wb,j}$ is thus measured, recorded and reported on the basis of the following sub-parameters: - $V_{t,wb,flare}$: Volumetric flow of LFG to the Flare - $V_{t,wb,genset-1}$: Volumetric flow of LFG to the engine-generator set 1 - $V_{t,wb,genset-2}$: Volumetric flow of LFG to the engine-generator set 2 - $V_{t,wb,genset-3}$: Volumetric flow of LFG to the engine-generator set 3 - $V_{t,wb,genset-4}$: Volumetric flow of LFG to the engine-generator set 4 - $V_{t,wb,genset-5}$: Volumetric flow of LFG to the engine-generator set 5 - $V_{t,wb,genset-6}$: Volumetric flow of LFG to the engine-generator set 6 The consideration of the above-listed sub-parameters is deemed correct, acceptable and under conformance with the requirements of ACM0001 /7/ and the applicable methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD /2/, continuous measurements of $V_{t,wb,j}$ are to be recorded and reported under an every-minute frequency. Moreover, as per the applicable guidance of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/ (which is applied in accordance to ACM0001 /7/), monitoring of $V_{t,wb,j}$ should be performed continuously if not specified in the underlying methodology. While ACM0001 /7/ does not explicitly specify any monitoring frequency for $V_{t,wb,j}$, the applied

		measuring, recording and reporting frequencies for this particular monitoring parameter (continuous measurements being recorded/reported under an every-minute frequency) are thus in accordance with both ACM0001 /7/ and the registered PDD /2/.
	Type of monitoring equipment/instrument:	Measurements of flow of LFG sent to the installed high temperature enclosed flare are performed by an installed LFG flow meter. Measurements of LFG flow sent one to each one the 6 installed engine-generator sets of the project's electricity generation component are performed by 6 installed identical LFG flow meter sets (one set for each engine-generator set) on the basis of the sub-parameters $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$). Each flow meter set includes a sensor element (annubar) and a pressure signal processing + data transmission unit. Instrument sets with the following specifications were applied for performing measurements of $V_{t,wb}$ (on the basis of measurements of the sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) during the considered monitoring period: *Flow meter sets used for measuring the parameter $V_{t,wb,flare}$ (Flare)*:

Specifications of the flow meter used for measuring the sub-parameter $V_{t,wb,flare}$	
Manufacturer	Fluid Components International (FCI)
Model	ST98
Serial Number period	282572
Internal instrument/ equipment identification	FIT-01
Accuracy:	±1.0%

Source: /51/

Flow meter set used for measuring the parameter $V_{t,wb,genset-1}$ (engine-generator set 1):

Specifications of the annubar element (differential pressure sensor) of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-1}$	
Manufacturer	Rosemount Inc.
Model	485 Annubar
Serial Number	0148661
Accuracy:	±1.0%

Source: /82/

Specifications of the pressure signal processing unit of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-1}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027669
Accuracy:	±1.0%

Source [83]

Flow meter set used for measuring the parameter $V_{t,wb,genset-2}$ (engine-generator set 2):

Specifications of the annubar element (differential pressure sensor) of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-2}$	
Manufacturer	Rosemount Inc.
Model	485 Annubar
Serial Number	0148659
Accuracy:	±1.0%

Source: [82]

Specifications of the pressure signal processing unit of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-2}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027628
Accuracy:	±1.0%

Source: [83]

Flow meter set used for measuring the parameter $V_{t,wb,genset-3}$ (engine-generator set 3):

Specifications of the annubar element (differential pressure sensor) of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-3}$	
Manufacturer	Rosemount Inc.
Model	485 Annubar
Serial Number	0148658
Accuracy:	±1.0%

Source: [82]

Specifications of the pressure signal processing unit of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-3}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027627
Accuracy:	±1.0%

Source: [83]

Flow meter set used for measuring the parameter $V_{t,wb,genset-4}$ (engine-generator set 4):

Specifications of the annubar element (differential pressure sensor) of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-4}$	
Manufacturer	Rosemount Inc.
Model	485 Annubar
Serial Number	0148656
Accuracy:	±1.0%

Source: [82]

Specifications of the pressure signal processing unit of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-4}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027625
Accuracy:	±1.0%

Source: [83]

Flow meter set used for measuring the parameter $V_{t,wb,genset-5}$ (engine-generator set 5):

Specifications of the annubar element (differential pressure sensor) of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-5}$	
Manufacturer	Rosemount Inc.
Model	485 Annubar
Serial Number	0148657
Accuracy:	±1.0%

Source: [82]

Specifications of the pressure signal processing unit of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-5}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027626
Accuracy:	±1.0%

Source: [83]

Flow meter set used for measuring the parameter $V_{t,wb,genset-6}$ (engine-generator set 6):

Specifications of the annubar of the flow meter element (differential pressure sensor) set used for measuring the sub-parameter $V_{t,wb,genset-6}$	
Manufacturer	Rosemount Inc.
Model	485 Annubar
Serial Number	0148660
Accuracy:	

		±1.0%

Source: [82]

Specifications of the pressure signal processing unit of the flow meter set used for measuring the sub-parameter $V_{t,wb,genset-6}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027629
Accuracy:	±1.0%

Source: [83]

Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	The registered PDD [2] and ACM0001 [7] do not specify any accuracy requirement for the LFG flow meters installed at the project site. The accuracy range for the installed LFG flow meters meter used for measuring $V_{t,wb,flare}$ is ±1.0%. The accuracy range for the installed LFG flow meters meter sets (annubar + pressure signal processing + data transmission unit) used for measuring $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$ is ±1.0%.. Based on its sectoral expertise and experience with other similar project-based initiative under the CDM (promoting collection and destruction and/or utilization of LFG), it is EPIC opinion that the use of the installed flow meters represents good practice for monitoring of LFG flow.
If applicable, has the reported monitoring data been cross-checked with other available data or source?	Not applicable.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	For the particular case of project's LFG flaring facility, figures of LFG flow as visualized by the EPIC verification team in the screen of the project's data supervisory system (in the project activity's control room) were compared with figures displayed by the LFG flow indicator measuring LFG flow to the flare (indicator included in the LFG flow meter) (for the same time instant) at the time of the production/watching of the live videos (movies) and photographs (pictures) [64] on 10/05/2021 (of which details are provided in Section D.2). Such data checking/comparison confirmed correct data processing and recording by the project's PLC unit and monitoring equipment respectively (at the time of the production/watching/visualization of the live videos (movies) [64] and photographs (pictures) on 10/05/2021). The 6 LFG flow meter sets of the project's electricity generation infrastructure do not have any display allowing visual confirmation of measured values. Further assessment details about recording of values measured at the project site are included in the end of this Section.

		Furthermore, a *data authenticity checking* was performed for all every minute basis measurement records of the following monitoring parameters in order to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) - Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$) - Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) - Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) - Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$) - Flame detection of flare in the minute *m* ($Flame_m$) - Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$). The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheets /5/ include only authentic monitoring records. Details about the performed *data authenticity checking* (which is valid for above-listed LFG and LFG flaring/utilization related monitoring data) are included in the end of this Section.
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in the end of this Section. Further details for monitoring management and quality assurance related aspects for the project activity are also included

calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	in the end of this Section. .

Assessment details for the monitoring parameter "Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis for j (where j is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s))" ($v_{CH4,t,wb,j}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($v_{CH4,t,wb,j}$) (monitored as per Option C of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/).
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuously measurements for the monitoring parameter $v_{CH4,t,wb,j}$ were recorded/reported with an every-minute frequency. As part of performed continuous measurements, samples of collected LFG continuously pass through the infrared cell of the installed continuous CH_4/O_2 content gas analyzer unit as a gas stream. Each every-minute reported value of $v_{CH4,t,wb,j}$ corresponds to a measurement actually performed at the last time instant the minute in question. While it takes about 5 seconds for the collected gas to go through the filtering process prior of reaching the infra-red cell (according to information provided by the equipment manufacturer), each individual every-minute measurement that is recorded/reported for a specific time instant (for example, 12:03:00) actually represents the concentration of the gas stream that entered the gas analyzer pump five seconds before (e.g. 12:02:55). This is deemed reasonable and acceptable.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD /2/, continuous measurements of $v_{CH4,t,wb,j}$ are to be recorded and reported every minute. Moreover, as per the applicable guidance of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/ (which is applied in accordance to ACM0001 /7/), monitoring of $v_{CH4,t,wb,j}$ should be performed continuously if not specified in the underlying methodology. While ACM0001 /7/ does not explicitly define or establish any monitoring frequency for $v_{CH4,t,wb,j}$, the applied measuring, recording and reporting frequencies for $v_{CH4,t,wb,j}$ are thus assumed as under conformance with

		both ACM0001 [7] and the registered PDD [2].
	Type of monitoring equipment/instrument:	During the considered monitoring period, continuous measurements of the monitoring parameter $v_{CH4,t,wb,j}$ were performed by a continuous CH_4/O_2 content gas analyzer units for which main specifications are summarized below: Specifications of installed continuous CH_4/O_2 content gas analyzer units Manufacturer: Siemens AG Model: Ultramat 23 Serial Number: N1-C8-283 Internal instrument/ equipment identification: AG-01 Accuracy: ±1.0% Source: [58] It is important to note that EPIC was able to confirm that the implemented LFG collection process ensures that LFG passing through the installed flow meters and through the installed continuous CH_4/O_2 content gas analyzer unit are measured on the same basis/conditions.
	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	The registered PDD [2] and ACM0001 [7] do not specify any accuracy requirement for the CH_4/O_2 content gas analyzer unit installed at the project site. The accuracy range for the installed equipment is ±1.0%. Based on its sectoral expertise and experience with other similar project-based initiative under the CDM (promoting collection and destruction and/or utilization of LFG), it is EPIC opinion that use of the installed equipment represents good practice for monitoring of CH_4 content of LFG.
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	Not applicable.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Figures of CH_4 content in the collected LFG as visualized by the EPIC verification team in the screen of the project's data supervisory system (in the project activity's control room) were compared with figures displayed in the display of the installed CH_4/O_2 content gas analyzer unit (for the same time instant) at the time of the production/watching/visualization of the live videos (movies) and photographs (pictures) [64] on 10/05/2021 (of which details are included in Section D.2). Such data checking/comparison confirmed correct data processing and recording by the project's PLC unit and monitoring equipment respectively (at the time the production/watching of the live videos (movies) [64] on 10/05/2021). Further assessment details about recording of values measured at the

		project site are included in the end of this Section. Furthermore, a *data authenticity checking* was performed for all every minute basis measurement records of the following LFG and LFG flaring/utilization related monitoring parameters (incl. sub-parameters) in order to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) - Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$) - Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) - Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) - Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$) - Flame detection of flare in the minute *m* ($Flame_m$) - Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$). The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheets /5/ include only authentic monitoring records. Details about the performed *data authenticity checking* (which is valid for above-listed LFG and LFG flaring/utilization related monitoring data) are included in the end of this Section.
	Does the applied monitoring data management process	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are assessed in the end of this Section.

(from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Further details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section. .

Assessment details for the monitoring parameter "Temperature of the LFG stream in time interval t" (T_t):

Data / Parameter: (as per the monitoring plan of the PDD):	Temperature of the LFG stream in time interval *t* (T_t)
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuously measurements of the monitoring parameter T_t were recorded/reported with an every-minute frequency. As correctly outlined in the latest version of the Monitoring Report /3/, while measurements for T_t are performed by 7 installed independent temperature sensors (one instrument for the installed flare and one instrument for each one of the installed 6 engine-generator sets of the electricity generation facility), the monitoring parameter is thus measured, recorded and reported on the basis of the following sub-parameters: - T_{tflare}: Temperature of the LFG which is sent to the Flare - $T_{tgenset-1}$: Temperature of the LFG which is sent to the engine-generator set 1 - $T_{tgenset-2}$: Temperature of the LFG which is sent to the engine-generator set 2 - $T_{tgenset-3}$: Temperature of the LFG which is sent to the engine-generator set 3 - $T_{tgenset-4}$: Temperature of the LFG which is sent to the engine-generator set 4 - $T_{tgenset-5}$: Temperature of the LFG which is sent to the engine-generator set 5 - $V_{tgenset-6}$: Temperature of the LFG which is sent to the engine-generator set 6 This is deemed correct, acceptable and under conformance with the requirements of ACM0001 /7/ and the applicable methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD /2/, continuous measurements of T_t are to be recorded and reported every minute. Moreover, as per the applicable guidance of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/ (which is applied in accordance to ACM0001 /7/), monitoring of T_t should be performed continuously if not specified in the underlying

	methodology. While ACM0001 [7] does not define or establish any monitoring frequency for T_t, the applied measuring, recording and reporting frequencies for T_t are thus assumed as being under conformance with both ACM0001 [7] and the registered PDD [2].
Type of monitoring equipment/instrument:	During the considered monitoring period, continuous measurements of temperature of LFG which is sent to the flare were performed by an installed LFG temperature sensor set (comprised by a sensor element and a data transmitter). Measurements of temperature of LFG which is sent to each one of the 6 installed engine-generator sets of the project's electricity generation component are performed by 6 installed LFG temperature sensors (one for each engine-generator set) on the basis of the sub-parameters $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$). Instruments with the following specifications were applied for performing measurements of $V_{t,wb}$ (on the basis of measurements of the sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) during the considered monitoring period: *Temperature sensor used for measuring the parameter T_{tflare} (Flare)*:

Specifications of the sensor element of the installed LFG temperature sensor used for measuring T_{tflare}	
Manufacturer	Consistec Controles e Sistemas de Automação
Model	RTD PT100
Serial Number	110813
Internal instrument / equipment identification	TIT-02
Accuracy	±1.0 ºC

Source: **Error! Reference source not found.**

Specifications of the data transmitter of the installed LFG temperature sensor used for measuring T_{tflare}	
Manufacturer	SMAR Equipamentos Ind. Ltda.
Model	TT301
Serial Number	57235
Internal instrument / equipment identification	TIT-02
Accuracy	±0.2 ºC

Source: [52]

Temperature sensor used for measuring the parameter $T_{tgenset-1}$ (engine-generator set 1):

Specifications of the installed LFG temperature sensor used for measuring $T_{tgenset-1}$	
Manufacturer	Elsi s.r.l.
Model	Y1-SEM203/P
Serial Number	E14PT0680
Accuracy	±0.5 ºC

Source: [84]

Temperature sensor used for measuring the parameter $T_{tgenset-2}$ (engine-generator set 2):

Specifications of the installed LFG temperature sensor used for measuring $T_{tgenset-2}$	
Manufacturer	Elsi s.r.l.
Model	Y1-SEM203/P
Serial Number	E14PT0678
Accuracy	±0.5 ºC

Source: [84]

Temperature sensor used for measuring the parameter $T_{tgenset-3}$ (engine-generator set 3):

Specifications of the installed LFG temperature sensor used for measuring $T_{tgenset-3}$	
Manufacturer	Elsi s.r.l.
Model	Y1-SEM203/P
Serial Number	E14PT0677
Accuracy	±0.5 ºC

Source: [84]

Temperature sensor used for measuring the parameter $T_{tgenset-4}$ (engine-generator set 4):

Specifications of the installed LFG temperature sensor used for measuring $T_{tgenset-4}$	
Manufacturer	Elsi s.r.l.
Model	Y1-SEM203/P
Serial Number	E14PT0675
Accuracy	±0.5 ºC

Source: [84]

Temperature sensor used for measuring the parameter $T_{tgenset-5}$ (engine-generator set 5):

Specifications of the installed LFG temperature sensor used for measuring $T_{tgenset-5}$	
Manufacturer	Elsi s.r.l.
Model	Y1-SEM203/P
Serial Number	E14PT0676
Accuracy	±0.5 ºC

Source: [84]

		Temperature sensor used for measuring the parameter $T_{tgenset-6}$ (engine-generator set 6): Specifications of the installed LFG temperature sensor used for measuring $T_{tgenset-6}$ Manufacturer: Elsi s.r.l. Model: Y1-SEM203/P Serial Number: E14PT0679 Accuracy: ±0.5 ºC Source: /84/
	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	The registered PDD /2/ and ACM0001 /7/ do not specify any accuracy requirement for the LFG temperature sensors installed at the project site. The accuracy range for the installed instrument sets are ±1.2 ºC (LFG temperature sensor set used for measuring T_{tflare}) and ±0.5 ºC (LFG temperature sensor sets used for measuring $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$). Based on its sectoral expertise and experience with other similar project-based initiative under the CDM (promoting collection and destruction and/or utilization of LFG), it is EPIC opinion that the use of the installed instruments represents good practice for monitoring of LFG temperature.
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	Not applicable.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	For the particular case of project's LFG flaring facility, figures of T_{tflare} as visualized by the EPIC verification team in the screen of the project's data supervisory system (in the project activity's control room) were compared with figures displayed by LFG temperature indicator (which is located in the LFG temperature sensor used for measuring T_{tflare}) (for the same time instant) at the time the production/watching of the live videos (movies) /64/ on 10/05/2021 (of which details are included in Section D.2). Such data checking/comparison confirmed correct T_{tflare} data processing and recording by the project's PLC unit and monitoring equipment respectively (at the time of the production/watching of the live videos (movies) /64/ on 10/05/2021). The 6 temperature sensors for the project's electricity generation infrastructure do not have any display allowing visual confirmation of measured values. Further assessment details about recording of values measured at the project site are included in the end of this Section. Furthermore, a *data authenticity checking* was performed for all every minute basis measurement records of the following LFG and

		LFG flaring/utilization related monitoring parameters (incl. sub-parameters) in order to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) - Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$) - Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) - Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) - Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$) - Flame detection of flare in the minute *m* ($Flame_m$) - Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$). The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheets /5/ include only authentic monitoring records. Details about the performed *data authenticity checking* (which is valid for above-listed LFG and LFG flaring/utilization related monitoring data) are included in the end of this Section.
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are assessed in the end of this Section. Further details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section. .

used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	

Assessment details for the monitoring parameter "Pressure of the LFG stream in time interval t" (P_t):

Data / Parameter: (as per the monitoring plan of the PDD):	Pressure of the LFG stream in time interval *t* (P_t)
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuously measurements of the monitoring parameter P_t were recorded/reported with an every-minute frequency. As correctly outlined in the latest version of the Monitoring Report /3/, while measurements for P_t are performed by 7 installed pressure sensors (one for the installed flare and one for each individual engine-generator set of the electricity generation facility), the monitoring parameter is thus measured, recorded and reported on the basis of the following sub-parameters: - P_{tflare}: Pressure of the LFG which is sent to the Flare - $P_{tgenset-1}$: Pressure of the LFG which is sent to the engine-generator set 1 - $P_{tgenset-2}$: Pressure of the LFG which is sent to the engine-generator set 2 - $P_{tgenset-3}$: Pressure of the LFG which is sent to the engine-generator set 3 - $P_{tgenset-4}$: Pressure of the LFG which is sent to the engine-generator set 4 - $P_{tgenset-5}$: Pressure of the LFG which is sent to the engine-generator set 5 - $P_{tgenset-6}$: Pressure of the LFG which is sent to the engine-generator set 6 This is deemed correct, acceptable and under conformance with the requirements of ACM0001 /7/ and the applicable methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD /2/, continuous measurements of P_t are to be recorded and reported every minute. Moreover, as per the applicable guidance of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/ (which is applied in accordance to ACM0001 /7/), monitoring of P_t should be performed continuously if not specified in the underlying methodology. While ACM0001 /7/ does not define or establish any monitoring frequency for P_t, the applied measuring, recording and reporting frequencies for P_t are thus assumed as being under conformance with both ACM0001 /7/ and the registered PDD /2/.

	Type of monitoring equipment/instrument:	During the considered monitoring period, continuous measurements of pressure of LFG which is sent to the flare were performed by an installed LFG pressure sensor. Measurements of pressure of LFG which is sent to each one of the 6 installed engine-generator sets of the project's electricity generation component are performed by 6 installed LFG pressure sensors (one for each engine-generator set) on the basis of the sub-parameters $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$). Instruments with the following specifications were applied for performing measurements of P_t (on the basis of measurements of the sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) during the considered monitoring period: *Pressure sensor used for measuring the parameter P_{tflare} (Flare)*: Specifications of installed LFG pressure sensors used for measuring P_{tflare} during the considered monitoring period Manufacturer: SMAR Equipamentos Ind. Ltda. Model: LD301 Serial Number: 249692 Internal instrument/ equipment identification: PIT-02 Accuracy: ±0.1% Source: [56] *Pressure sensor set used for measuring the parameter $P_{tgenset-1}$ (engine-generator set 1)*: Specifications of the pressure signal processing + data transmission unit used for measuring the sub-parameter $P_{tfgenset-1}$ Manufacturer: ABB S.p.A. Model: 2600T Serial Number: 3K646614027622 Accuracy: ±1.0% Source: [83] *Pressure sensor set used for measuring the parameter $P_{tgenset-2}$ (engine-generator set 2)*: Specifications of the pressure signal processing + data transmission unit used for measuring the sub-parameter $P_{tfgenset-2}$ Manufacturer: ABB S.p.A. Model: 2600T Serial Number: 3K646614027620 Accuracy: ±1.0% Source: [83]

Pressure sensor set used for measuring the parameter $P_{tgenset-3}$ (engine-generator set 3):

Specifications of the pressure signal processing + data transmission unit used for measuring the sub-parameter $P_{tfgenset-3}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027619
Accuracy:	±1.0%

Source: [83]

Pressure sensor set used for measuring the parameter $P_{tgenset-4}$ (engine-generator set 4):

Specifications of the pressure signal processing + data transmission unit used for measuring the sub-parameter $P_{tfgenset-4}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027617
Accuracy:	±1.0%

Source: [83]

Pressure sensor set used for measuring the parameter $P_{tgenset-5}$ (engine-generator set 5):

Specifications of the pressure signal processing + data transmission unit used for measuring the sub-parameter $P_{tfgenset-5}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027618
Accuracy:	±1.0%

Source: [83]

Pressure sensor set used for measuring the parameter $P_{tgenset-6}$ (engine-generator set 6):

Specifications of the pressure signal processing + data transmission unit used for measuring the sub-parameter $P_{tfgenset-6}$	
Manufacturer	ABB S.p.A.
Model	2600T
Serial Number	3K646614027621
Accuracy:	±1.0%

Source: [83]

	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the	The registered PDD [12] and ACM0001 [77] do not specify any accuracy requirement for the LFG pressure sensors installed at the project site. The accuracy range for the installed instruments is ±0.1% (LFG pressure sensor used for measuring P_{tflare}) and ±1.0% (LFG pressure sensors used for measuring $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$). Based

	monitoring equipment/instrument represents good monitoring practice?	on its sectoral expertise and experience with other similar project-based initiative under the CDM (promoting collection and destruction and/or utilization of LFG), it is EPIC opinion that the use of the installed instruments represents good practice for monitoring of LFG pressure.
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	A *data authenticity checking* was performed for all every minute basis measurement records of the following LFG and LFG flaring/utilization related monitoring parameters (incl. sub-parameters) in order to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) - Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$) - Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) - Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) - Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$) - Flame detection of flare in the minute *m* ($Flame_m$) - Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$). The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheets /5/ include only authentic monitoring records. Details about the performed *data authenticity checking* (which is valid for above-listed LFG and LFG flaring/utilization related monitoring data) are included in the end of this Section.

	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	For the particular case of project's LFG flaring facility, figures for P_{tflare} as visualized by the EPIC verification team in the screen of the project's data supervisory system (in the project activity's control room) were compared with figures displayed by LFG pressure indicator (which is located in the LFG pressure sensor used for measuring P_{tflare}) (for the same time instant) at the time the production/watching of the live videos (movies) /64/ on 10/05/2021 (of which details are included in Section D.2. Such data checking/comparison confirmed correct data processing and recording by the project's PLC unit and monitoring equipment respectively (at the time of the production/watching of the live videos (movies) /64/ on 10/05/2021). The 6 pressure sensors for the project's electricity generation infrastructure do not have any display allowing visual confirmation of measured values. Further assessment details about recording of values measured at the project site are included in the end of this Section. Furthermore, a *data authenticity checking* was performed for all every minute basis measurement records of the following LFG and f LFG flaring/utilization related monitoring parameters (incl. sub-parameters) in order to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) - Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$) - Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) - Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) - Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$) - Flame detection of flare in the minute *m* ($Flame_m$) - Operation of the equipment that	

	consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$). The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheets /5/ include only authentic monitoring records. Details about the performed *data authenticity checking* (which is valid for above-listed LFG and LFG flaring/utilization related monitoring data) are included in the end of this Section.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are assessed in the end of this Section. Further details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section. .

Assessment details for the monitoring parameter "Amount of grid electricity consumed by the project activity during the year y" ($EC_{PJ,grid,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Amount of grid electricity consumed by the project activity during the year *y* ($EC_{PJ,grid,y}$)
Measuring, recording and reporting frequencies:	During the considered monitoring period, accumulated values of continuously measurements of the monitoring parameter $EC_{PJ,grid,y}$ were aggregated and recorded/reported hourly by the Brazilian Chamber of Electric Energy Commercialization (CCEE). As indicated in the latest version of the Monitoring Report /3/, during the considered monitoring period, the electricity demand of the project activity was met by electricity generated by the project's electricity generation infrastructure whenever it is under operation. During the time periods when the project's electricity generation component is not under operation (temporary interruptions), the electricity demand of the project activity is met by imports of grid electricity through the same dedicated power transmission line which is used

		for exporting electricity generated by the project activity.
	Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD [2], continuous measurements of $EC_{PJ,grid,y}$ are to be recorded and reported with an every week frequency. The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" [13], and ACM0001 [7] do not clearly indicate recording and reporting frequencies for continuous measurements for the parameter $EC_{PJ,grid,y}$. Thus, the adopted measuring, recording and reporting frequencies are assumed as in accordance with the monitoring plan of the registered PDD [2], the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" [13] and ACM0001 [7].
	Type of monitoring equipment/instrument:	During the considered monitoring period, while imports of grid-sourced electricity have been made through the same dedicated transmission line which is used for exporting electricity generated by the project activity, measurements of grid electricity consumed by the project activity have thus been made by the same bi-directional electricity meter which is used for measuring electricity generated by the project activity. The specifications of the installed bi-directional electricity meter are as follows: Specifications of installed electricity meter Manufacturer: Schneider Electric Model: 8650 Serial Number (S/N): RSARELUBREC01P Accuracy: ±0.2% Source: [86]
	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	The registered PDD [2], the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" [13] and ACM0001 [7] do not specify any accuracy requirement for the electricity meters installed at the project site. The accuracy range for the installed instrument is ±0.2%. Based on its sectoral expertise and experience with other similar project-based initiative under the CDM (promoting collection and destruction and/or utilization of LFG), it is EPIC opinion that the use of the installed instrument represents good practice for monitoring of consumption of grid-sourced electricity by the project activity.
	If applicable, has the reported monitoring data been cross-checked with	Under conformance with paragraph 374 (b) of the CDM-VVS-PA version 02.0 [1], records of grid-sourced electricity consumed by the project

	other available data or source?	activity during the considered monitoring period, as reported in the summarized emission reduction calculation spreadsheet /5/ and Monitoring Report /3/ were cross-checked (compared) against monthly additional invoices/reports for consumption of grid-sourced electricity by the project activity infrastructure which were issued by Companhia Estadual de Distribuição de Energia Elétrica – CEEE-D) /102/ (the local power distribution company). Such invoices were made available to the EPIC verification team and their content was assessed. The performed cross-checking allowed the EPIC verification team to confirm the correctness of all reported data for $EC_{PJ,grid,y}$ valid for the considered monitoring period.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	The EPIC verification team has confirmed that values for the monitoring parameter $EC_{PJ,grid,y}$ as reported in the summarized emission reduction calculation spreadsheet /5/ and Monitoring Report /3/ are in accordance with primary monitoring records /92/ reported every week.
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section. .

Assessment details for the monitoring parameter "Amount of electricity generated using LFG by the project activity in year y" (EC_{BLy})

Data / Parameter: (as per the monitoring plan of the PDD):	Amount of electricity generated using LFG by the project activity in year y" (EC_{BLy})
Measuring, recording and reporting frequencies:	During the considered monitoring period, accumulated values of continuously measurements of the monitoring parameter $EC_{BL,y}$ were aggregated and recorded/reported hourly by the Brazilian Chamber of Electric Energy Commercialization (CCEE). All electricity generated by the project activity is exported through a 22 km length high voltage transmission which was built as part of the project activity and connects the project's electricity generation component to a power substation (operated and maintained by the local electricity transmission/distribution company named Companhia Estadual de Distribuição de Energia Elétrica – CEEE-D) located in the region

		of the project site.
	Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD [/2/], continuous measurements of $EC_{BI,y}$ are to be recorded and reported at least with an every month frequency. The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" [/13/], and ACM0001 [/7/] do not clearly indicate recording and reporting frequencies for continuous measurements for the parameter $EC_{BL,y}$. Thus, the adopted measuring, recording and reporting frequencies are assumed as in accordance with the monitoring plan of the registered PDD [/2/], the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" [/13/] and ACM0001 [/7/].
	Type of monitoring equipment/instrument:	Electricity generated by the project activity during the considered monitoring period was measured by a bi-directional electricity meter located in the power substation that the project's electricity generation facility is connected to. The specifications of the installed bi-directional electricity meter are as follows: Specifications of installed electricity meter Manufacturer: Schneider Electric Model: 8650 Serial Number (S/N): RSARELUBREC01P Accuracy: ±0.2% Source: [/86/]
	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	The registered PDD [/2/], the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" [/13/] and ACM0001 [/7/] do not specify any accuracy requirement for the electricity meter installed. The accuracy range for the installed instruments is ±0.2%. Based on its sectoral expertise and experience with other similar project-based initiative under the CDM (promoting collection and destruction and/or utilization of LFG), it is EPIC opinion that the use of the installed instrument represents good practice for monitoring of generation of electricity by the project activity.
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	Under conformance with paragraph 374 (b) of the CDM-VVS-PA version 02.0 [/1/], records of net electricity generated by the project activity and exported to the National Electricity Grid of Brazil during the considered monitoring period, as reported in the summarized emission reduction calculation spreadsheet [/5/] and Monitoring Report [/3/], were cross-checked (compared) against values reported in issued monthly receipts of commercialization of

		electricity generated by the project activity which were issued by Biotérmica Energia S.A. /103/ [12] and are valid for the considered monitoring period. Such set of monthly electricity commercialization receipts was made available to the EPIC verification team and the content of each electricity commercialization receipt was assessed. The performed cross-checking allowed the EPIC verification team to confirm the correctness of all reported data for EC_{BLy} valid for the considered monitoring period.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	The EPIC verification team has confirmed that values for the monitoring parameter $EC_{BL,y}$ as reported in the summarized emission reduction calculation spreadsheet /5/ and Monitoring Report /3/ are in accordance with primary monitoring records /92/ reported every hour.
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section. .

[12] As appropriately outlined in the Monitoring Report, the company/enterprise Biotérmica Energia S.A. was established with the goal of implementing and operating such project's electricity generation infrastructure. While playing the role of an Independent Power Producer (IPP) within the Brazilian electricity market, besides of being currently responsible for the day-to-day operation of the project's electricity generation infrastructure + commercialization of generated electricity. Like the host-country project participant and project owner CRVR S.A, Biotérmica Energia S.A. is mostly owned by Solvi Group (www.solvi.com).

As explained to the EPIC verification team by the interviewed representatives of the project participant Companhia Riograndense de Valorização de Resíduos S/A and outlined in the Monitoring Report /2/, Biotérmica Energia S.A. is remunerated for net electricity generated by the project activity (electricity exported through the National Electricity Grid of Brazil) on the basis of power purchase agreements (PPAs) that were previously established with large scale grid-connected electricity consumers under the currently valid rules and procedures of the Free Contracting Environment (FCE) for the Brazilian electricity trading market. Besides of commercializing electricity under the FCE power trading market, as part of its developed power commercialization strategy, Biotérmica Energia S.A. has also sold minor share of generated electricity under the so-called short-term market for electricity (under variable spot prices that are weekly calculated based the system marginal operational cost for the four existent power sub-markets in Brazil (South, Southeast, North, Northeast)). Under FCE, power generation agents are free to establish bilateral contractual agreements with electricity consumers, defining prices, quantities, durations and hedge clauses of electricity commercialization deals. As per the current rules of the Brazilian power market, IPPs are allowed to sell electric power within the two environments (RCE and FCE), maintaining their competitive nature of the generation. Further details about the Brazilian power market are available at the peer-reviewed paper titled "The Brazilian Electricity Model: An Overview of the Current Structure and Market Design" (available online: https://www.researchgate.net/publication/228701847_The_Brazilian_Electricity_Model_An_Overview_of_the_Current_Structure_and_Market_Design) /104/.

Assessment details for the monitoring parameter "Operation margin CO_2 emission factor in year = Dispatch data analysis operating margin CO_2 emission factor in year y" ($EF_{grid,OM,y} = EF_{grid,OM-DD,y}$)

Data / Parameter: (as per the monitoring plan of the PDD):	Operation margin CO_2 emission factor in year *y* = Dispatch data analysis operating margin CO_2 emission factor in year *y* ($EF_{grid,OM,y} = EF_{grid,OM-DD,y}$)
Measuring, recording and reporting frequencies:	Not applicable. The selected value for $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ is the calculated average annual value valid for year 2020 as officially published by the DNA of Brazil /61/.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Not applicable. There are no measurements or measurement instruments/equipment involved for the definition of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$. As established in The registered PDD /2/, the ex-post calculated value for $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ (as officially published by the DNA of Brazil) is considered.
Type of monitoring equipment/instrument:	Not applicable. There are no measurements or measurement instruments/equipment involved for the definition of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$.
Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	Not applicable. There are no measurements or measurement instruments/equipment involved for the definition of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$.
If applicable, has the reported monitoring data been cross-checked with other available data or source?	Not applicable. The selected value is the calculated average annual value valid for year 2020 as published by the DNA of Brazil /61/.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	As confirmed by the EPIC verification team, the DNA of Brazil has regularly calculated values of $EF_{grid,OM,y}$ for the National Electricity Grid of Brazil by applying classified information and data on dispatch of electricity by grid-connected power plants within the National Electricity Grid of Brazil and by following calculation guidance applicable for "Dispatch data analysis operating margin CO_2 emission factor" ($EF_{grid,OM-DD,y}$) (based on dispatch merit order data for grid-connected power plants) as established by the methodological tool "Tool to calculate the emission factor for an electricity system" (version 04.0) /17/.

	Related clarifications and details for the determination of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ by the DNA of Brazil are made available at a specific section of the website of the DNA of Brazil /61/. Information made available in the website of the DNA of Brazil /61/ confirms the correctness of the selected value for $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$. The EPIC verification team also confirmed as part of its performed assessment that *ex-post* determined values for $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ on the basis of information officially published by the DNA of Brazil /61/ have been selected and applied for the determination of both baseline and project emissions related to electricity generation and consumption respectively in CDM projects hosted in Brazil with full acceptance both from the DOEs involved in the assessments and from the CDM-EB. The selected 2020 vintage value for the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ (0.4539 tCO_2/MWh) was confirmed by the EPIC verification to correctly represent the official value for $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ for year 2020 as published by the DNA of Brazil /61/. In summary, it is EPIC opinion that the selection and reporting of the value for the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ is deemed correct and acceptable.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable. There are no measurements or measurement instruments/equipment involved for the definition of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$.

Assessment details for the monitoring parameter "Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility)" ($Op_{j,h}$)

Data / Parameter: (as per the monitoring plan of the PDD):	Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$)
Measuring, recording and reporting frequencies:	During the considered monitoring period, the operational status of each one of the 6 engine-generator sets were recorded and reported every-minute on the basis of continuous measurements of the operational status of each engine-generator set (on the basis of the sub

		parameters $Op_{genset-1,y}$,. $Op_{genset-2,y}$, $Op_{genset-3,y}$, $Op_{genset-4,y}$, $Op_{genset-5,y}$, $Op_{genset-6,y}$). As confirmed by the EPIC verification team through assessment of the monthly emission reduction calculation spreadsheets /5/ valid for the considered monitoring period, for every minute *m* that a particular engine-generator set was operational, the operational status for this particular minute is set as 1 (1 = "*on*") for the engine-generator set in question, otherwise the operational status is set to 0 (0 = *off*").
	Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per both the registered PDD /2/ and ACM0001 /7/, the operational status of each engine-generator set shall be recorded once per minute. Thus, the applied measuring, recording and reporting frequencies for $Op_{j,h}$ are thus in accordance with both ACM0001 /7/ and The registered PDD /2/.
	Type of monitoring equipment/instrument:	Not applicable. The operational status the engine-generator sets, as automatically detected by the electronic control system for each engine-generator set based on functional parameters, is sent to the project's control system infrastructure and recorded as monitoring data.
	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	Not applicable. There are no measurements for operation status of the equipment that consumes LFG (engine-generator sets of the electricity generation facility). While the detection of the operational status of the equipment is not based on performance of measurements, no monitoring equipment/instrument is utilized.
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	Not applicable.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	A *data authenticity checking* was performed for all every minute basis measurement records of the following LFG and LFG flaring/utilization related monitoring parameters (incl. sub-parameters) in order to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$,

		$V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) - Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$) - Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) - Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) - Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$) - Flame detection of flare in the minute *m* ($Flame_m$) - Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$). The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheets /5/ include only authentic monitoring records. Details about the performed *data authenticity checking* (which is valid for above-listed LFG and LFG flaring/utilization related monitoring data) are included in the end of this Section.
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are assessed in the end of this Section. Further details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section.

Assessment details for the monitoring parameter "Mass flow of methane in the exhaust gas of the flare(s) on a dry basis at reference conditions in the time period t" ($F_{CH4,EG,t}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Mass flow of methane in the exhaust gas of the flare(s) on a dry basis at reference conditions in the time period *t* ($F_{CH4,EG,t}$)
Measuring, recording and reporting frequencies:	For the considered monitoring period, two valid measurements for the monitoring parameter $F_{CH4,EG,t}$ were performed third party accredited entities. The independent 3rd party inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA. was selected by Biogas Riograndense Ltda. for performing all measurements related to the determination of the biannual values for $F_{CH4,EG,t}$. As outlined in the test/evaluation technical reports /59/ /60/, performance of measurements for the determination of the set of values for $F_{CH4,EG,t}$ valid for the considered monitoring period occurred in the following dates: - Measurements performed on 03/06/2019 and 14/01/2020 by Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD /2/, measurements and calculations for the determination of values for the monitoring parameter $F_{CH4,EG,t}$ are to be performed biannually. As per the applicable guidance of the methodological tool "Project emissions from flaring" /12/ the following is established: "*(…) The two time periods in year y during which the flare efficiency is measured, each a minimum of one hour and separated by at least six months* ". While the considered monitoring period encompasses 62 days, the performed measurements events on 03/06/2019 and 14/01/2020 are deemed correct and the most representatives available.
Type of monitoring equipment/instrument:	As outlined in the Monitoring Report /3/ and in the test/evaluation reports /59/ /60/ issued for the valid performed measurements and calculations for the regular determination of the values of $F_{CH4,EG,t}$, for performing the measurements of amount of residual methane in the exhaust gas of the flare, the following measuring instruments were used: - For performing the measurements of amount of residual methane in the exhaust gas of the flare a

		chromatographer was utilized by both the independent 3rd party inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA. - For determining the speed of exhaust gas in the flare (in order to calculate the flow of exhaust gas of the flare), an appropriated Pitot tube was used by Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA. as part of the measurements. - As per information made available in the technical evaluation/testing report issued by Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA., applicable measurement and test methodologies of U.S.A. Environmental Protection Agency (US-EPA) and CETESB (Companhia Ambiental do Estado de São Paulo (Environmental Agency for São Paulo State in Brazil)) were applied as follows: • US-EPA Method 18 – "Measurement of Gaseous Organic Compound Emission by Gas Chromatography" • CETESB L9.221 - "Pipelines and chimneys in stationary emission sources - Sampling points determination procedure" • CETESB L9.222 - "Pipeline and chimneys in stationary emission sources – Determination of speed and outflow of gases" • CETESB L9.223 – "Pipeline and chimneys in stationary emission sources – Determination of dry molecular mass and the excess of the air flow gas" • CETESB L9.224 - "Pipeline and chimneys in stationary emission sources – "Determination of humidity of effluents"
	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	The registered PDD [/2/] and ACM0001 [/7/] do not specify any equipment or procedural requirement for performing the related measurements and calculations for the determination of values for $F_{CH4,EG,t}$. The methodological tool "Project emissions from flaring" [/12/] establishes that *"(…) under Option B.1 the measurement is conducted by an accredited entity on a biannual basis".* The following disclaimer about the entities that performed the set of measurements for $F_{CH4,EG,t}$ that are valid for the considered monitoring period is appropriately included in Section D.2. of the Monitoring Report [/3/]:

		"Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA. Is an independent third party inspections services company specialized in inspections and testing of air emissions from stationary sources accredited by the Instituto Nacional de Metrologia, Qualidade e Tecnologia (INMETRO) (the Brazilian national authority for metrology and certification affairs), which is responsible for the regulation of operation of inspection entities and labs." In summary, it is the opinion of EPIC that Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA performing related measurements with the chromatographer + an appropriate Pitot tube and following the applicable measurement and test methodologies of the US-EPA and CETESB represents a good practice for the determination of $F_{CH4,EG,t}$. The EPIC verification team has assessed the technical specifications sheet /59/ for the chromatographer and was able to confirm this type of gas analyzer is appropriate for performing gas related analysis and measurements in enclosed high temperature flare. The accreditation certificate for Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA from INMETRO was made available and was assessed by the EPIC verification team /73/ .
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	The related technical test/evaluation reports /59/ /60/ for the performed measurements of $F_{CH4,EG,t}$ issued by the inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA were made available and assessed by the EPIC verification team. Information made available in the Monitoring Report /3/ are in line with measurement details outlined in these technical reports /59/ /60/. As confirmed by the EPIC verification team through review of the technical test/evaluation reports issued by Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA /59/ /60/, guidance and requirements from the US-EPA Method 18 – Measurement of Gaseous Organic Compound Emission by Gas Chromatography were followed and met as part of performed biannual determination of $F_{CH4,EG,t}$ for the installed flare within the considered monitoring period. Based on its sectoral expertise, the EPIC verification team acknowledges that, as appropriately outlined in the Monitoring Report /3/, such method has been widely internationally recognized and/or accepted by different national and international organizations as a standard/method for performance of emission measurements from stationary emission sources

			in a wide range of industries. The EPIC verification team also confirmed that, as also outlined in the Monitoring Report /3/, different agencies in the United States (USA) and in other countries require or recommend that determination of concentration of VOC portion in landfill gas is to be performed by applying US-EPA Method 18. The US-EPA Method 18 was also confirmed by the EPIC verification team as being refereed in the most popular and acknowledged pollution control handbooks and guides (i.e. Pollution Control Handbook for Oil and Gas Engineering, 2016, published by John Wiley & Sons, Inc. – USA, US-EPA Guidance for evaluating landfill gas emissions from closed or abandoned facilities, SEPA Guidance for monitoring landfill gas engine emissions, Pollution Prevention and Abatement Handbook 1998 – The World Bank Group, etc.) as also claimed in the Monitoring Report /3/. The EPIC verification team also confirmed that technical test/evaluation reports issued by Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA /59/ /60/ for the performed biannual determination of $F_{CH4,EG,t}$ for the installed flare within the considered monitoring period also refers to methods recommended by the environmental authority of São Paulo State in Brazil. In summary, the EPIC verification team confirmed that $F_{CH4,EG,t}$ is measured according to an appropriate national or international standard as required by the methodological tool “Project emissions from flaring” /12/ for the application of its Option B.1. It is also important to note that, as outlined in the latest version of the Monitoring Report /3/, the flare efficiency calculation spreadsheet /5/ also includes determination of the average flow of LFG sent to the flare within a 6-month period prior to each one of evaluation assessments performed by the independent 3rd party inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA. The EPIC verification team has confirmed that, as required by the methodological tool “Project emissions from flaring”, such calculated average values of LFG flow sent to the flare within the 6-month period prior to the performance of measurements related to the determination of the biannual values for $F_{CH4,EG,t}$ are lower than the average values of flow of LFG sent to the flare during each 1-hour periods for which the measurements of mass flow of methane in the exhaust gas of the flare were performed as part of the determination of the biannual values for $F_{CH4,EG,t}$. In summary, the EPIC verification team confirmed that the average flow rate to the flare	

	during the period in which measurements for $F_{CH4,EG,t}$ were made are greater than the average flow rate observed for the previous six months as required by the methodological tool "Project emissions from flaring" /12/ for the application of its Option B.1.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	The EPIC verification team compared the results of all measurements and calculations as outlined in the test/evaluation technical reports /59/ /60/ issued by Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA against description of measurements and calculations as presented in the latest version of the Monitoring Report /3/ and spreadsheet including the calculation of flare efficiency values valid for the considered monitoring period /5/.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section.

Assessment details for the monitoring parameter "Saturation pressure of H_2O at temperature T_t in time interval t" ($p_{H2O,t,sat}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Saturation pressure of H_2O at temperature T_t in time interval *t* ($p_{H2O,t,sat}$)
Measuring, recording and reporting frequencies:	The determination of applicable value for the monitoring parameter $p_{H2O,t,sat}$ is not based on measurements. As correctly indicated in the Monitoring Report /3/, $p_{H2O,t,Sat}$ is determined as a function of the LFG temperature (T_t) and it is only used in the context of the determination of the methane mass flow in the residual gas (in a dry basis) for each minute *m* of the two time periods in year *y* during which the flare efficiency is measured (parameter $F_{CH4,RG,t}$).
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Not applicable. The determination of applicable value for the monitoring parameter $p_{H2O,t,sat}$ is not based on measurements.

Type of monitoring equipment/instrument:	Not applicable. The determination of applicable value for the monitoring parameter $p_{H2O,t,sat}$ is not based on measurements.
Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	Not applicable. The determination of applicable value for the monitoring parameter $p_{H2O,t,sat}$ is not based on measurements.
If applicable, has the reported monitoring data been cross-checked with other available data or source?	Not applicable.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	EPIC verification team has confirmed that the values of $p_{H2O,t,sat}$ as reported in the FE calculation spreadsheet /5/ and Monitoring Report /3/ were indeed calculated as per the applicable guidance of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/, which refers to the literature "Fundamentals of Classical Thermodynamics" /72/.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable.

Assessment details for the monitoring parameter "Temperature in the exhaust gas of the enclosed flare in minute m" ($T_{EG,m}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$)
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuous measurements of the monitoring parameter $T_{EG,m}$ were recorded/reported with an every minute frequency. This is deemed correct, acceptable and under conformance with requirements of ACM0001 /7/ and applicable methodological tools.

	Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD [/2/], continuous measurements of the monitoring parameter $T_{EG,m}$ are to be recorded and reported every minute. Moreover, as per the applicable guidance of the methodological tool "Project emissions from flaring" [/12/], (which is applied in accordance ACM0001 [/7/]), values of $T_{EG,m}$ shall be recorded once per minute. Thus, the applied measuring, recording and reporting frequencies for $T_{EG,m}$ are thus in accordance with both ACM0001 [/7/] and the registered PDD [/2/].
	Type of monitoring equipment/instrument:	Measurements of $T_{EG,m}$ are continuously performed by two thermocouples (internal instrument ID. TT-04 and TT-05) located in the upper section of the enclosed high temperature flare which were used simultaneously during the considered monitoring period. As correctly indicated in the monthly emission reduction calculation spreadsheets, in accordance with recommendations from the flare's manufacturer, measurements from the thermocouples TT-04 or TT-05 are considered as follows: - For the time periods when the flare operated within the range from 300 Nm^3/h to 3,000 Nm^3/h, measurements from thermocouple TT-04 were recorded and reported; - For the time periods when the flare operated within the range from 3,000 Nm^3/h to 8,100 Nm^3/h, measurements from thermocouple TT-05 were recorded and reported. Specifications of the thermocouples are summarized below: Specifications of the installed thermocouples Manufacturer: ECIL Met Tec Ltda. Model: ATC-204, type N Serial Number: See footnote [13] Accuracy: ±0.75% Internal instrument/ equipment identification: TT-04 and TT-05 Source: [/62/]

[13] It is noteworthy that, as indicated in the latest version of the Monitoring Report and confirmed by the EPIC verification team through visual inspection of the installed while watching online (and later further assessing/reviewing) the live videos (movies) produced by operational staff of the project activity on 10/05/2021, the two thermocouples which were used during the considered monitoring period to measure the temperature of the exhaust gas of the flare do not have any Serial Number (S/N) or batch number indicated on them. As previously declared by the manufacturer of the thermocouples installed in the Flare (Mr. Moisés Vieira, Ecil Produtos e Sistemas de Medição e Controle Ltda., Laboratory of Metrology), the EPIC verification team confirmed that, as per the applied production practice, no equipment of these series receives Serial Number identification. Based on EPIC sectoral knowledge and experience, it can be confirmed that it is normal industrial practice that thermocouples are not equipped with serial numbers. That sufficiently justifies/explains the fact that in the project site there were identical thermocouples installed and used along the monitoring period and that there was no Serial Number indication.

	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	The registered PDD [12] and ACM0001 [77] do not specify any accuracy requirement for the thermocouples installed at the project site. The accuracy range for the installed instruments is ±0.75%. Based on its sectoral expertise and experience with other similar project-based initiative under the CDM (promoting collection and destruction and/or utilization of LFG), it is EPIC opinion that the use of the installed instruments represents good practice for monitoring of temperature in the exhaust gas of the flare.
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	Not applicable.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Although flare temperature values cannot be read from any display of the installed thermocouples, at the time of the production/watching of the live videos (movies) [64] on 10/05/2021 (of which details are included in Section D.2), it was checked that, while the flare was under operation, the values measured through thermocouples TT-04 and TT-05 displayed on the PLC display could be read and were within the operational range as defined by the manufacturer. Furthermore, a *data authenticity checking* was performed for all every minute basis measurement records of the following LFG and LFG flaring/utilization related monitoring parameters (incl. sub-parameters) in order to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) - Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$) - Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) - Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) - Temperature in the exhaust gas of the

	enclosed flare in minute *m* ($T_{EG,m}$) - Flame detection of flare in the minute *m* ($Flame_m$) - Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$). The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheets /5/ include only authentic monitoring records. Details about the performed *data authenticity checking* (which is valid for above-listed LFG and LFG flaring/utilization related monitoring data) are included in the end of this Section.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are assessed in the end of this Section. Further details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section.

Assessment details for the monitoring parameter "Flame detection of flare in the minute m" ($Flame_m$):

Data / Parameter: (as per the monitoring plan of the PDD):	Flame detection of flare in the minute *m* ($Flame_m$)
Measuring, recording and reporting frequencies:	During the considered monitoring period, the operational status of the flare was recorded and reported every-minute on the basis of continuous measurements of the status of flame in the flare. As confirmed by the EPIC verification team through assessment of the monthly emission reduction calculation spreadsheets /5/, for every minute *m* during which flame was detected in the flare, the flame status of the flare for each minute is set as 1 (1 = Flame "*on*"), otherwise the flame status of the flare for the given minute is set to 0 (0 = Flame "*off*").

	Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per both the registered PDD [2] and the methodological tool "Project emissions from flaring" [12], (which is applied in accordance to ACM0001 [7]), the operational status of the flare shall be recorded once per minute. Thus, the applied measuring, recording and reporting frequencies for $Flame_m$ are thus in accordance with both ACM0001 [7] and the registered PDD [2].
	Type of monitoring equipment/instrument:	Monitoring of the operational status of the flare is performed by an installed UV flame detector with the following specifications: Specifications of the UV Flame detector installed on the flare Manufacturer: Honeywell Analytics Ltd. Model: C7061A Dynamic Self-Check Ultra-Violet Flame Detector Serial Number: 10371 Internal instrument/ equipment identification: UV-01 Source: [41]
	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	Not applicable. There are no measured values for Flame detection of flare in the minute *m*.
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	Not applicable.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	A *data authenticity checking* was performed for all every minute basis measurement records of the following LFG and LFG flaring/utilization related monitoring parameters (incl. sub-parameters) in order to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) - Volumetric fraction of CH_4 in the

	collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$) - Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) - Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) - Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$) - Flame detection of flare in the minute *m* ($Flame_m$) - Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$). The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheets /5/ include only authentic monitoring records. Details about the performed *data authenticity checking* (which is valid for above-listed LFG and LFG flaring/utilization related monitoring data) are included in the end of this Section.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are assessed in the end of this Section. Further details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section.

Assessment details for the monitoring parameter "Maintenance events completed in year y as monitored by the project participants" ($Maintenance_y$):

Data / Parameter: (as per the monitoring plan of the PDD):	Maintenance events completed in year *y* as monitored by the project participants ($Maintenance_y$)

	Measuring, recording and reporting frequencies:	As per the implemented monitoring procedure adopted at Biogas Riograndense Ltda., all the maintenance events performed at the project site are registered by the staff of the project participant and project operator Biogas Riograndense Ltda. in a customized maintenance log book (with details about historical of performed interventions (repair, maintenance and calibration services) /24/. As established in the registered PDD /2/, the latest version of the Monitoring Report /3/ summarizes the maintenance events (inspection and maintenance services) that were performed in the installed flare which are valid for the considered monitoring period (dated 01/08/2019, 10/01/2020 and 16/04/2020). The performed maintenance events encompass general inspection/maintenance services (incl. inspection of the condition of the flare isolation ceramics revetment material, checking of conditions of the LPG supply valve for pilot flame, checking of condition/function of the air inlet dumpers, checking of the conditions of the thermocouples, checking of the condition of the UV flame detector, checking of the condition of the flame arrester valve, checking of the conditions of the LFG injectors, checking of painting conditions). As also appropriately outlined in the Monitoring Report /3/, general inspection/maintenance services on the flare are opportunely performed during planned or unplanned interruptions of operation of the flare. Moreover, as also highlighted in the Monitoring Report, the isolation ceramics revetment material of the flare was replaced in October/2014 and more recently on April/2018. As indicated in the registered PDD /2/, the expected lifetime for the isolation ceramics revetment material for the flare is of at least 10 years (as established in details for the ex-ante determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$)).
	Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per both the registered PDD /2/ and the methodological tool "Project emissions from flaring" /12/, (which is applied in accordance to ACM0001 /7/), monitoring of the parameter $Maintenance_y$ is to be performed annually. Thus, the applied monitoring frequency for the parameter (with maintenance events being registered at the date when the event is performed) is thus in accordance with both ACM0001 /7/ and the registered PDD /2/.
	Type of monitoring equipment/instrument:	Not applicable. There are no measurements involved in the monitoring of $Maintenance_y$.

Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	Not applicable. There are no measurements involved in the monitoring of $Maintenance_y$.
If applicable, has the reported monitoring data been cross-checked with other available data or source?	Yes. The EPIC verification team compared details included in the Monitoring Report /3/ for the monitoring parameter $Maintenance_y$ against all available documented evidences for performed maintenance services at the flare installed as part of the project activity (incl. log book with details about historical of performed interventions (repair, maintenance and calibration services) at the flare /24/).
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Not applicable. While all performed maintenance events in the installed flare (including inspection and/or replacement of flare revetment material) are performed in accordance with requirements established in details for the ex-ante determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$), the determination of emission reductions achieved by the project activity during the considered monitoring period are thus not negatively impacted by the records for the monitoring parameter $Maintenance_y$.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable.

Assessment details for the monitoring parameter "Quantity of LPG consumed by the project activity in year y" ($FC_{LPG,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Quantity of LPG consumed by the project activity in year *y* ($FC_{LPG,y}$)
Measuring, recording and reporting frequencies:	Measurements of $FC_{LPG,y}$ are performed by the local LPG distribution company Liquigás Distribuidora S.A. as part of each LPG delivery event.

	Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD [/2/], continuous measurements of $FC_{LPG,y}$ are to be monitored with a frequency not lower than once a month.
	Type of monitoring equipment/instrument:	Monitoring records for $FC_{LPG,y}$ were measured by a weight scale with the specifications provided below. Specifications of the weight scale used for measuring LPG mass Manufacturer: Mettler-Toledo Inc. Model: IND560 Serial Number: 10734698 Capacity: Max. 250 kg Accuracy: ±13 grams Source: [/50/]
	Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	The registered PDD [/2/] and ACM0001 [/7/] do not specify any measurement requirement for monitoring consumption of LPG. The accuracy for the installed scale is ±13 grams. It is EPIC opinion that the use of this kind of weight scale represents good practice for measuring consumption of LPG by the project activity.
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	EPIC verification team has compared the records of LPG delivered to the CRR landfill as reported in the summarized emission reduction calculation spreadsheet [/5/] and Monitoring Report [/3/] against a declaration/communication [/48/] issued by the local LPG distribution company Liquigás Distribuidora S.A. confirming that no LPG was supplied to Biogas Riograndense Ltda. during the period from January2020 to March/2020.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	EPIC verification team has confirmed that values for $FC_{LPG,y}$ as reported in the summarized emission reduction calculation spreadsheet [/5/] and Monitoring Report [/3/] are in accordance with provided evidences of primary records [/48/].
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be	Details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section.

used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	

Assessment details for the monitoring parameter "Net calorific value of the fuel LPG in year y" ($NCV_{LPG,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Net calorific value of the fuel LPG in year *y* ($NCV_{LPG,y}$)
Measuring, recording and reporting frequencies:	Not applicable. The selected value for $NCV_{LPG,y}$ (46.5 GJ/ton_{LPG}) corresponds to the National default value as per the Brazilian National Energetic Balance Report for year 2020 (Balanço Energético Nacional (BEN) – 2020) / Table VIII.9 – Specific Mass and Heating Values (Higher Heating Value) /65/. The determination of $NCV_{LPG,y}$ is also in accordance with applicable guidance of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /15/. No measurement or calculation was performed in the context of the determination of the parameter and no monitoring equipment/instrument was used either.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD /2/, "*(…) In case regional or national default values or IPCC default values are considered an every year monitoring frequency is applied."* The adopted monitoring frequency (annual national default value) is thus in accordance with the registered PDD /2/.
Type of monitoring equipment/instrument:	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
If applicable, has the reported monitoring data been cross-checked with other available data or source?	In order to confirm that the selected value for $NCV_{LPG,y}$ indeed corresponds to the value as per the default values published in the Brazilian Energetic Balance Report 2020 /65/, EPIC verification team assessed this report. Moreover, as part of its verification assessment, the EPIC verification team also confirms that the determination of $NCV_{LPG,y}$ is indeed in

		accordance with applicable guidance of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /15/. Moreover, EPIC has also confirmed that the reported value is within the uncertainty range of the IPCC default value (as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines /11/).
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	See above.
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable.

Assessment details for the monitoring parameter "CO_2 emission factor of fuel LPG in year y" ($EF_{CO2,LPG,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	CO_2 emission factor of fuel LPG in year *y* ($EF_{CO2,LPG,y}$)
Measuring, recording and reporting frequencies:	Not applicable. The value for the monitoring parameter $EF_{CO2,LPG,y}$ is selected as 0.0656 tCO_2/GJ which corresponds to the default value as per the IPCC Guidelines for National Greenhouse Gas Inventories, 2006 (IPCC, 2006), Chapter 1, Volume 2, Table 1.4 (value at the upper limit of the uncertainty at 95% confidence interval) /11/. The determination of $EF_{CO2,LPG,y}$ is in accordance with applicable guidance of the Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /15/. No measurement or calculation was performed in the context of the determination of the parameter $EF_{CO2,LPG,y}$ and no monitoring equipment/instrument was used either.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	The following is outlined in the registered PDD /2/: "*(…) In case regional or national default values or IPCC default values are considered an every year monitoring frequency is applied."* The adopted monitoring frequency (annual IPCC default value) is thus in accordance with the registered PDD /2/.

Type of monitoring equipment/instrument:	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument represents good monitoring practice?	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
If applicable, has the reported monitoring data been cross-checked with other available data or source?	In order to confirm that the selected value for $EF_{CO2,LPG,y}$ indeed corresponds to the default value as per the IPCC Guidelines for National Greenhouse Gas Inventories, 2006, Volume 2, Chapter 1, Table 1.4 /11/ (value at the upper limit of the uncertainty at 95% confidence interval), the EPIC Assessment Team assessed these IPCC guidelines. Moreover, as part of its verification assessment, the EPIC verification team also confirms that the determination of $EF_{CO2,LPG,y}$ is indeed in accordance with applicable guidance of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /15/.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	See above.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable.

Assessment details for the monitoring parameter "Quantity of electricity generated in captive diesel backup generator during the year y" ($EC_{PJ,captive,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Quantity of electricity generated in captive diesel backup generator during the year *y* ($EC_{PJ,captive,y}$)
Measuring, recording and reporting frequencies:	Measurements of electricity generated by the backup off-grid electricity generator (fuelled by Diesel) have been continuously measured by electricity meters, where continuous measurements have been recorded and reported with an every-month frequency.
Are measuring, recording and reporting frequencies in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PDD /2/, continuous measurements of $EC_{PJ,captive,y}$ are to be recorded and reported at least with an every month frequency. The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /13/, and ACM0001 /7/ do not clearly indicate recording and reporting frequencies for continuous measurements for the parameter $EC_{PJ,captive,y}$. Thus, the adopted measuring, recording and reporting frequencies are assumed as in accordance with the monitoring plan of the registered PDD /2/, the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /13/ and ACM0001 /7/.
Type of monitoring equipment/instrument:	Measurements of $EC_{PJ,captive,y}$ have been continuously measured by an electricity meter installed in the project site. While 2 meters are installed (main and backup) for monitoring this parameter, the highest accumulated value from the meters is considered for the determination of related project emissions. The specifications of the installed electricity meters are summarized below: Specifications of the installed electricity meter Manufacturer: Ello Sistemas Eletrônicos S/A Model: 2106 Serial Numbers: 00008150 and 00045288 Accuracy: ±1% Source: /85/
Is the accuracy of the monitoring equipment/instrument as stated in the PDD? If the registered PDD does not specify the accuracy of the monitoring equipment/instrument, does the utilization of the monitoring equipment/instrument	The registered PDD /2/ and ACM0001 /7/ do not specify any accuracy requirement for the electricity meters installed at the project site. The accuracy range for the installed instruments is ±1.0%. It is EPIC contention that the use of the installed instruments represents good practice for monitoring of temperature in the exhaust gas of the flare.

	represents good monitoring practice?	
	If applicable, has the reported monitoring data been cross-checked with other available data or source?	Under conformance with paragraph 374 (b) of the CDM-VVS-PA /1/, reported monthly records of amount of electricity generated by the installed backup captive electricity generator (fuelled by Diesel) (which was consumed by the project activity during the considered monitoring period) were cross-checked (compared) against available records of the amount of Diesel fuel purchased which was filled in the fuel tank of the captive electricity generator (as per data made available in assessed service and maintenance log books for both the project's LFG flaring facility and electricity generation facility /24/) with values for power generation capacity (0.144 MW) and technical specific fuel consumption (35 liters/hour with engine under full load) of the installed backup captive diesel generator being considered in the cross-checking. These values were confirmed by the EPIC verification team as indicated in assessed specification sheet published by the manufacturer of the installed captive electricity generator /104/. The performed cross-checking allowed the EPIC verification team to confirm the correctness of all reported data for $EC_{PJ,captive,y}$ valid for the considered monitoring period vis-à-vis available fuel use records.
	How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	The EPIC verification team has confirmed that values for the monitoring parameter $EC_{PJ,captive,y}$ as reported in the summarized emission reduction calculation spreadsheet /5/ and Monitoring Report /3/ are as per the primary monitoring records.
	Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Details for monitoring management and quality assurance related aspects for the project activity are also included in the end of this Section.

It is important to note that the monitoring plan of the registered PDD /2/ also includes the following monitoring parameters of which monitoring was not required during the considered monitoring period since the methodological options for which they are applicable were not selected during the considered monitoring period[14].

[14] While Option C of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" was selected for the determination of $F_{CH4,flared,y}$ during the considered monitoring period, it is important to note the following:

- $V_{t,db}$ was not monitored as Option A of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" was not selected.

Parameter not monitored during the considered monitoring period
Volumetric flow of LFG stream in time interval *t* on a dry basis on a dry basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($V_{t,db,j}$)
Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a dry basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($v_{CH4,t,db,j}$)
Mass flow of the LFG stream in time interval *t* on dry basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($M_{t,db,j}$)
Quantity of fuel Diesel combusted by the captive off-grid electricity generator ($FC_{Diesel,y}$)
Net calorific value of the fuel Diesel in year *y* ($NCV_{Diesel,y}$)
CO_2 emission factor of fuel Diesel in year *y* ($EF_{CO2,Diesel,y}$)
Quantity of electricity generated in captive diesel backup generator during the year *y* ($EG_{Diesel-Generator,y}$)

Moreover, as also correctly outlined in the Monitoring Report, while as per ACM0001 the monitoring parameters "Tariff of the electricity exported" (Tariff of electricity exported) and "Total investment to implement the project and total cost to operate the project" (CAPEX and OPEX) (which are also included in the monitoring plan of the registered PDD) are to be monitored only at the first issuance request after each phase of the project activity is fully implemented and by also considering that both parameters were monitored in the previous 9th periodic verification for the project activity (which was the first monitoring period after the implementation of the project's electricity generation infrastructure), monitoring of Tariff of electricity exported and CAPEX and OPEX is no longer necessary (since there are no other phases of the project activity to be implemented).

Handling of records for both parameters monitored ex-post and ex-ante determined parameters in the context of determination of achieved emission reductions:
During the considered monitoring period, as part of the applied monitoring procedure, measurements for the following monitoring parameters were automatically processed and recorded by the installed data acquisition/archiving solution (database) that is designed and configured by Biotecnogas S.r.l. (with reporting frequency of 1 minute):

- Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$)
- Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$),
- Temperature of the LFG stream in time interval *t* (T_t),
- Pressure of the LFG stream in time interval *t* (P_t),
- Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$)
- Flame detection of flare in the minute *m* ($Flame_m$)
- Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$)

- $v_{CH4,t,db}$ was not monitored as Options A and D of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" was not selected.
- $M_{t,db}$ was not monitored as Option D of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" was not selected.

As confirmed by the EPIC verification team, as per the project's working procedure in place during the considered monitoring period, monitoring data recorded in the available data acquisition/archiving solution (database) that is designed and configured by Biotecnogas S.r.l cannot be edited and can anytime read/retrieve data by using the data export function of the solution.

EPIC was able to verify that during the whole considered monitoring period, reliable and robust monitoring mechanisms were established, implemented and were followed by Biogas Riograndense Ltda. It is EPIC opinion that the use of the data acquisition/archiving solution (database) designed and configured by Biotecnogas S.r.l. for recording monitoring details for the project activity represents good practice in terms of data acquisition and data archiving.

Data transmission, data export/conversion and creation of "raw data" input files for the emission reduction calculations:

As part of the currently applied monitoring procedure and in place during the considered monitoring period, all monitoring data recorded in the installed data acquisition/archiving solution (database) designed and configured by Biotecnogas S.r.l. is regularly and directly transferred (exported) in MS-Excel format via utilization of the data export function of the database solution.

On a daily basis, monitoring data stored at the installed data acquisition/archiving solution (database) is retrieved/exported into MS-Excel format by the monitoring manager for the project activity through the application of the data export functionality of the database user interface. Such daily data is monthly aggregated for generating the MS-Excel "raw-data" data monthly files /6/ (which are used as input data for the monthly emission reductions calculation spreadsheets that are enclosed to the Monitoring Reports). EPIC was able to confirm that during the considered monitoring period, all generated MS-Excel format "raw-data" files /6/ (resulted from the aggregation of export of data into monthly MS-Excel format files) were appropriately and correctly used as primary data input for the compilation of the monthly emission reduction calculations with monitoring data as follows:

Period	File Names
January/2020	*"Jan.2020"*
February/2020	*"Feb.2020"*
March/2020 (from 01/03/2020 to 02/03/2020)	*"Mar.2020"*

As per the implemented monitoring procedure, 3 individual MS-Excel format data files (resulted from performed aggregation of daily data exports from the installed data acquisition/archiving solution (database) into monthly spreadsheet) were generated for the considered monitoring period.

These MS-Excel-format "raw data" files /6/ were made available and assessed by EPIC verification team. The raw data files contain a date and time stamp for every minute, and the related monitoring records for LFG flow, LFG pressure, LFG temperature, Flare temperature, flame detection of the flare, operational status of the engine-generator sets and CH_4 content of LFG, which are all used for the calculation of GHG emission reductions.

As verified by EPIC, the number of records for each MS-Excel format "raw-data" spreadsheet file exceeds 40,000 rows in the case of a full month (e.g. 28 days * 24 hours * 60 minutes = 40,320 entries). It is crucial to note that when generating such files in MS-Excel format, data could be eventually intentionally or unintentionally edited/modified. Thus, in order to ensure that only authentic (not edited /not modified) "raw data" were used as a basis for the emission reduction calculations, a systematic *data authenticity checking* was performed by the EPIC verification team for all the monitored data as described and assessed below in the sub-

section "*Data authenticity checking*".

As per the adopted monitoring procedure and in accordance with the requirements of ACM0001 /7/ and related provisions of the registered PDD, GHG emission reductions are calculated based on measurement records and selected default values of the *ex-post* monitored parameters (of which monitoring details are presented in the tables above) and also using the values for the ex-ante determined parameters presented in Section E.6.1.

Baseline emissions for the monitoring period were partially calculated through application of the *blank* version of the spreadsheet template that is developed by the project participant Biogas Riograndense Ltda. and termed "monthly emission reduction calculation spreadsheet template" /23/. This calculation spreadsheet template uses the following data/information as input data for the determination of every-minute and accumulated monthly values for the calculation parameters "Amount of methane in the LFG which is flared and/or used in the project activity" ($F_{CH4,PJ,y}$) and "Amount of methane in the LFG that would be flared in the baseline scenario (absence of project activity)" ($F_{CH4,BL,y}$):

- Monitoring records included in the MS-Excel format "raw-data" spreadsheet files /6/ valid for the monitoring period

- the *ex-ante* determined parameters presented in Sectio E.6.1.

It is noteworthy that the calculations for the determination of the applicable values for the monitoring parameter Flare efficiency ($\eta_{flare,calc,y}$) are performed in a separate calculation spreadsheet termed "*FE calculation spreadsheet*" (file name "*MR 19 - Recreio - V.2 - FE.xlsx"*/5/). Further assessment for the determination of $\eta_{flare,calc,m}$ is presented on Section E.8.1.

For the considered monitoring period from 01/01/2020 to 02/03/2020, 3 monthly calculation spreadsheets /5/ were thus generated as a result of the use of the spreadsheet template for the months within the period from January/2020 to March/2020. The elaborated monthly emission reduction calculation spreadsheet files /5/ aggregates (reports) the following recorded monitoring data on an every-minute recording/reporting frequency (folder "Output"):

- Volumetric flow of LFG stream in time interval *t* on a wet basis ($V_{t,wb,j}$) (sub-parameters $V_{t,wb,flare}$, $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$)

- Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis ($v_{CH4,t,wb}$)

- Temperature of the LFG stream in time interval *t* (T_t) (sub-parameters T_{tflare}, $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$)

- Pressure of the LFG stream in time interval *t* (P_t) (sub-parameters P_{tflare}, $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$)

- Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$)

- Flame detection of flare in the minute *m* ($Flame_m$)

- Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$) (sub-parameters $Op_{genset-1,h,y}$, $Op_{genset-2,h,y}$, $Op_{genset-3,h,y}$, $Op_{genset-4,h,y}$, $Op_{genset-5,h,y}$, $Op_{genset-6,h,y}$).

An additional calculation spreadsheet (termed "Summarized emission reduction calculation spreadsheet") (file name "*MR 19 - Recreio - V.2.xlsx"*) /5/ correctly summarizes the achieved baseline emissions due to destruction of methane by the project activity during the considered monitoring period. Moreover, such summarized spreadsheet /5/ also calculates baseline emissions from the

	displacement of the equivalent amount of electricity generated by the project activity (which would otherwise be generated by existing grid-connected power plants, including fossil-fuel fired power plants (and addition of new power generation units) within the National Electricity Grid of Brazil). Further assessment details about the calculation of baseline emissions are included in Section E.8.1. Project emissions due to consumption of LPG, grid-sourced electricity and electricity generated by the installed backup off-grid electricity generator (fuelled by diesel) by the project activity are also calculated in the summarized emission reduction calculation spreadsheet /5/ on the basis of monitoring records (input data) for (i) monitoring parameters that are not automatically recorded/reported by the project's PLC unit (Amount of grid electricity consumed by the project activity in the year *y* ($EC_{PJ,y}$), Operation margin CO_2 emission factor in year *y* = Dispatch data analysis operating margin CO_2 emission factor in year *y* ($EF_{grid,OM,y} = EF_{grid,OM-DD,y}$), Quantity of LPG consumed by the project activity in year *y* ($FC_{LPG,y}$), Net calorific value of the fuel LPG ($NCV_{LPG,y}$), CO_2 emission factor of fuel LPG in year *y* ($EF_{CO2,LPG,y}$) and Quantity of electricity generated in captive backup generator during the year *y*) and (ii) related *ex-ante* determined parameters (Average technical transmission and distribution losses for providing electricity to the grid and/or for grid sourced electricity consumed by the project activity ($TDL_{grid,y}$), Weighting of build margin emissions factor (w_{BM}), Weighting of operating margin emissions factor (w_{OM}), Build margin CO_2 emission factor in year *y* ($EF_{grid,BM,y}$), Average technical transmission and distribution losses for electricity sourced by the captive electricity generator ($TDL_{captive,y}$) and CO_2 emission factor for electricity sourced by the captive off-grid electricity generators ($EF_{EL,captive,y}$)). Further assessment details about the calculation of project emissions are included in Section E.8.2. The MS-Excel-format monthly emission reduction calculation spreadsheet files /5/ and the summarized emission reduction calculation spreadsheet /5/ were made available and assessed by the EPIC verification team. In summary, the EPIC verification team was able to confirm that calculations of baseline emissions and project emissions were correctly performed as per the formulae and methods stated in the registered PDD /2/, monitoring methodology and applicable tools /12/ /13/ /14/ /15/ as described and assessed in Section E.8. All calculations are thus confirmed by the EPIC verification team to be under conformance with applicable requirements from: - CDM baseline and monitoring methodology ACM0001 – "Flaring or use of landfill gas" (version 15.0) /7/, - "Tool to calculate baseline, project and/or leakage CO_2 emissions from fossil fuel combustion" (version 02) /15/, - "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01) /13/, - "Tool to calculate the emission factor for an electricity system" (version 04.0) /17/, - "Project emissions from flaring" (version 02.0.0) /12/, - "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) /14/, - Monitoring plan of the registered PDD /2/. The table below presents the reported results of the generated monthly emission reduction spreadsheets and the summarized emission reduction calculation spreadsheet:

File name for the monthly emission reduction calculation spreadsheets	Period	Reported amount of methane flared ($F_{CH4,PJ,v}$)
"202001.xlsx"	01/01/2020 to 31/01/2020	1,177 tCH_4
"202002.xlsx"	01/02/2020 to 29/02/2020	1,005 tCH_4
"202003.xlsx"	01/03/2020 to 02/03/2020	72 tCH_4
"MR 19 - Recreio - V.2.xlsx" (Summarized emission reduction calculation spreadsheet for the whole monitoring period)	From 01/01/2020 to 02/03/2020	2,254 tCH_4

Monitoring Management and Quality Assurance:
The EPIC verification team was able to confirm that robust quality control and quality assurance (QA/QC) procedures are implemented by the project participant and project operator Biogas Riograndense Ltda. for preventing or identifying and correct eventual errors or omissions in the reported monitoring parameters.

As verified by the EPIC verification team, competent and sufficiently trained staff are recruited for operating the project activity and handling related monitoring data. Such employees are found with knowledge not only about the operation of the project activity, but also with sufficient knowledge and competence to ensure the application of all related QA/QC procedures for data recording and storage.

Furthermore, for the 19th periodic verification, the host-country project participant and project operator Biogas Riograndense Ltda. was also supported with consultancy and advisory services in CDM and LFG management related issues by the consultancy service company named UniCarbo Energia e Biogás Ltda. As confirmed by the EPIC verification team, the technical team from UniCarbo Energia e Biogás Ltda. has contributed for the development of related documentation (e.g. Monitoring Report /3/ and emission reduction calculation spreadsheets /5/) and also supported Biogas Riograndense Ltda. for addressing all raised outstanding issues (raised CARs).

As also assessed by the EPIC verification team, the project activity has been operated by sufficiently trained staff by correctly following guidance and instructions of internal documented working procedures and with high quality technical support from external CDM and LFG management consultants.

As confirmed by the EPIC verification team, the applied procedures for data collection, data reporting, performance of calibration events and other aspects related to the applied procedures for determining the emission reductions are systematically implemented and have been appropriately followed by the host-country project participant and project operator Biogas Riograndense Ltda. While watching online (and later further assessing/reviewing (re-watching)) the produced live videos (movies) /64/ (of which details are included in Section D.2), the EPIC verification team was also able to verify that the operational structure of the project activity is also in line with the information made available in the registered PDD /2/ and in the Monitoring Report /3/.

In summary, EPIC was also able to verify that detailed management and operational work procedures are in place and confirmed that an operational structure for the project activity is established with responsibilities clearly identified. Moreover, trained staff is employed to ensure data quality.

Data authenticity checking:

As part of the performed verification assessment, the EPIC verification team was able to confirm that the monthly emission reduction calculation spreadsheets /5/ completed by Biogas Riograndense Ltda. are basically an MS-Excel spreadsheet that, in theory, could have recorded data being easily edited/modified (intentionally or unintentionally). Thus, these spreadsheets, if inappropriately edited, could potentially tamper reported monitoring records, thus resulting in unreal and/or incorrect calculation and reporting of emission reductions achieved by the project activity during the considered monitoring period. In order to ensure that all emission reductions calculations are entirely and correctly based on authentic and real monitoring records valid for the considered monitoring period, a *data authenticity check* was performed as part of the verification assessment.

Such checking aimed to ensure that only authentic and unmodified monitoring data records were used by the host-country project participant Biogas Riograndense Ltda. for performing the emission reduction calculation for the considered monitoring period (thus ensuring that measurement records made available in the MS-Excel format "raw data" input files /6/ and measurement records reported in the monthly emission reduction spreadsheets were not intentionally or unintentionally edited/modified during the generation or handling of these files).

The performed *data authenticity check* involved the following steps:

STEP 1: Assessment and handling of exports of monitoring data into MS-Excel format from the installed data acquisition/archiving solution (database) designed and configured by Biotecnogas S.r.l.
As part of the implemented data reporting and emission reduction calculation procedures applicable for the 2nd 7-year crediting period of the project activity, one MS-Excel file is generated for every month of the monitoring period by aggregating daily data which are generated as a result of the direct application of the data export function of the installed data acquisition/archiving solution (database) designed and configured by Biotecnogas S.r.l. The EPIC verification team has assessed the daily MS-Excel format files valid for the whole considered monitoring period (which were previously generated as a result of the direct application of the data export function of the installed data acquisition/archiving solution (database) as part of the implemented monitoring procedure at Biogas Riograndense Ltda.) and later aggregated such daily data into monthly MS-Excel format files. As an outcome of STEP 1, new comparative files in MS-Excel format (with primary data inputs from the data acquisition/archiving solution (database) designed and configured by Biotecnogas S.r.l.) were generated. This additional comparative file were termed by the EPIC verification team as "*raw-data for checking*" files /22/.

STEP 2: Re-calculation of emission reductions:
By using the MS-Excel format "*raw-data for checking*" comparative files /22/ (that were generated under STEP 1) as input data, the procedures for emission reductions calculations were reproduced by the EPIC verification team for the considered monitoring period.
The content of the MS-Excel format "*raw-data for checking*" comparative files /22/ was used as input data for the compilation of the comparative monthly emission reduction calculation spreadsheets /21/ by applying a *blank* version of the emission reduction calculation spreadsheet /5/ that was made available by the project participant and was assessed by the EPIC verification team. Moreover, correct values for the applicable *ex-ante* determined parameters were also inserted in the *blank* version of the emission reduction calculation spreadsheet /5/ as input data. As a result of this step, a comparative monthly emission reduction spreadsheet /21/ was thus created.

STEP 3 – Comparison of emission reduction calculation spreadsheets developed by the project participant Biogas Riograndense Ltda. against the created comparative monthly emission reduction spreadsheet and analysis of the results:

	The calculated accumulated monthly values of the parameter $F_{CH4,PJ,y}$ in the created comparative monthly emission reduction spreadsheets /21/ (files generated under STEP 2) were compared against the corresponding accumulated value for the parameter $F_{CH4,PJ,y}$ in the emission reduction spreadsheets /5/ previously created by the project participant Biogas Riograndense Ltda. as part of the monitoring/reporting process applicable for the project activity. As a result of STEP 3, by comparing the file previously generated by the project participant against the file generated by EPIC under STEP 2, the EPIC verification team was able to confirm that the generated comparative monthly checking spreadsheets /21/ is identical to the monthly emission reduction calculation spreadsheets /5/ previously created by the project participants. While no quantitative deviations or differences were identified when comparing the accumulated value for the calculation parameters presented in these files, and by assuming that all data stored in the installed data acquisition/archiving solution (database) designed and configured by Biotecnogas S.r.l. format represent credible and authentic monitoring data; the performed *data authenticity check* thus successfully and sufficiently confirmed that only authentic and not-modified monitored measurement data were previously used by the project participant Biogas Riograndense Ltda. for the calculation of emission reductions as reported in the Monitoring Report /3/.
Findings	One (one) CAR was raised regarding the compliance of monitoring activities valid for the considered monitoring period with monitoring requirements as per the monitoring plan from the registered PDD: **CAR 2:** The Monitoring Report includes incorrect monitoring details for the parameter "Management of SWDS" as monitored by the project participants and valid for the considered monitoring period.
Conclusion	In summary, upon successful closure of the raised related CAR, the EPIC verification team was able to confirm, upon closure of the raised related CARs, that monitoring plan has been implemented in accordance with the monitoring plan. The monitoring mechanism is effective and reliable. The EPIC verification team sufficiently confirmed that: The monitoring plan and the applied methodology had been properly implemented and related monitoring activities have been correctly performed. - The responsibilities and authorities for monitoring and reporting were in accordance with the general responsibilities and authorities for the monitoring plan as outlined in the latest version of the Monitoring Report /3/. - QA/QC procedures are implemented for preventing or identifying and correct eventual errors or omissions in the reported monitoring parameters. - All parameters for which monitoring were required (by taking into account the monitoring approaches and calculation options selected for the considered monitoring period) were sufficiently and appropriately monitored during the considered monitoring period. For each monitored parameter, sufficient details about data generation, aggregation, recording and reporting are included in the latest version of the Monitoring Report /3/).

E.6.3. Implementation of sampling plan

Means of verification	Not applicable[15].
Findings	Not applicable.
Conclusion	Not applicable.

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	The EPIC verification team has assessed whether all monitoring instruments/equipment installed at the project site have operated during the considered monitoring period under full compliance with calibration requirements as per both related provisions from the registered PDD /2/ and recommendations/guidance from the instrument/equipment manufacturers. The following tables include assessment details for calibration events performed on the monitoring instruments/equipment used for performance of measurements monitoring the ex-post determined parameters during the considered monitoring period: *Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Management of the SWDS":*

Data / Parameter: (as per the monitoring plan of the PDD):	Management of the SWDS (Management of SWDS)
Calibration frequency /interval for the monitoring equipment/instrument:	Not applicable. While monitoring of the parameter "Management of the SWDS" is not performed based on measurements, there are no monitoring equipment/instruments utilized. Thus, there are no compliance with applicable calibration frequency/intervals of monitoring equipment/instruments to be assessed.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Not applicable. While monitoring of the parameter Management of the SWDS is not performed based on measurements, there are no monitoring equipment/instruments utilized. Thus, there are no compliance with applicable calibration frequency/intervals of monitoring equipment/instruments to be assessed.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Not applicable. While monitoring of the parameter Management of the SWDS is not performed based on measurements, there are no monitoring equipment/instruments utilized. Thus, there are no compliance with applicable calibration frequency/intervals of monitoring equipment/instruments to be assessed.
Is(are) the performed calibration(s) valid for the whole reporting period?	Not applicable. While monitoring of the parameter Management of the SWDS is not performed based on measurements, there are no monitoring equipment/instruments utilized. Thus, there are no compliance with applicable calibration frequency/intervals of monitoring

[15] As per the monitoring and GHG calculation approaches that are valid for the project activity (as established in the registered PDD and applied CDM baseline and monitoring methodology + applicable methodological tools) no sampling procedure and no sampling-based monitoring are valid/required for the determination of achieved emission reductions. Moreover, as further assessed in Section E.6.2, under *Data authenticity checking*, cross-checking/reproducing all reported LFG and LFG flaring/utilization measurement records valid for the considered monitoring period against the related primary data sources were performed (with all reported related monitoring data being cross-checked/reproduced instead of having selected samples of data being cross-checked/reproduced).

	equipment/instruments to be assessed.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Volumetric flow of LFG stream in time interval t on a wet basis for j (where j is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s))" ($V_{t,wb,j}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Volumetric flow of LFG stream in time interval *t* on a wet basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($V_{t,wb,j}$) (monitored as per Option C of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/).
Calibration frequency /interval for the monitoring equipment/instrument:	As per the implemented monitoring procedure at Biogas Riograndense Ltda. and recommendations from the equipment's manufacturer, the installed LFG flow meter used for measuring LFG flow sent to the flare (sub-parameter $V_{t,wb,flare}$) is calibrated at least once every 18 months by a third party independent accredited calibration laboratory. The pressure signal + data transmission unit of the installed LFG flow meter sets used for measuring LFG flow sent to each engine-generator set (sub-parameters $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$) are calibrated every 2 years. The EPIC verification team was able to confirm that no regular calibration is required for the annubar element of the installed LFG flow meter sets used for measuring LFG flow sent to each engine-generator set (sub-parameters $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$, $V_{t,wb,genset-6}$) as per the equipment manufacturer. Anyhow, as confirmed by the EPIC verification team through assessment of specification sheet for the annubar element /82/, it is recommended a dimensional checking (metrology analysis) in the element every 5 years in order to confirm the dimensional integrity of the instrument (which is an instrumental condition for its proper functioning and accuracy of measurements). *Calibration details for the LFG flow meters used for measuring the sub-parameter $V_{t,wb,flare}$:* For the flow meter with S/N 282572, a valid calibration event was performed on 14/03/2019, as indicated in the Calibration Certificate Number LMH 2262/2019 /49/ issued by Hirsa Sistemas de Automação e Controle Ltda. *Calibration details for the pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-1}$:*

		A valid calibration event was performed on 10/06/2019, as indicated in the Certificate of Calibration No. TRP-0283393/19 /38/ issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-2}$:* A valid calibration event was performed on 10/06/2019, as indicated in the Certificate of Calibration No. TRP-0483393/19 /38/ issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-3}$:* A valid calibration event was performed on 10/06/2019, as indicated in the Certificate of Calibration No. TRP-0683393/19 /38/ issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-4}$:* A valid calibration event was performed on 10/06/2019, as indicated in the Certificate of Calibration No. TRP-0883393/19 /38/ issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-5}$:* A valid calibration event was performed on 10/06/2019, as indicated in the Certificate of Calibration No. TRP-1083393/19 /38/ issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-6}$:* A valid calibration event was performed on 10/06/2019, as indicated in the Certificate of Calibration No. TRP-1283393/19 /38/ issued by CEIME - Comércio e Metrologia Ltda. For the annubar elements of the installed LFG flow meter sets used for measuring LFG flow sent to each engine-generator set, a valid dimensional checking was performed in each element on 11/06/2019. All the Calibration Certificates were made available and were assessed by the EPIC verification team.
	Is the calibration interval in line with the monitoring	As per both the registered PDD /2/ and ACM0001 /7/, the installed LFG flow meters are to be

	plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the applied calibration frequencies (every 18 months for the flow meter used for measuring $V_{t,wb,flare}$ and every 2 years for the flow meter sets used for measuring $V_{t,wb,genset-1}$, $V_{t,wb,genset-2}$, $V_{t,wb,genset-3}$, $V_{t,wb,genset-4}$, $V_{t,wb,genset-5}$ and $V_{t,wb,genset-6}$, as per recommendations from the equipment's manufacturers) are under full conformance with both the monitoring plan of the registered PDD /2/ and ACM0001 /7/.
	Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration events for the installed LFG flow meters confirm proper functioning of these measurement instruments.
	Is(are) the performed calibration(s) valid for the whole reporting period?	EPIC was able to confirm the validity of the performed calibration events for the installed LFG flow meters as follows: *LFG flow meter used for measuring the sub-parameter $V_{t,wb,flare}$:* - Calibration event performed on 14/03/2019, valid 13/09/2020 (18 months) *Pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-1}$:* - Calibration event performed on 10/06/2019, valid 09/06/2021 (18 months) *Annubar elements of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-1}$:* - *Dimensional checking performed on 11/06/2019, valid until 10/06/2024 (5 years)* *Pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-2}$:* - Calibration event performed on 10/06/2019, valid 09/06/2021 (18 months) *Annubar elements of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-2}$:* - *Dimensional checking performed on 11/06/2019, valid until 10/06/2024 (5 years)* *Pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-3}$:* - Calibration event performed on

			10/06/2019, valid 09/06/2021 (18 months) *Annubar elements of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-3}$:* - *Dimensional checking performed on 11/06/2019, valid until 10/06/2024 (5 years)* *Pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-4}$:* - Calibration event performed on 10/06/2019, valid 09/06/2021 (18 months) *Annubar elements of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-4}$:* - *Dimensional checking performed on 11/06/2019, valid until 10/06/2024 (5 years)* *Pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-5}$:* - Calibration event performed on 10/06/2019, valid 09/06/2021 (18 months) *Annubar elements of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-5}$:* - *Dimensional checking performed on 11/06/2019, valid until 10/06/2024 (5 years)* *Pressure signal + data transmission unit of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-6}$:* - Calibration event performed on 10/06/2019, valid 09/06/2021 (18 months) *Annubar elements of the LFG flow meter set used for measuring the sub-parameter $V_{t,wb,genset-6}$:* - *Dimensional checking performed on 11/06/2019, valid until 10/06/2024 (5 years)*

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis for j (where j is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s))" ($v_{CH4,t,wb}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline

		to the flare(s)) ($v_{CH4,t,wb}$)
	Calibration frequency /interval for the monitoring equipment/instrument:	As per the implemented monitoring procedure at Biogas Riograndense Ltda., the installed CH_4/O_2 content gas analyzer unit is to be calibrated every 6 months by a third party independent accredited calibration laboratory. For the gas analyser unit with S/N N1-C8-283, the following calibration events valid for the considered monitoring period were performed: - Calibration event performed on 23/08/2019, as indicated in the Certificate of Calibration No. 4896-19B /31/. Issued by Fazit – Controle e Automação de Processos Industriais Ltda. - Calibration event performed on 20/01/2020, as indicated in the Certificate of Calibration No. 5551-20A /89/. Issued by Fazit – Controle e Automação de Processos Industriais Ltda. The Calibration Certificates were made available and were assessed by the EPIC verification team.
	Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	As per the registered PDD /2/, ACM0001 /7/ and the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/, the installed continuous CH_4/O_2 content gas analyzer unit is to be calibrated in a frequency to be established under conformance with instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequency (every 6 months, as per recommendations from the equipment's manufacturer) is in line with the monitoring plan of the registered PDD /2/, ACM0001 /7/ and the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/.
	Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration events for the CH_4/O_2 content gas analyzer unit confirmed proper functioning of these measurement instruments.
	Is(are) the performed calibration(s) valid for the whole reporting period?	Yes. The performed calibration events for the CH_4/O_2 content gas analyzer unit are valid for the whole monitoring period. EPIC was able to confirm the validity of the performed calibration events for the CH_4/O_2 content gas analyzer unit as follows: *Continuous CH_4/O_2 content gas analyser unit used for measuring the parameter $v_{CH4,t,wb}$:* - Calibration event performed on

		23/08/2019 – valid until 22/02/2020 (6 months) - Calibration event performed on 20/01/2020 – valid until 19/07/2020 (6 months)

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Temperature of the LFG stream in time interval t" (T_t):

Data / Parameter: (as per the monitoring plan of the PDD):	Temperature of the LFG stream in time interval *t* (T_t)
Calibration frequency /interval for the monitoring equipment/instrument:	As per the implemented monitoring procedure at Biogas Riograndense Ltda. and recommendations from the equipment's manufacturer, the installed LFG temperature sensor used for measuring temperature of the LFG which is sent to the flare (sub-parameter T_{tflare}) is to be calibrated every year and the installed LFG temperature sensors used for measuring temperature of the LFG which is sent to each engine-generator set (sub-parameters $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$) are to be calibrated every 2 years. *Calibration details for the LFG temperature sensor used for measuring the sub-parameter T_{tflare}:* An initial calibration event was performed on 13/06/2019 as indicated in the Certificate No. 12694/2019 /37/, also issued by SGS do Brasil Ltda. *Calibration details for the LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-1}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. 0183393/19 /42/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-2}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. 0283393/19 /42/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-3}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. 0383393/19 /42/, issued by CEIME - Comércio e Metrologia Ltda.

			Calibration details for the LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-4}$: A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. 0483393/19 /42/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-5}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. 0583393/19 /42/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-6}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. 0683393/19 /42/, issued by CEIME - Comércio e Metrologia Ltda. All the Calibration Certificates were made available and assessed by the EPIC verification team.
		Is the calibration interval in line with the monitoring plan of the PDD? If The PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	As per both the registered PDD /2/ and ACM0001 /7/, the installed LFG temperature sensors are to be calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequencies (every year for the LFG temperature sensor used for measuring T_{tflare} and every 2 years for the LFG temperature sensors used for measuring $T_{tgenset-1}$, $T_{tgenset-2}$, $T_{tgenset-3}$, $T_{tgenset-4}$, $T_{tgenset-5}$ and $T_{tgenset-6}$, as per recommendations from the equipment's manufacturer) are in line with the both the monitoring plan of the registered PDD /2/ and ACM0001 /7/.
		Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration events for the LFG temperature sensors confirm proper functioning of these measurement instruments.
		Is(are) the performed calibration(s) valid for the whole reporting period?	Yes. The performed calibration events for the installed LFG temperature sensors are valid for the whole monitoring period. EPIC was able to confirm the validity of the performed calibration events for the installed LFG temperature sensors as follows:

		LFG temperature sensor used for measuring the sub-parameter T_{tflare}: - Calibration event performed on 13/06/2019 - valid until 12/06/2020 (1 year) *LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-1}$:* - Calibration event performed on 10/06/2019 valid until 09/06/2021 (2 years) *LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-2}$:* - Calibration event performed on 10/06/2019 valid until 09/06/2021 (2 years) *LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-3}$* - Calibration event performed on 10/06/2019 valid until 09/06/2021 (2 years) *LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-4}$:* - Calibration event performed on 10/06/2019 valid until 09/06/2021 (2 years) *LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-5}$:* - Calibration event performed on 10/06/2019 valid until 09/06/2021 (2 years) *LFG temperature sensor used for measuring the sub-parameter $T_{tgenset-6}$:* - Calibration event performed on 10/06/2019 valid until 09/06/2021 (2 years)

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Pressure of the LFG stream in time interval t" (P_t):

Data / Parameter: (as per the monitoring plan of the PDD):	Pressure of the LFG stream in time interval *t* (P_t)
Calibration frequency /interval for the monitoring equipment/instrument:	As per the implemented monitoring procedure at Biogas Riograndense Ltda. and recommendations from the equipment's manufacturer, the installed LFG pressure sensor used for measuring pressure of the LFG which is sent to the flare (sub-parameter P_{tflare}) is to be calibrated every year and the installed LFG pressure sensors used for measuring pressure of the LFG which is sent to each engine-generator set (sub-parameters $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$) are to be calibrated every 2 years.

		Calibration details for the LFG pressure sensors used for measuring the sub-parameter P_{tflare}: A valid calibration event was performed on 13/06/2019 (Certificate No. 6624/2019 /36/, issued by SGS do Brasil Ltda.). *Calibration details for the LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-1}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. TRP-0183393/19 /87/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-2}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. TRP-0383393/19 /87/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-3}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. TRP-0583393/19 /87/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-4}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. TRP-0783393/19 /87/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-5}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. TRP-0983393/19 /87/, issued by CEIME - Comércio e Metrologia Ltda. *Calibration details for the LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-6}$:* A valid calibration event was performed on 10/06/2019 as indicated in the Calibration Certificate No. TRP-1183393/19 /87/, issued by CEIME - Comércio e Metrologia Ltda. All the Calibration Certificates were made available and assessed by the EPIC verification team.
	Is the calibration interval in line with the monitoring plan of the PDD? If the	As per both the registered PDD /2/ and ACM0001 /7/, the installed LFG pressure sensors are to be calibrated in a frequency as per the instrument's

	PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequencies (every year for the LFG pressure sensor used for measuring P_{tflare} and every 2 years for the LFG pressure sensors used for measuring $P_{tgenset-1}$, $P_{tgenset-2}$, $P_{tgenset-3}$, $P_{tgenset-4}$, $P_{tgenset-5}$ and $P_{tgenset-6}$, as per recommendations from the equipment's manufacturers) are in line with the both the monitoring plan of the registered PDD /2/ and ACM0001 /7/.
	Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration events for the LFG pressure sensors confirm proper functioning of these measurement instruments.
	Is(are) the performed calibration(s) valid for the whole reporting period?	Yes. The performed calibration events for the installed LFG pressure sensors are valid for the whole monitoring period. EPIC was able to confirm the validity of the performed calibration events for the installed LFG pressure sensors as follows: *LFG pressure sensor used for measuring the sub-parameter P_{tflare}:* - Calibration event performed on 13/06/2019, valid until 12/06/2020 (1 year) *LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-1}$:* - Calibration event performed on 10/06/2019, valid until 09/06/2021 (2 years) *LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-2}$:* - Calibration event performed on 10/06/2019, valid until 09/06/2021 (2 years) *LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-3}$:* - Calibration event performed on 10/06/2019, valid until 09/06/2021 (2 years) *LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-4}$:* - Calibration event performed on 10/06/2019, valid until 09/06/2021 (2 years) *LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-5}$:* - Calibration event performed on 10/06/2019, valid until 09/06/2021 (2 years) *LFG pressure sensor used for measuring the sub-parameter $P_{tgenset-6}$:*

	- Calibration event performed on 10/06/2019, valid until 09/06/2021 (2 years)

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Amount of grid electricity consumed by the project activity during the year y" ($EC_{PJ,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Amount of grid electricity consumed by the project activity during the year *y* ($EC_{PJ,y}$)
Calibration frequency /interval for the monitoring equipment/instrument:	As per the implemented monitoring procedure at Biogas Riograndense Ltda. and recommendations from the equipment's manufacturer, the installed bi-directional electricity meter is to be calibrated every 5 years. As confirmed by the EPIC verification team through assessment of the specification sheet for the installed electricity meter, the selected calibration frequency is as per the recommendations of the instrument manufacturer. A valid calibration event was performed on 20/08/2018 (Calibration Certificate Number 12791/Z-18, performed by 3C Services) /93/.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Both the monitoring plan of the registered PDD /2/ and ACM0001 /7/ do not specify any calibration frequency requirements for the electricity meters. The registered PDD /2/ states the following: *"Instrument will be subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice."* As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /13/, the following requirement is established regarding maintenance and calibration for electricity meters: *"(...)* *meters should be installed, maintained and calibrated according to equipment manufacturer instructions and be in line with national standards, or, if these are not available, international standards (e.g. IEC, ISO)".* It is important to note that the installed electricity meter is approved/certified by the Brazilian national authority for metrology and standardization affairs (INMETRO). The meter is thus in conformance with INMETRO's requirements for maintenance and testing of electricity meters. Furthermore, the adopted calibration frequency is confirmed to be in accordance with related

	requirements/recommendations as established by the meters manufacturer. While, as confirmed by the EPIC verification team, as per the instrument manufacturer, the meter is to be calibrated every 5 years, a calibration frequency of 5 years is applied for the installed electricity meter.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration events confirm proper functioning of the electricity meters (at the time the calibration events were performed).
Is(are) the performed calibration(s) valid for the whole reporting period?	Yes. The performed calibration events as correctly outlined in the Monitoring Report /3/ are valid for the whole considered monitoring period. EPIC was able to confirm the validity of the performed calibration event for the installed electricity meter as follows: - Calibration event performed on 20/08/2018, valid until 19/08/2023 (5 years)

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Amount of electricity generated using LFG by the project activity in year y" ($EC_{BL,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Amount of electricity generated using LFG by the project activity in year *y* ($EC_{Bl,y}$)
Calibration frequency /interval for the monitoring equipment/instrument:	As per the recommendations from the equipment's manufacturer, the installed electricity meter is to be calibrated every 5 years. As confirmed by the EPIC verification team through assessment of the specification sheet for the installed electricity meters, the selected calibration frequency is as per the recommendations of the instrument manufacturer. A valid calibration event was performed on 20/08/2018 (Calibration Certificate Number 12791/Z-18, performed by 3C Services). /93/
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the	Both the monitoring plan of the registered PDD /2/ and ACM0001 /7/ do not specify any calibration frequency requirements for the electricity meters. The registered PDD /2/ states the

	frequency of calibration, does the selected frequency represent good monitoring practice?	following: *"Instrument will be subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice."* As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /13/, the following requirement is established regarding maintenance and calibration for electricity meters: *"(...) meters should be installed, maintained and calibrated according to equipment manufacturer instructions and be in line with national standards, or, if these are not available, international standards (e.g. IEC, ISO)".* It is important to note that the installed electricity meter is approved/certified by the Brazilian national authority for metrology and standardization affairs (INMETRO). The meter is thus in conformance with INMETRO's requirements for maintenance and testing of electricity meters. Furthermore, the adopted calibration frequency is confirmed to be in accordance with related requirements/recommendations as established by the meters manufacturer. While, as confirmed by the EPIC verification team, as per the instrument manufacturer, the meter is to be calibrated every 5 years, a calibration frequency of 5 years is applied for the installed electricity meter.
	Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration events confirm proper functioning of the electricity meter (at the time the calibration events were performed).
	Is(are) the performed calibration(s) valid for the whole reporting period?	Yes. The performed calibration events as correctly outlined in the Monitoring Report /3/ are valid for the whole considered monitoring period. EPIC was able to confirm the validity of the performed calibration event for the installed electricity meter as follows: - Calibration event performed on 20/08/2018, valid until 19/08/2023 (5 years)

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Operation margin CO_2 emission factor in year y = Dispatch data analysis operating margin CO_2 emission factor in year y" ($EF_{grid,OM,y} = EF_{grid,OM\text{-}DD,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Operation margin CO_2 emission factor in year *y* = Dispatch data analysis operating margin CO_2 emission factor in year *y* ($EF_{grid,OM,y} = EF_{grid,OM-DD,y}$)
Calibration frequency /interval for the monitoring equipment/instrument:	Not applicable. There are no measurements or measurement instruments/equipment involved for the definition of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Not applicable. There are no measurements or measurement instruments/equipment involved for the definition of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Not applicable. There are no measurements or measurement instruments/equipment involved for the definition of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$.
Is(are) the performed calibration(s) valid for the whole reporting period?	Not applicable. There are no measurements or measurement instruments/equipment involved for the definition of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility)" ($Op_{j,h}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation facility) ($Op_{j,h}$)
Calibration frequency /interval for the monitoring equipment/instrument:	Not applicable. The operational status of the engine-generator sets is automatically registered by the electronic control system for each engine-generator set of the project's electricity generation component.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Not applicable.
Did the performed calibration(s) confirm proper functioning of	Not applicable.

monitoring equipment/instrument? (Yes / No):	
Is(are) the performed calibration(s) valid for the whole reporting period?	Not applicable.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Mass flow of methane in the exhaust gas of the flare(s) on a dry basis at reference conditions in the time period t" ($F_{CH4,EG,t}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Mass flow of methane in the exhaust gas of the flare(s) on a dry basis at reference conditions in the time period *t* ($F_{CH4,EG,t}$)
Calibration frequency /interval for the monitoring equipment/instrument:	Both the technical test/evaluation reports issued by the third-party independent inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA highlight that the utilized chromatographers and Pitot tubes were in full conformance with calibration requirements applicable for these instruments/equipment.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	The registered PDD [12] and ACM0001 [17] do not specify any equipment or procedural requirement for performing the related measurements and calculations for the determination of values for $F_{CH4,EG,t}$. The methodological tool "Project emissions from flaring" [12] establishes that *"(…) under Option B.1 the measurement is conducted by an accredited entity on a biannual basis".* Thus, no calibration frequency requirement for related instruments/equipment is specified by such methodological tool either. As indicated in the technical valid test/evaluation reports issued by the third party independent inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA, the performed calibration events for both the utilized chromatographer and the Pitot tube were in conformance with calibration requirements applicable for these instruments.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	No information, evidences/proof for performed calibration events in equipment/instruments utilized by the inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA were made available to the EPIC verification team.
Is(are) the performed calibration(s) valid for the whole reporting period?	No information, evidences/proof for performed calibration events in equipment/instruments utilized by the inspection service company Biotec Estudos e Avaliacoes de Emissoes

	Atmosfericas LTDA were made available to the EPIC verification team.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Saturation pressure of H_2O at temperature T_t in time interval t" ($p_{H2O,t,sat}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Saturation pressure of H_2O at temperature T_t in time interval *t* ($p_{H2O,t,sat}$)
Calibration frequency /interval for the monitoring equipment/instrument:	Not applicable. The determination of applicable value for the monitoring parameter $p_{H2O,t,sat}$ is not based on measurements.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Not applicable. The determination of applicable value for the monitoring parameter $p_{H2O,t,sat}$ is not based on measurements.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Not applicable. The determination of applicable value for the monitoring parameter $p_{H2O,t,sat}$ is not based on measurements.
Is(are) the performed calibration(s) valid for the whole reporting period?	Not applicable. The determination of applicable value for the monitoring parameter $p_{H2O,t,sat}$ is not based on measurements.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Temperature in the exhaust gas of the enclosed flare in minute m" ($T_{EG,m}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Temperature in the exhaust gas of the enclosed flare in minute *m* ($T_{EG,m}$)
Calibration frequency /interval for the monitoring equipment/instrument:	As per the implemented monitoring procedure at Biogas Riograndense Ltda. and recommendations from the equipment's manufacturer, the installed thermocouples are to be calibrated every 2 years. As confirmed by the EPIC verification team through assessment of the specification sheet for the installed thermocouples /62/, the selected calibration frequency is as per the recommendations of the instrument manufacturer. *Calibration details for the thermocouple TT-04:* A valid calibration event was performed on 27/03/2019 (Certificate No. 6779/2019 /39/ issued by SGS do Brasil Ltda.). *Calibration details for the thermocouple TT-05:* A valid calibration event was performed on

	27/03/2019 (Certificate No. 6780/2019 /40/ issued by SGS do Brasil Ltda.). The Calibration Certificates were made available and assessed by the EPIC verification team.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	As per both the registered PDD /2/ and the methodological tool "Project emissions from flaring" /12/, the installed thermocouples are to be replaced or calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequency (every 2 years, as per recommendations from the equipment's manufacturer) is in line with the both the monitoring plan of the registered PDD /2/ and ACM0001 /7/.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration events for the installed thermocouples confirm proper functioning of these measurement instruments.
Is(are) the performed calibration(s) valid for the whole reporting period?	Yes. The performed calibration events as correctly outlined in the Monitoring Report /3/ are valid for the whole considered monitoring period. EPIC was able to confirm the validity of the performed calibration events for the installed thermocouples as follows: Thermocouple TT-04: - calibration event performed on 27/03/2019, valid until 26/03/2021 (2 years) Thermocouple TT-05: - calibration event performed on 27/03/2019, valid until 26/03/2021 (2 years)

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Flame detection of flare in the minute m" ($Flame_m$):

Data / Parameter: (as per the monitoring plan of the PDD):	Flame detection of flare in the minute *m* ($Flame_m$)
Calibration frequency /interval for the monitoring equipment/instrument:	Not applicable. As confirmed by the EPIC verification team through assessment of the specification sheet for the UV Flame detector installed at the project site /41/, the installed UV Flame detector has a self-checking function and thus do not require any calibration.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected	Not applicable.

frequency represent good monitoring practice?	
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Not applicable.
Is(are) the performed calibration(s) valid for the whole reporting period?	Not applicable.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Maintenance events completed in year y as monitored by the project participants" (Maintenance$_y$):

Data / Parameter: (as per the monitoring plan of the PDD):	Maintenance events completed in year *y* as monitored by the project participants (Maintenance$_y$)
Calibration frequency /interval for the monitoring equipment/instrument:	Not applicable. There are no measurements involved in the monitoring of the parameter Maintenance$_y$.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Not applicable. There are no measurements involved in the monitoring of the parameter Maintenance$_y$.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Not applicable. There are no measurements involved in the monitoring of the parameter Maintenance$_y$.
Is(are) the performed calibration(s) valid for the whole reporting period?	Not applicable. There are no measurements involved in the monitoring of the parameter Maintenance$_y$.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Quantity of LPG consumed by the project activity in year y" ($FC_{LPG,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Quantity of LPG consumed by the project activity in year *y* ($FC_{LPG,y}$)
Calibration frequency /interval for the monitoring equipment/instrument:	The EPIC verification team was able to confirm that the Brazilian National Agency of Petroleum, Natural Gas and Biofuels (*Agência Nacional do Petróleo, Gás Natural e Biocombustíveis - ANP*), as the federal government agency responsible for the regulation of the oil sector (including production and distribution of petroleum fuels)

			defines in its Resolution 15 (dated 18/05/2005) /68/ that any LPG distributor operating in Brazil should have a functioning weight scale for checking the weight of LPG commercialized in 45 kg cylinders. As also established by the Resolution 15, related weight scales should be regularly calibrated by a certification/calibration company with accreditation from the Brazilian national authority for metrology and standardization issues "Instituto Nacional de Metrologia, Qualidade e Tecnologia" (INMETRO). Moreover, it was made available to the EPIC verification team a declaration/communication issued by the local LPG distribution company Liquigás Distribuidora S.A. (dated 14/05/2019) /48/ confirming that: - Liquigás Distribuidora S.A.has historically calibrated weight scales as per the Internal working procedure "Calibração e Aferição de Balanças (Calibration and admeasurement of weigh scales)". Doc. Code: PP-1LQ-00004-A **Error! Reference source not found.**. - The weight scale Mettler-Toledo - model IND560 – S/N 10734698 has been regularly calibrated as per internal working procedure PP-1LQ-00004-A **Error! Reference source not found.**. A copy of the working procedure PP-1LQ-00004-A **Error! Reference source not found.** was also made available and was assessed by the EPIC verification team. Moreover, Certificates of Calibration **Error! Reference source not found.** for the pattern standard weights internally used by Liquigás Distribuidora S.A. (used for the performance of regular calibration events of weight scales) and the Calibration Certificate for the weight scale 10734698 (calibration event performed 23/03/2018 /71/, issued by INMETRO) were also made available and assessed by the verification team. Through review of the user manual for the utilized weight scale /96/, the EPIC verification team confirmed that, as appropriately outlined in the Monitoring Report, the instrument manufacturer Toledo do Brasil Industria de Balanças Ltda. recommends the weight scale Mettler-Toledo model IND560 to be regularly calibrated with a 12-month frequency. As also appropriately outlined in the Monitoring Report, the every 12-month calibration frequency recommended by weight scale manufacturer is under conformance with recommendations from the Instituto Nacional de Metrologia, Qualidade e Tecnologia (INMETRO)	

		(the Brazilian national authority for metrology and certification affairs) as established in the guidelines of the INMETRO's manual "*Orientações sobre verificação intermediária das balanças*" (Guidance on intermediate verification of scales) /97/, of which a copy was made available and reviewed by the EPIC verification team. Finally, as also confirmed by the EPIC verification team, the every 12-month calibration frequency recommended by weight scale manufacturer is also under conformance with the calibration procedure/routines applied by the LPG supplier Liquigás Distribuidora S.A. (as established in their working procedure/instruction PP-1LQ-00004-A /79/).
	Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	As per the registered PDD /2/ *"(…) Periodic calibration events will be performed in the mass meters by a third party independent accredited calibration laboratory in a frequency as per instrument specifications and/or instrument manufacturer's recommendations.*" As per Resolution 15 /68/ of ANP, any LPG distributor operating in Brazil should have a functioning weight scale for checking the weight of LPG commercialized in 45 kg cylinders. As also established by the Resolution 15, related weight scales should be regularly calibrated by a certification/calibration company with accreditation from INMETRO. While the every 12-month calibration frequency recommended by weight scale manufacturer is under conformance both with recommendations from INMETRO and the calibration procedure/routines applied by the LPG supplier Liquigás Distribuidora S.A. (as established in their working procedure/instruction PP-1LQ-00004-A /79/), the applied calibration frequency for the utilized weight scale is in accordance with national requirements and also with related requirements/recommendations as established by the weight scale manufacturer (thus, also in accordance with provisions of the PDD).
	Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration event for the weight scale confirms proper functioning of the measurement instrument.
	Is(are) the performed calibration(s) valid for the whole reporting period?	Yes. The performed calibration event referred in the Monitoring Report /3/ is valid for the considered LPG delivery event.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Net calorific value of the fuel LPG in year y" ($NCV_{LPG,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Net calorific value of the fuel LPG in year *y* ($NCV_{LPG,y}$)
Calibration frequency /interval for the monitoring equipment/instrument:	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
Is(are) the performed calibration(s) valid for the whole reporting period?	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "CO_2 emission factor of fuel LPG in year y" ($EF_{CO2,LPG,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	CO_2 emission factor of fuel LPG in year *y* ($EF_{CO2,LPG,y}$)
Calibration frequency /interval for the monitoring equipment/instrument:	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.

Is(are) the performed calibration(s) valid for the whole reporting period?	Not applicable. No measuring instrument was used for determining the value of the parameter during the considered monitoring period.

Assessment of performed calibration events for equipment/instruments used for monitoring the parameter "Quantity of electricity generated in captive diesel backup generator during the year y" ($EC_{PJ,captive,y}$):

Data / Parameter: (as per the monitoring plan of the PDD):	Quantity of electricity generated in captive diesel backup generator during the year *y* ($EC_{PJ,captive,y}$)
Calibration frequency /interval for the monitoring equipment/instrument:	As per the implemented monitoring procedure at Biogas Riograndense Ltda. and recommendations from the equipment's manufacturer, the 2 installed electricity meters are to be calibrated at least every 5 years. As confirmed by the EPIC verification team through assessment of the service and operation manual for the installed electricity meters, the applied calibration frequency is as per the recommendations of the instrument manufacturer. For the electricity meter with S/N 00008150, a valid calibration event was performed on 25/03/2016 (Calibration Certificate E0684/2016 /32/, issued by LABELO - Laboratórios Especializados em Eletroeletrônica Calibração e Ensaios.). For the electricity meter with S/N 00045288 a valid calibration event was performed on 25/03/2016 (Calibration Certificate E0685/2016 /70/, issued by LABELO - Laboratórios Especializados em Eletroeletrônica Calibração e Ensaios.). The EPIC verification team has confirmed that the installed instruments indeed comply with the applicable and valid calibration and verification requirements as set and approved by the Brazilian authority for metrology INMETRO. As appropriately outlined in the Monitoring Report, the installed electricity meters are both under operation since 08/02/2012. The installed instruments are of a model which is currently approved by the Brazilian Metrology authority INMETRO. The EPIC verification team assessed the approval note /48/ issued by INMETRO as part of its assessment. The manufacturing and verification processes applied for the installed meters (which are manufactured and verified in Brazil) are approved as per the rules set by INMETRO. As confirmed by the EPIC verification team, the installed meters were not required to be individually calibrated by the equipment manufacturer prior to be made available to commercialization and utilization. As also confirmed by the EPIC verification team, the manufacturing and calibration/testing/verification

		procedures applicable for the installed electricity meters are regulated by the INMETRO's Decree No. 431 (passed on 04/12/2007) /67/. This decree is currently replaced by the more recently passed INMETRO's Decree No. 587 (dated 05/11/2012) /69/. As per both Decrees, by taking into account the design and construction technology currently commonly applied for electronic electricity meters for active and reactive power, it is established by INMETRO that homologated electronic electricity meters manufactured in Brazil under controlled production batches are to be calibrated, tested and verified on a sampling basis (and not any longer on an individual basis) by applying specific calibration, testing and verification procedures which are approved and prescribed by INMETRO. The EPIC verification team was also able to confirm that, as indicated in the operation and commissioning manual/report for the installed captive off-grid electricity generator /48/ (issued by 5EC Engenharia Ltda.), the installed electricity meters S/N 00008150 and 00045288 were also tested and approved as part of the related commissioning work performed by 5EC Engenharia Ltda. (with results of performed field verifications in the instruments being reported in the operation and commissioning manual/report for the installed captive off-grid electricity generator). This report was also assessed by the EPIC verification team.	
	Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practice?	Both the monitoring plan of the registered PDD /2/ and ACM0001 /7/ do not specify any calibration frequency requirements for the electricity meters. The registered PDD /2/ states the following: *"Periodic calibration events will be performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Instrument will be subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice."* As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /13/, the following requirement is established regarding maintenance and calibration for electricity meters: *"(...) meters should be installed, maintained and calibrated according to equipment manufacturer instructions and be in line with national standards, or, if these are not available, international standards (e.g. IEC, ISO)".* Therefore, the calibration frequency considered	

	for these electricity meters was as per recommendations from the instrument manufacturer. It is the opinion of the EPIC verification team that the adopted calibration frequency for the electricity meters represents good monitoring practice.
Did the performed calibration(s) confirm proper functioning of monitoring equipment/instrument? (Yes / No):	Yes. The performed calibration events confirm proper functioning of the electricity meters (at the time the calibration events were performed).
Is(are) the performed calibration(s) valid for the whole reporting period?	Yes. The performed calibration events as correctly outlined in the Monitoring Report /3/ are valid for the whole considered monitoring period. EPIC was able to confirm the validity of the performed calibration events for the installed electricity meters as follows: Electricity meter with Serial Number 00008150: - calibration event performed on 25/03/2016, valid until 24/03/2021 (5 years) Electricity meter with Serial Number 00045288: - calibration event performed on 25/03/2016, valid until 24/03/2021 (5 years)

It is important to note that, as further assessed in Section E.6.2., the monitoring plan of the registered PDD /2/ also includes the following monitoring parameters of which monitoring was not required during the considered monitoring period:

Parameter not monitored during the considered monitoring period
Volumetric flow of LFG stream in time interval *t* on a dry basis on a dry basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($V_{t,db,j}$)
Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a dry basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($v_{CH4,t,db,j}$)
Mass flow of the LFG stream in time interval *t* on dry basis for *j* (where *j* is the LFG delivery pipeline to each item of electricity generation and LFG delivery pipeline to the flare(s)) ($M_{t,db,j}$)
Quantity of fuel Diesel combusted by the captive off-grid electricity generator ($FC_{Diesel,y}$)
Net calorific value of the fuel Diesel in year *y* ($NCV_{Diesel,y}$)
CO_2 emission factor of fuel Diesel in year *y* ($EF_{CO2,Diesel,y}$)
Quantity of electricity generated in captive diesel backup generator during the year *y* ($EG_{Diesel-Generator,y}$)
Tariff of the electricity exported (Tariff of electricity exported)
Total investment to implement the project and total cost to operate the project (CAPEX and OPEX)

No assessment details are thus included for the parameters listed above.

Findings	No related findings (CARs, CLs and/or FARs) were raised regarding compliance with the calibration frequency requirements for measuring instruments/equipment.
Conclusion	As a conclusion, the EPIC verification team was able to confirm that the calibration events performed for most of the monitoring instruments of the project activity were conducted under conformance with calibration frequency requirements established by instrument/equipment manufacturers, the monitoring plan of the registered PDD /2/, ACM0001 /7/) and applicable tools during the considered monitoring period. Documented evidences for performed calibration events allowed the EPIC verification team to confirm that applied monitoring instruments/equipment operated under appropriate manner during the considered monitoring period. Moreover, the EPIC verification team has also confirmed that no calibration event valid for the considered monitoring period has identified an error beyond the maximum permissible error of the respective measuring instrument.

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification

The EPIC verification team assessed whether the methods and formulae used to determine baseline emissions for the considered monitoring period are correct and appropriate. The performed assessment encompassed checking whether applied methods and formulae as described in the registered monitoring plan and applicable methodology + methodological tools were correctly applied, including confirmation whether the Monitoring Report includes all parameters and monitored data at the intervals required by the applied methodology + methodological tools as per the registered PDD /2/). The correctness of application of emission factors and default values (ex-ante determined/fixed parameters as per the registered PDD) /2/ was also verified.

Through assessment of the Monitoring Report, the EPIC verification team was able to verity that as correctly indicated in the Monitoring Report /3/ and also as established by ACM0001 /7/, applied methodological tools and the registered PDD /2/, baseline emissions (BE_y) for the considered monitoring period are correctly calculated as follows:

$BE_y = BE_{CH4,y} + BE_{EC,y}$

Where:

$BE_{EC,y}$ Baseline emissions associated with electricity generation in year *y*. $BE_{EC,y}$ is determined as follows:

$BE_{EC,y} = EC_{BL,y} * EF_{EL,grid,y} * (1 + TDL_{grid,y})$

Where:

$EC_{BL,y}$ Amount of electricity generated using LFG in year y (in MWh). The monthly record of net electricity generated by the project activity (using collected LFG as gaseous fuel) for the considered monitoring period is summarized below, with value being correcty applied:

Month	Amount of electricity generated using LFG (MWh)
Jan./2020	4,619.929
Feb./2020	4,727.451
Mar./2020	348.157

(from 01/03/2020 to 02/03/2020)	

$TDL_{grid,y}$ Average technical transmission and distribution losses for providing electricity to the grid and/or for grid sourced electricity consumed by the project activity. As indicated in the registered PDD /2/, in the particular case of the determination of $BE_{EC,y}$, $TDL_{grid,y}$ is *ex-ante* determined as 3% ($TDL_{grid,export,y}$), with selected value being correcty applied.

$EF_{EL,grid,y}$ Emission factor for grid-sourced electricity in year *y*. For the considered monitoring period, $EF_{EL,grid}$ is determined ex-post as the Combined margin CO_2 emission factor ($EF_{grid,CM,y}$) that is calculated as the weighted average of the ex-post determined value for the monitoring parameter "Operating margin CO_2 emission factor in year *y*" ($EF_{grid,OM,y}$) and the value for the ex-ante determined paramter "Build margin CO_2 emission factors" ($EF_{grid,BM,y}$). In order to appropriately weight these two factors, the also previously determined and validated default values for the *ex-ante* determined parameters "Weighting of operating margin emission factor" (w_{OM}) and "Weighting of build margin emission factor" (w_{BM}) are applied. For the considered monitoring period, $EF_{grid,CM,y}$ is thus determined as follows:

$$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$$

Where:

w_{OM} Weighting of operating margin emissions factor. As established in the registered PDD /2/, w_{OM} is ex-a*nte* determined as 0.25 (25%).

w_{BM} Weighting of operating margin emissions factor. As established in the registered PDD /2/, w_{BM} is *ex-ante* determined as 0.75 (75%).

$EF_{grid,OM,y}$ Operating margin CO_2 emission factor in year *y*. As per the applied monitoring procedure, the selected value for the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ represents the official anual average value for year 2020 (0.4539 tCO_2/MWh) as calculated and published by the DNA of Brazil. Further assessment details for the monitoring parameter $EF_{grid,OM,y}$ are included in Section E.6.2.

$EF_{grid,BM,y}$ Build margin CO_2 emission factor in year *y*. As indicated in the registered PDD /2/, $EF_{grid,BM,y}$ is ex-ante determined as 0.2963 tCO_2/MWh.

For the considered monitoring period, $EF_{EL,grid,y}$ is thus calculated as 0.3357 tCO_2/MWh.

As confirmed by the EPIC verification team, the calculated accumulated value for $BE_{EC,y}$ for the considered monitoring period is correctly determined as 3,351 tCO_2.

$BE_{CH4,y}$ Baseline emissions of methane from the SWDS. $BE_{CH4,y}$ is determined as follows:

$$BE_{CH4,y} = ((1 - OX_{top\_layer}) * F_{CH4,PJ,y} - F_{CH4,BL,y}) * GWP_{CH4}$$

Where:

OX_{top_layer} Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline scenario. As indicated in the registered PDD /2/, OX_{top_layer} is *ex-ante* determined as 10%.

$GWP_{CH4,y}$ Global warming potential of CH_4. As indicated in the registered PDD /2/, $GWP_{CH4,y}$ is *ex-ante* determined as 25.

$F_{CH4,BL,y}$ Amount of methane in the LFG that would be flared in the baseline scenario (absence of project activity). $F_{CH4,BL,y}$ is calculated as follows:

$$F_{CH4,BL,y} = 0.2 * F_{CH4,PJ,capt,y}$$

Where:

$F_{CH4,PJ,capt,y}$ Amount of methane collected by the project activity. While during the considered monitoring period encompassing collected LFG was sent for combustion in both the high temperature enclosed flare and in the engine-generator sets of the project's electricity generation component, $F_{CH4,PJ,capt,y}$ is thus determined as follows:

$$F_{CH4,PJ,capt,y} = F_{CH4,sent\_flare,y} + F_{CH4,EL,y}$$

Where:

$F_{CH4,EL,y}$ Amount of methane in the LFG which is used for electricity generation in year y (in tCH_4/yr). Assessment details for the determination of every-minute values for $F_{CH4,EL,y}$ for the considered monitoring period are presented below (under *"Assessment details for the determination of every-minute values for the calculation parameters $F_{CH4,sent\_flare,y}$ and $F_{CH4,EL,y}$"*).

$F_{CH4,sent\_flare,y}$ Amount of methane in the LFG which is sent to the flare in year y (in tCH_4/yr). Assessment details for the determination of every-minute values for $F_{CH4,sent\_flare,y}$ for the considered monitoring period are presented below (under *"Assessment details for the determination of every-minute values for the calculation parameters $F_{CH4,sent\_flare,y}$ and $F_{CH4,EL,y}$"*).

As confirmed by the EPIC verification team, the calculated accumulated value for $F_{CH4,BL,y}$ for the considered monitoring period is correctly determined as 435 tCH_4.

$F_{CH4,PJ,y}$ Amount of methane in the LFG which is flared and/or used in the project activity. As outlined in the latest version of the Monitoring Report /3/ and in accordance with the registered PDD /2/, $F_{CH4,PJ,y}$ is correctly determined as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y}$$

Where:

$F_{CH4,EL,y}$ Amount of methane in the LFG which is used for electricity generation in year *y* (in tCH_4/yr). Assessment details for the determination of every-minute values for $F_{CH4,EL,y}$ for the considered monitoring period are presented below (under "*Assessment details for the determination of every-minute values for the calculation parameters $F_{CH4,sent\_flare,y}$ and $F_{CH4,EL,y}$*").

$F_{CH4,flared,y}$ Amount of methane in the LFG flared by the project activity (in tCH_4). In accordance with requirements from the registered PDD /2/ and by correctly following the applicable guidance of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/, every-minute values of $F_{CH4,flared,y}$ are determined for the installed high temperature enclosed flare within the considered monitoring period as the difference between the amount of methane supplied to the flare and residual methane project emissions from combustion of LFG for the flare as follows:

$$F_{CH4,flared,y} = F_{CH4,sent\_flare,y} - (PE_{flare,y} / GWP_{CH4})$$

Where:

$F_{CH4,sent\_flare,y}$ Amount of methane in the LFG which is sent to the flare. Details for the determination of every-minute values for $F_{CH4,sent\_flare,y}$ are presented below (under "*Assessment details of the determination of every-minute values for the calculation parameters $F_{CH4,sent\_flare,y}$ and $F_{CH4,EL,y}$*").

$PE_{flare,y}$ Project emissions from flaring of the residual gas stream. Details for the determination of every-minute values for $PE_{flare,y}$ are presented below (under " *Assessment details for determination of every-minute values for $PE_{flare,y}$* ").

Assessment details for the determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$ and $F_{CH4,EL,y}$:

In accordance with ACM0001 /7/, the amount of methane in the LFG which is sent to the flare ($F_{CH4,sent\_flare,y}$) and to each each-generator set of the project's electricity generation facility (based on the calculation sub-parameters $F_{CH4,EL,y,genset-1}$, $F_{CH4,EL,y,genset-2}$, $F_{CH4,EL,y,genset-3}$, $F_{CH4,EL,y,genset-4}$, $F_{CH4,EL,y,genset-5}$, $F_{CH4,EL,y,genset-6}$) is determined by following the applicable guidance of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/. For the considered monitoring period, Option C (volume flow of LFG and volumetric fraction of CH_4 in collected LFG being measured in wet basis) of this methodological tool is selected[16]. As per Option C of this methodological tool, the

[16] The registered PDD states the following regarding the determination of values for $F_{CH4,sent\_flare,y}$:

amount of methane in the LFG which is sent to the installed flare and to the engine-generator sets is determined as follows:

$F_{CH4,sent\_flare,y}$:

$F_{CH4,sent\_flare,y} = F_{CH4,t} = V_{t,wb,n,flare} * v_{CH4,t,wb} * \rho_{CH4,n}$

Where:

$V_{t,wb,n,flare}$ Volumetric flow of the gaseous stream (LFG) in time interval *t* on a wet basis at normal conditions. As confirmed by the EPIC verification team, while the sub-parameter $V_{t,wb,flare}$ is already measured in normal conditions, there is no need to calculate every-minute values of the calculation parameter $V_{t,wb,n,flare}$ by using LFG pressure and LFG temperature data. As correctly outlined in the Monitoring Report /3/, while the installed LFG flow meter already measures volumetric flow of LFG in Nm^3 wet gas/h (normal conditions), the following assumption is valid:

$V_{t,wb,n,flare}$ is equivalent to $V_{t,wb,flare}$

Where:

$V_{t,wb,flare}$ Volumetric flow of the gaseous stream (LFG) sent to the flare in time interval *t* on a wet basis.

$v_{CH4,t,wb}$ Volumetric fraction of CH_4 in the gaseous stream in time interval *t* on a wet basis.

$\rho_{CH4,n}$ Density of CH_4 in the gaseous stream (LFG) at normal conditions. As per the selected determination procedure of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/, $\rho_{CH4,n}$ is calculated as follows:

$\rho_{CH4,n} = (P_n * MM_i) / (R_u * T_n)$

Where:

P_n Absolute pressure at normal conditions. *Ex-ante* determined as 101,325 Pa.

T_n Temperature at normal conditions. *Ex-ante* determined as 273.15 Kelvin.

MM_i Molecular mass of greenhouse gas *i* (*i* = CH_4). *Ex-ante* determined as 16.04 kg/mol.

R_u Universal ideal gases constant. *Ex-ante* determined as 8,314 $Pa.m^3$/kmol.K.

The EPIC verification team was able to verify that the value of the parameter $\rho_{CH4,n}$ was correctly calculated and reported as 0.7156650 $kgCH_4/m^3CH_4$.

"*(…) Applicable guidance of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" will be applied to determine $F_{CH4,sent\_flare,y}$* and $F_{CH4,EL,y}$ *by using Option 2: Simplified calculation without measurement of the moisture content, and one of the options A, C or D. The selection of the determination option will depend on project conditions and additional equipment to be installed."*

The adopted calculation approach for determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$ during the considered monitoring period is thus in accordance with both ACM0001 and the registered PDD.

$F_{CH4,EL,y}$ *(calculation sub-parameters* $F_{CH4,EL,y,genset-1}$, $F_{CH4,EL,y,genset-2}$, $F_{CH4,EL,y,genset-3}$, $F_{CH4,EL,y,genset-4}$, $F_{CH4,EL,y,genset-5}$, $F_{CH4,EL,y,genset-6}$*):*

$F_{CH4,EL,y,\ genset-n} = V_{t,wb,n,genset-n} * v_{CH4,t,wb} * \rho_{CH4,n}$

Where:

n	The engine-generator set in question (*n* = 1, 2, 3, 4, 5 and 6)
$V_{t,wb,n,genset-n}$	Volumetric flow of the gaseous stream (LFG) to the engine-generator set n in time interval *t* on a wet basis at normal conditions. While measurements of volumetric flow of LFG sent to each one of the engine-generator sets *n* are not automatically processed and recorded in Nm³ of wet gas/h (normal conditions), values of $V_{t,wb,n,genset-n}$ valid for each minute encompassed by the considered monitoring period are correctly calculated as follows:

$V_{t,wb,n,genset-n} = V_{t,wb,genset-n} * (T_n / T_{tgenset-n}) * (P_{tgenset-n} * P_n)$

Where:

$V_{t,wb,genset-n}$	Volumetric flow of the gaseous stream (LFG) sent to the engine-generator set n in time interval *t* on a wet basis at actual conditions.
$T_{tgenset-n}$	Temperature of the LFG which is sent to engine-generator set n in time interval *t*. Further assessment details are included in Section E.6.2.
T_n	Temperature at normal conditions. T_n is *ex-ante* determined as 273.15 Kelvin.
$P_{tgenset-n}$	Pressure of the LFG which is sent to engine-generator n in time interval *t*. Further assessment details are included in Section E.6.2.
P_n	Absolute pressure at normal conditions. P_n is e*x-ante* determined as 101,325 Pa.
n	Number of the installed engine-generator set. n = 1, 2, 3, 4, 5 and 6.
$v_{CH4,t,wb}$	Volumetric fraction of CH_4 in the gaseous stream in time interval *t* on a wet basis.
$\rho_{CH4,n}$	Density of CH_4 in the gaseous stream (LFG) at normal conditions. $\rho_{CH4,n}$ is calculated as 0.7156650 $kgCH_4$ / m^3CH_4 as presented above.

Assessment details for determination of every-minute values for $PE_{flare,y}$*:*

In accordance with applicable guidance from both the methodological tool "Project emissions from flaring" /12/ and from the registered PDD /2/, every-minute values of $PE_{flare,y}$ are determined as a function of every-minute records of mass flow of methane sent to the flare as well as based on *ex-post* calculated values for flare efficiency ($\eta_{flare,m} = \eta_{flare,calc,y}$). Values of $PE_{flare,y}$ are correctly calculated for the considered monitoring period as follows:

$$PE_{flare,y} = GWP_{CH4} * \sum_{m=1}^{525,600} F_{CH4,RG,m} * (1 - \eta_{flare,m}) * 10^{-3}$$

Where:

$F_{CH4,RG,m}$ Methane mass flow in the residual gas of the flare. For each minute *m* of the considered monitoring period, values for $F_{CH4,RG,m}$ are equal to the measured and reported every-minute values of the monitoring parameter "Amount of methane in the LFG which is sent to the flare" ($F_{CH4,sent\_flare,y}$).

$\eta_{flare,m}$ Flare efficiency in minute *m*. For the considered monitoring period, as confirmed by the EPIC verification team, $\eta_{flare,m}$ is determined based on performed measurements by following applicable guidance of Option B B.1 of the methodological tool Project emissions from flaring" /12/. As required by this determination option, related measurements to determine the efficiency of the flare (measurement for monitoring parameter $F_{CH4,EG,t}$) were performed by an accredited independent third party entity (e.g. an independent inspection/analysis service company) on a biannual basis. The calculated flare efficiency ($\eta_{flare,calc,m}$) is determined as the average of two performed measurements within the year encompassed by the considered monitoring period as follows:

$$\eta_{flare,calc,y} = 1 - \frac{1}{2}\sum_{t=1}^{2}\left(\frac{F_{CH4,EG,t}}{F_{CH4,RG,t}}\right)$$

Where:

$F_{CH4,EG,t}$ Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period *t*. For determining $F_{CH4,EG,t}$, biannual measurements of residual methane in the exhaust gas of the flare during a considered time and measurements of speed of exhaust gas of the flare were performed by the third party inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA. This inspection service company is specialized in measurement of air emissions and inspections for air pollutants. Further assessment details for the ex-post determination of values for $F_{CH4,EG,t}$ are included in Section E.6.2.

t The two time periods in year *y* during which the flare efficiency is measured. Each measurement event takes a minimum duration of one hour. The time interval between the measurement events is at least six months. Further assessment details are included in Section E.6.2.

$F_{CH4,RG,t}$ Mass flow of methane in the residual gas on a dry basis at reference conditions in the time period *t.*

Assessment details for the determination of $F_{CH4,RG,t}$:
As per the applicable guidance of the methodological tool "Project emissions from flaring" /12/ and also as per the registered PDD /2/, values of $F_{CH4,RG,t}$ shall be calculated by following the applicable guidance of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/. Values for the parameter $F_{CH4,RG,t}$ are thus calculated as follows:

$F_{CH4,RG,t} = V_{t,db,n} * v_{CH4,t,db} * \rho_{CH4,n}$

Where:

$\rho_{CH4,n}$ Density of greenhouse gas *i* (*i* = CH_4) in the gaseous stream (LFG) at normal conditions. Further details for the determination of $\rho_{CH4,n}$ are presented above under the sub-section "*Determination of every-minute values for the*

calculation parameter $F_{CH4,sent\_flare,y}$".

$v_{CH4,t,db}$ Volumetric fraction of greenhouse gas *i* (*i* = CH_4) in the gaseous stream in a time interval *t* on a dry basis. As confirmed by the EPIC verification team, Footnote 3 of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/: states the following:

"*(…) Flow measurement on a dry basis is not feasible at reasonable costs for a wet gaseous stream, so there will be no difference in the readings for volumetric fraction in wet basis analyzers and dry basis analyzers and both types can be used indistinctly for calculation Options A and D*."

Thus, every-minute values of $v_{CH4,t,db}$ are regarded as equal to every-minute values of the monitoring parameter $v_{CH4,t,wb,j}$ (for which further details are presented above under the sub-section "*Determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$*").

$V_{t,db,n}$ Volumetric flow of the gaseous stream (LFG) in time interval *t* on a dry basis which is sent to the flare. As per Option B of the applicable methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/, the volumetric flow of the gaseous stream on a dry basis is determined by converting the measured volumetric flow from wet basis to dry basis as follows:

$$V_{t,db,n} = V_{t,wb,n} / (1+v_{H2O,t,db})$$

Where:

$V_{t,wb,n}$ Volumetric flow of the gaseous stream (LFG) in time interval *t* on a wet basis at normal conditions. Further details of $V_{t,wb,n}$ are presented above under the sub-section "*Determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$*".

$v_{H2O,t,db}$ Volumetric fraction of H_2O in the gaseous stream in time interval *t* on a dry basis. As per applicable guidance of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/, $v_{H2O,t,db}$ is calculated as follows:

$$v_{H2O,t,db} = \frac{m_{H2O,t,db} * MM_{t,db}}{MM_{H2O}}$$

Where:

MM_{H2O} Molecular mass of H_2O. *Ex--ante* determined as 18.0152 kg/kmol.

$MM_{t,db}$ Molecular mass of the gaseous stream in time interval *t* on a dry basis. As per applicable guidance of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/, $MM_{t,db}$ is calculated as follows:

$$MM_{t,db} = \sum_{k} (v_{k,t,db} * MM_{k})$$

Where:

k — All gases, except H_2O, contained in the gaseous stream (e.g. N_2, CO_2, O_2, CO, H_2, CH_4, N_2O, NO, NO_2, SO_2, SF_6 and PFCs). See simplification below.

$V_{k,t,db}$ — Volumetric fraction of gas *k* in the gaseous stream in time interval *t* on a dry basis. As confirmed by the EPIC verification team, applicable guidance of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /14/ established the following:

> "*(…) The determination of the molecular mass of the gaseous stream ($MM_{t,db}$) requires measuring the volumetric fraction of all gases (k) in the gaseous stream. However, as a simplification, the volumetric fraction of only the gases k that are greenhouse gases and are considered in the emission reduction calculation in the underlying methodology must be monitored and the difference to 100% may be considered as pure nitrogen."*

As also confirmed by the EPIC verification team, ACM0001 /7/ does not include any restriction to such simplification. Thus, only the volumetric fraction of gases that are greenhouse gases and are correctly considered in related calculations (CH_4 in the particular case of the project activity) should be measured and the difference to 100% is just considered as pure nitrogen. Further details for the determination of the volumetric fraction of CH_4 in the gaseous stream ($V_{k,t,db}$ = $v_{CH4,t,db}$) are presented above under the calculation parameter $v_{CH4,t,db.}$

MM_k — Molecular mass of gas *k* (*k* = CH_4 and N_2). As indicated in the registered PDD /2/, the molecular mass of CH_4 and N_2 are ex-ante determined as 16.04 and 28.01 respectively.

$m_{H2O,t,db}$ — Absolute humidity in the gaseous stream in time interval *t* n a dry basis. As per Option 2 of the methodological "Tool to determine

the mass flow of a greenhouse gas in a gaseous stream" [14], by conservatively assuming that the gaseous stream is saturated ($m_{H2O,t,db} = m_{H2O,t,db,Sat}$), $m_{H2O,t,db}$ is calculated as follows [17]:

$$m_{H2O,t,db,Sat} = \frac{p_{H2O,t,Sat} * MM_{H2O}}{(P_t - p_{H2O,t,Sat}) * MM_{t,db}}$$

Where:

MM_{H2O}	Molecular mass of H_2O. As indicated in the registered PDD [2], MM_{H2O} is *ex-ante* determined as 18.0152.
P_t	Absolute pressure of the gaseous stream in time interval *t*. Further assessment details for the monitoring parameter P_t are included in Section E.6.2.
$MM_{t,db}$	Molecular mass of the gaseous stream in a time interval *t* on a dry basis. Further assessment details for the determination of $MM_{t,db}$ are presented above.
$p_{H2O,t,Sat}$	Saturation pressure of H_2O at temperature T in time *t*, Further assessment details for the monitoring parameter $p_{H2O,t,Sat}$ are included in Section E.6.2.

As correctly outlined in the latest version of the Monitoring Report

[17] It is important to note that the simplified calculation for the absolute humidity of the gaseous stream ($m_{H2O,t,db}$) presented in Option 2 of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" shall be applied by assuming the gaseous stream is dry or saturated depending on which is the conservative situation.

As confirmed by the EPIC verification team, Footnote 4 of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" states the following:

> "*An assumption that the gaseous stream is saturated is conservative for the situation that the mass flow of greenhouse gas i is underestimated (applicable for calculating baseline emissions). Conversely, an assumption that the gas stream is dry is conservative for the situation that the greenhouse gas t is overestimated (applicable for calculating project emissions).*"

In this particular case, $m_{H2O,t,db}$ is calculated for the determination of the mass flow of methane in the residual gas on a dry basis during the time period *t* ($F_{CH4,RG,t}$). While $F_{CH4,RG,t}$ is used for the determination of the parameter $PE_{flare,y}$ (project emissions from flaring the residual gas), the assumption that the gaseous stream is dry (conservatively applicable for calculating project emissions) would not be conservative in this case as an overestimation of the amount of methane in the residual gas would actually increase the calculated efficiency of the flare, thus resulting in a reduction of $PE_{flare,y}$ and consequent increment of emission reductions.

	[3], a value of 0.8962251 was calculated for the parameter $\eta_{flare,calc,y}$ for the considered monitoring period. *Assessment details for (i) compliance with operational and maintenance requirements for the flares (as established by the ex-ante determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$)) and (ii) consideration of data records for the monitoring parameter "Flame detection of flare in the minute m" ($Flame_m$) for the calculation of every-minute values:* As also confirmed by the EPIC verification team by assessing the monthly emission reduction spreadsheets [5], in accordance with the applied monitoring procedure for the project activity, compliance with operational and maintenance requirements for the flares, as established by the *ex-ante* determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$), was correctly considered for the determination and application of values of $\eta_{flare,m}$ for calculating every-minute values of $F_{CH4,flared,y}$ along the considered monitoring period[18]. As also confirmed by the EPIC verification team through assessment of the monthly emission reduction calculation spreadsheets [5], data records for the monitoring parameter "Flame detection of flare in the minute *m*" ($Flame_m$) are also effectively considered for the determination and application of the values of $\eta_{flare,m}$ along the considered monitoring period. For each installed flare, the time the flare has operated is monitored through every-minute monitoring the flame combustion status/condition by using an UV flame detector (of which status signal (flame status "*on*" or "*off*") is recorded and reported in the monthly emission reduction calculation spreadsheets valid for the considered monitoring period [5]. As also assessed by the EPIC verification team, monitoring requirements related to operational requirements/conditions for the flare (as provided by the manufacturer's specifications for operating conditions as per the *ex-ante* determined parameter $SPEC_{flare}$ (min. and max. flow of LFG to the flare + temperature of exhaust gas of the flare + meeting of maintenance requirements)) are also effectively and correctly considered in the context of the determination and application of values for $\eta_{flare,m}$ for calculating every-minute values of $F_{CH4,flared,y}$ along the considered monitoring period regardless of the selection of Option A of the methodological tool "Project emissions from flaring". As also confirmed through assessment of the monthly emission reduction

[18] While all performed maintenance events in the installed flares (including inspection and/or replacement of flare revetment material) were performed in accordance with requirements established in details for the ex-ante determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$)), the determination of emission reductions achieved by the project activity during the considered monitoring period are thus not negatively impacted by the records for the monitoring parameter $Maintenance_{y..}$
The Monitoring Report appropriately includes the following disclaimer about monitoring of the parameter $Maintenance_{y..}$ during the considered monitoring period:

> *"Monitoring of this parameter is required for the case of enclosed flare and the project participant selects Option B of the methodological tool "Project emissions from flaring" (version 02.0.0) to determine flare efficiency.*
> *(…)*
> *For the considered monitoring period, although Option A of the methodological tool "Project emissions from flaring" (version 02.0.0) is selected to determine flare efficiency, available monitoring registries for $Maintenance_y$ are anyway reported and considered for sake of completeness."*

	calculation spreadsheets /5/, for each minute *m* within the considered monitoring period when the flare have combusted LFG by not operating in accordance with the operational criteria as established by the *ex-ante* estimated parameter $SPEC_{flare}$ (in terms of LFG flow, temperature of exhaust gas or maintenance practice), no destruction of methane is accounted for the flare as part of the calculation of every-minute values $F_{CH4,flared,y.}$ The calculated accumulated value for $F_{CH4,PJ,y}$ = $F_{CH4,flared,y}$ + $F_{CH4,EL,y}$ for the considered monitoring period is correctly determined as 2,254 tCH_4. The calculated value for $BE_{CH4,y}$ for the considered monitoring period is correctly determined as 39,840 tCO_2e. The calculated total value for baseline emissions (BE_y) for the considered monitoring period is correctly determined as 43,191 tCO_2e.
Findings	Two (2) CARs were raised concerning the calculations of baseline emissions: **CAR 3:** The value for the calculation parameter $F_{CH4,PJ,y}$ reported in the summarized emission reduction calculation spreadsheet valid for the month of January/2020 is not in accordance with the value reported in the monthly emission reductions calculation spreadsheet for the month of January/2020. **CAR 4:** The reported values for the parameter $EC_{BL,y}$ in both the Monitoring Report and the summarized emission reductions calculation spreadsheet are not in accordance with the values presented in the invoices/reports for consumption of grid-sourced electricity by the project activity infrastructure which were issued by Companhia Estadual de Distribuição de Energia Elétrica – CEEE-D.
Conclusion	The EPIC verification team was able to confirm, upon successful closure of the raised related CARs, that all related calculations for the determination of baseline emissions related are provided in the monthly emission reduction calculation spreadsheets files /5/ and the summarized emission reduction calculation spreadsheet /5/ in a deemed correct and transparent manner. All performed calculations for baseline emissions, as reported in the latest version of the Monitoring Report /3/ and emission reduction calculation spreadsheets /5/, were verified to be performed under full conformance with applicable requirements of the registered PDD /2/, ACM0001 /7/ and applicable methodological tools /12/ /13/ /14/ /15/. Applied methods and formulae, as described in the monitoring plan from the registered PDD /2/ and applicable methodology + methodological tools, were correctly applied. The calculated value for BE_y for the considered monitoring period is correctly determined as 43,191 tCO_2e.

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	The EPIC verification team assessed whether the methods and formulae used to determine project emissions for the considered monitoring period are appropriate. The performed assessment encompassed checking whether applied methods and formulae as described in the registered monitoring plan and applicable methodology + methodological tools were correctly applied, including confirmation whether the Monitoring Report includes all parameters and monitored data at the intervals required by the applied methodology + methodological tools as per the registered PDD /2/. The correct application of emission factor and default values (ex-ante determined/fixed parameters as per the registered PDD /2/) was also verified.

The EPIC verification team was able to verity that as correctly indicated in the Monitoring Report /3/, project emissions for the whole monitoring period due to the operation of the project activity are determined as follows:

$PE_y = PE_{EC,grid,y} + PE_{EC,captive,y} + PE_{LPG,y}$

Where:

$PE_{EC,grid,y}$ Project emissions due to the consumption of grid-sourced electricityby the project activity in year *y*

$PE_{EC,captive,y}$ Project emissions from consumption of electricity generated by a captive off-grid electricity generator fuelled by fossil fuel (diesel) in year *y*

$PE_{LPG,y}$ Project emissions due to the consumption of LPG by the project activity in year *y*

Project emissions due to the consumption of grid-sourced electricity by the project activity ($PE_{EC,grid,y}$):

As correctly outlined in the latest version of the Monitoring Report /3/, for the whole considered monitoring period, emissions due to the consumption of grid-sourced electricity by the project activity ($PE_{EC,grid,y}$) are correctly determined by following applicable guidance of the methodological tool "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01) /13/ as follows:

$PE_{EC,grid,y} = EC_{PJ,grid,y} * EF_{EL,grid,y} * (1 + TDL_{grid,y})$

Where:

$EC_{PJ,grid,y}$ Quantity of grid-sourced electricity consumed by the project activity in year *y*. The following monthly value for consumption of grid-sourced electricity ($EC_{PJ,grid,y}$) within the considered monitoring period is correctly reported in the Monitoring Report /3/ and summarized emission reduction calculation spreadsheet /5/:

Month	Amount of grid-sourced electricity consumed by the project activity (MWh)
Jan./2020	7.864
Feb./2020	1.163
Mar./2020 (from 01/03/2020 to 02/03/2020)	0.086

Assessment details for the monitoring parameter $EC_{PJ,grid,y}$ valid for the considered monitoring period are included in Section E.6.2.

$TDL_{grid,y}$ Average technical transmission and distribution losses for providing electricity to the grid and/or for grid sourced electricity consumed by the project activity. As indicated in the registered PDD /2/, in the particular case of the determination of $PE_{EC,grid,y}$, In the particular case of consumption of grid-sourced electricity, the value for $TDL_{grid,y}$ is *ex-ante* determined as 20% ($TDL_{grid,import,y}$).

$EF_{EL,grid,y}$ Emission factor for grid-sourced electricity in year *y*. For the considered monitoring period, $EF_{EL,grid}$ is determined ex-post as the Combined margin CO_2 emission factor ($EF_{grid,CM,y}$) that is calculated as the weighted average of the ex-post determined value for the monitoring parameter "Operating margin CO_2 emission factor in year *y*" ($EF_{grid,OM,y}$) and the value for the ex-ante determined paramter "Build margin CO_2 emission factors" ($EF_{grid,BM,y}$). In order to

appropriately weight these two factors, the also previously determined and validated default values for the *ex-ante* determined parameters "Weighting of operating margin emission factor" (w_{OM}) and "Weighting of build margin emission factor" (w_{BM}) are applied. For the considered monitoring period, $EF_{grid,CM,y}$ is thus determined as follows:

$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$

Where:

w_{OM} Weighting of operating margin emissions factor. As established in the registered PDD /2/, w_{OM} is ex-an*te* determined as 0.25 (25%).

w_{BM} Weighting of operating margin emissions factor. As established in the registered PDD /2/, w_{BM} is *ex-ante* determined as 0.75 (75%).

$EF_{grid,OM,y}$ Operating margin CO_2 emission factor in year *y*. As per the applied monitoring procedure, the selected value for the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ represents the official average annual value for year 2020 (0.4539 tCO_2/MWh) as calculated and published by the DNA of Brazil.

$EF_{grid,BM,y}$ Build margin CO_2 emission factor in year *y*. As indicated in the registered PDD /2/, $EF_{grid,BM,y}$ is ex-ante determined as 0.2963 tCO_2/MWh.

The calculated value for $PE_{EC,grid,y}$ for the considered monitoring period is correctly determined as 6 tCO_2 (rounded value).

Project emissions from consumption of electricity generated by a captive off-grid electricity generator fuelled by fossil fuel (diesel) in year y ($PE_{EC,captive,y}$):

As correctly outlined in the latest version of the Monitoring Report /3/, for the whole considered monitoring period, emissions due to the consumption of electricity sourced by the captive off-grid electricity generator fuelled by Diesel by the project activity ($PE_{EC,captive,y}$) are correctly determined by following applicable guidance of the methodological tool "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01) /13/ as follows:

$PE_{EC,captive,y} = EC_{PJ,captive,y} * EF_{EL,captive,y} * (1 + TDL_{captive,y})$

Where:

$EC_{PJ,captive,y}$ Amount of electricity sourced by the captive electricity generator (fuelled by Diesel) and consumed by the project activity. For the considered monitoring period, $EC_{PJ,captive,y}$ is monitored as summarized below:

Month	Amount of electricity sourced by the installed back-up off grid electricity generator (fuelled by diesel) (MWh)
Jan./2020	0.0
Feb./2020	0.004
Mar./2020 (from 01/03/2020 to 02/03/2020)	0.0

Assessment details for the monitoring parameter $EC_{PJ,captive,y}$ valid for

the considered monitoring period are included in Section E.6.2.

$TDL_{captive,y}$ Average technical transmission and distribution losses for electricity sourced by the captive electricity generator. As indicated in the registered PDD /2/, $TDL_{captive,y}$ is *ex-ante* determined as zero.

$EF_{EL,captive,y}$ CO_2 emission factor for electricity sourced by the captive off-grid electricity generators. As indicated in the registered PDD /2/, $EF_{EL,captive,y}$ is *ex-ante* determined as 1.3 tCO_2/MWh.

The calculated value for $PE_{EC,captive,y}$ for the considered monitoring period is correctly determined as 1 tCO_2.

Project emissions due to the consumption of LPG by the project activity ($PE_{LPG,y}$):

Project emissions due to the consumption of LPG by the project activity ($PE_{LPG,y}$) are correctly determined by following the applicable guidance of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 02) /15/ as follows:

$PE_{LPG,y} = FC_{LPG,y} * COEF_{LPG,y}$

Where:

$FC_{LPG,y}$ Quantity of LPG consumed by the project activity in year *y*. $FC_{LPG,y}$ is correctly reported as 45 kg (0.045 ton). The following relevant disclaimer is appropriately added in the Monitoring Report /3/ regarding the consumption of LPG by the project activity during the considered monitoring period:

> *"During the period from 01/01/2020 to 02/03/2020 no LPG purchasing occurred. The amount equivalent for the last occurred purchasing event of LPG (1 cylinder of 45 kg of LPG) on 05/04/2018 is thus considered. Although by the end of the considered monitoring period, the gas content of such particular LPG cylinder (45 kg of LPG) was yet fully consumed, for sake of transparency and completeness, it is considered the 45 kg value as a conservative approach for the determination of the amount of LPG consumed by the project activity during the considered monitoring period. Anyway, it is crucial to note that the magnitude of consumed LPG by the project activity represents less than 1 tCO_2 in terms of project emissions (1 tCO_2 is the rounded value). For sake of comparison, it is relevant to note that a consumption of 45 kg of LPG represents slightly less than 1 tCO_2 in terms of GHG emissions."*

Detailed assessment for monitoring of $FC_{LPG,y}$ is presented in Section E.6.2.

$COEF_{LPG,y}$ CO_2 emission coefficient for LPG. $COEF_{LPG,y}$ is calculated as follows:

$COEF_{LPG,y} = NCV_{LPG,y} * EF_{CO2,LPG,y}$

Where:

$EF_{CO2,LPG,y}$ CO_2 emission factor of fuel LPG (in energy basis). A

	default value of 0.0656 tCO_2/GJ is selected for the considered monitoring period (value sourced by IPCC Guidelines for National Greenhouse Gas Inventories, 2006 /11/, Chapter 1, Volume 2, Table 1.4). Further details about the monitoring parameter $EF_{CO2,LPG,y}$ are included in Section E.6.2. $NCV_{LPG,y}$ Net calorific value of the fuel LPG. A default value of 46.5 GJ/ton is selected for the considered monitoring period (value sourced by the Brazilian Energetic Balance Report, year 2020 /65/). The calculated value for $PE_{LPG,y}$ for the considered monitoring period is correctly determined as 1 tCO_2 (rounded value). Total project emissions (PE_y) are correctly calculated and reported as 8 tCO_2 (rounded value) and are correctly considered in the context of the emission reduction calculations.
Findings	One (1) CAR was raised regarding the calculations of project emissions: **CAR 5:** The reported value for the parameter $EC_{PJ,captive,y}$ for the month of March/2020 in both the Monitoring Report and the summarized emission reductions calculation spreadsheet is not in accordance with primary monitoring records.
Conclusion	The EPIC verification team was able to confirm, upon successful closure of the raised related CAR, that all related calculations for the determination of project emissions are provided in the summarized emission reduction calculation spreadsheet /5/ in a deemed correct and transparent manner. All performed calculations for project emissions, as reported in the latest version of the Monitoring Report /3/ and summarized emission reduction calculation spreadsheet /5/, were verified to be performed under full conformance with applicable requirements of the registered PDD /2/, ACM0001 /7/ and applicable methodological tools /13/ /15/ /17/. Applied methods and formulae, as described in the monitoring plan from the registered PDD /2/ and applicable methodology + methodological tools, were correctly applied. The calculated value for PE_y for the considered monitoring period is correctly determined as 8 tCO_2 (rounded value).

E.8.3. Calculation of leakage GHG emissions

Means of verification	Not applicable. In accordance with the applied CDM baseline and monitoring methodology ACM0001 /7/, the registered PDD /2/ indicates that no leakage emissions are to be considered in the context of emission reduction calculations.
Findings	Not applicable.
Conclusion	Not applicable.

E.8.4. Summary calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	The EPIC verification team assessed whether calculation and reporting of achieved GHG emission reductions for the considered monitoring period are correct. As a result of the performed verification assessment, the EPIC verification team was able to confirm that the determination of achieved GHG emission reductions for the considered monitoring period are performed and reported in a correct, objective and transparent manner. As confirmed by the EPIC verification team, determination of baseline and project emissions are in accordance with the applicable requirements from the following reference and methodological

	documents: - Monitoring plan and other related provisions of the registered PDD /2/. - CDM baseline and monitoring methodology ACM0001 - 'Flaring or use of landfill gas" (version 15.0) /7/, - Tool to calculate baseline, project and/or leakage emissions from electricity consumption (version 01) /13/. - Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 02) /15/ - "Tool to calculate the emission factor for an electricity system" (version 04.0 /17/) - "Project emissions from flaring" (version 02.0.0) /12/ - "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) /14/ All figures and input data as well as all performed calculations were checked by the EPIC verification team and were found to be reported in a deemed correct, appropriate and transparent manner in the latest versions of the Monitoring Report /3/ and emission reduction calculation spreadsheets /5/. EPIC was thus able to confirm that the emission reductions reported for the considered monitoring period are based on authentic measurements of related monitoring data and are also based on the application of a semi-automatic and systematic data monitoring procedure for automatically recorded monitoring data as well as data related to the consumption of LPG, electricity sourced by the installed captive off-grid electricity generator (fuelled by Diesel), grid–sourced electricity by the project activity and electricity generated by the project activity. Moreover, as also assessed by the EPIC verification team, monitoring data records were correctly retrieved and utilized in the emission reduction calculation spreadsheets /5/ for performing related calculation and reporting of achieved emission reductions for the considered monitoring period. EPIC was thus able to verify that, in general, all calculation and reporting procedures were adopted in a deemed transparent, correct and reliable manner.
Findings	No related findings (CARs, CLs and/or FARs) were raised regarding reporting and calculations of summary of calculation of GHG emission reductions.
Conclusion	The EPIC verification team was able to confirm that reported achieved emission reductions for the considered monitoring period are correctly calculated and reported as the difference between determined accumulated values for baseline emissions and project emissions for the period. Reported achieved emission reductions are in accordance with all applicable measurement, reporting and calculation requirements as per the monitoring plan of the registered PDD /2/, monitoring and baseline methodology ACM0001 - 'Flaring or use of landfill gas" /7/ and applicable methodological tools /13/ /14/ /15/ /17/.

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	The EPIC verification team assessed the comparison of achieved GHG emission reductions with related estimates as per the registered PDD /2/. As part of the performed verification assessment, reported and verified emission reductions achieved by the project activity during the monitoring period encompassing 62 days within year 2020 were compared against the equivalent related *ex-ante* estimation of emission reductions for 2020 valid for such 62-day period as per the registered PDD /2/. The results of such comparisons are summarized and assessed below:

	<table><tr><th>Period</th><th>Ex-ante estimation of emission reductions as per the PDD (in tCO_2e)</th><th>Achieved emission reductions (in tCO_2e)</th></tr><tr><td>Period from 01/01/2020 to 02/03/2020 (considered monitoring period)</td><td>94,008[19]</td><td>43,183</td></tr></table>
Findings	No related findings (CARs, CLs and/or FARs) were raised regarding the comparison of achieved emission reductions against related *ex-ante* estimation of emission reductions as per the registered PDD.
Conclusion	As confirmed by the EPIC verification team, for the 62-day length monitoring period from 01/01/2020 to 02/03/2020, achieved emission reductions are correctly indicated as representing about ~46% of the comparable value of *ex-ante* estimation of emission reductions as per the registered PDD /2/ valid for such period. As further assessed in Section E.8.6., the Monitoring Report presents a set of factors and aspects that sufficiently explains the occurred differences between achieved/verified emission reductions during the considered monitoring period and the comparable value for *ex-ante* estimation of emission reductions as per the registered PDD /2/ for the same time period. This is deemed correct and in accordance with applicable verification requirements.

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	The EPIC verification team assessed the remarks on the difference between achieved GHG emission reductions and applicable estimated value in PDD /2/. As appropriately indicated in Section E.6 of the latest version of the Monitoring Report /3/, there are a set of factors and aspects that sufficiently explain the occurred slightly difference between verified emission reductions achieved during the considered monitoring period and the comparable value for *ex-ante* estimation of emission reductions as per the registered PDD /2/ for the same time period. Assessment for such factors and aspects are summarized below: *Aspects/conditions that represent a decrease factor of reported emission reductions for the considered monitoring period when compared against the ex-ante estimation of emission reduction for the same period in the PDD:* *<u>1. Uncertainties associated with the application of First Order Decay (FOD) multi-phased model for estimating the emission reductions in the PDD:</u>* Like any other CDM project activity encompassing LFG collection and destruction/utilization, all potential uncertainties associated with the application of the First Order Decay (FOD) multi-phased model in the context of the *ex-ante* estimation of emission reductions in the registered PDD /2/ are applicable for the *ex-ante* estimation of emission reductions for the "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". The EPIC verification team has confirmed that it is reasonable to assume that the uncertainties associated with the application of such decay model have somehow underestimated the amount of LFG to be generated and collected by the project activity during the considered monitoring period.

[19] The 94,008 tCO_2e value is calculated as the share of the estimated total emission reductions for year 2020 to be achieved during the 62-day length considered monitoring period within year 2020 (calculated as 554,952 tCO_2e * 62 / 366)

	Lack of LFG collection infrastructure covering all area of the CRR landfill: As outlined in the latest version of the Monitoring Report, while a significant part of the MSW disposal area of the CRR landfill lacked LFG collection infrastructure during the considered monitoring period, a large share of LFG generated at the landfill was thus not collected/combusted by the project activity.
Findings	One (1) CAR was raised regarding remarks on difference between achieved GHG emission reductions and applicable estimated value in PDD: **CAR 6**: While during the considered monitoring period a significant amount of methane generated at the CRR landfill has not been collected and destroyed by the project activity due to the lack of LFG collection infrastructure covering all the area of the CRR landfill, such condition is not listed as one of the aspects/conditions which contributed to the significant difference between achieved emission reductions during the considered monitoring period and ex-ante estimation of emission reduction for the same period as per the PDD.
Conclusion	As a conclusion, by taking into account the factors/aspects listed above and upon successful closure of the raised related CAR, it is the opinion of the EPIC verification team that the occurred relative difference between achieved emission reductions during the considered monitoring period and calculated comparable PDD's ex-ante estimation of emission reductions for the same period is deemed acceptable, plausible and reasonable.

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	As the monitoring period covered by this Verification Report (01/01/2020 to 02/03/2020) started after 01/01/2013, this verification does not include assessment of GHG emission reductions occurred during the first commitment period. Achieved emission GHG emission reductions as reported in the Monitoring Report /3/ occurred after 01/01/2013.
Findings	No related findings (CARs, CLs and/or FARs) were raised regarding reporting and calculations of GHG emission reductions during the first commitment period and the period from 01/01/2013 onwards.
Conclusion	As a conclusion, EPIC thus confirms that the reported achieved emission reductions for the considered monitoring period are in accordance with all measurement, reporting and calculation requirements of the monitoring plan of the registered PDD /2/, monitoring and baseline methodology ACM0001 - 'Flaring or use of landfill gas" /7/ and applicable methodological tools /13/ /14/ /15/ /17/. No emission reductions occurred prior 01/01/2013 were considered in the current verification.

E.9. Assessment of reported sustainable development co-benefits

Means of verification	Not applicable. The project activity does not encompass monitoring of sustainable development co-benefits.
Findings	Not applicable.
Conclusion	Not applicable.

E.10. Global stakeholder consultation

Means of verification	Not applicable. This verification report does not encompass assessment of the first monitoring period of the project activity.
Findings	Not applicable.
Conclusion	Not applicable.

SECTION F. Internal quality control

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As part of EPIC internal quality control system, after the completion of assessment by the verification team, all the relevant documentation is submitted to a qualified, independent technical review team. The technical review team (with at least one member) is appointed to review the draft final verification report (Draft FVR). The technical review team assesses whether all the reporting requirements have been fulfilled and whether all the issues raised were satisfactorily addressed. The technical reviewer team either accepts or rejects element(s) of the Draft FVR included by the verification team. The comments made by the technical review team are taken into consideration and incorporated in the final FVR. The final report (after resolutions of all findings) is then submitted to the head of operations for review and approval.

SECTION G. Verification opinion

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It is the opinion of EPIC that reported GHG emission reductions for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" for the monitoring period from 01/01/2020 to 02/03/2020, as reported in the latest version of the Monitoring Report issued on 31/08/2021 (version 2.0), are calculated and reported without material misstatements and in a correct manner.

Moreover, EPIC has confirmed that all information presented in the latest version of the Monitoring Report /3/ and all applied calculations for the determination of emission reductions achieved during the considered monitoring period are under full conformance with provisions and requirements of the registered PDD /2/, monitoring and baseline methodology ACM0001 - 'Flaring or use of landfill gas" /7/ and applicable methodological tools /13/ /14/ /15/ /17/.

EPIC thus confirms the following regarding verified emission reductions:

Project title:	Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)
UNFCCC ref no:	0648
PDD Monitoring Report	Version 9.2, dated 16/06/2017. Version 2.0, dated 31/08/2021
Methodology used for verification:	ACM0001 (version 15.0)
Applicable monitoring period:	01/01/2020 to 02/03/2020 (first and last day included)
Achieved emission reductions:	43,183 tCO_2e

SECTION H. Certification statement

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EPIC Sustainability Services Pvt. Ltd. (EPIC) has performed the 19th periodic verification assessment of the registered CDM project activity titled "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". The project activity was registered by the UNFCCC on 31/12/2006 as CDM project activity with registration no. 0648 and it is currently under its 2nd 7-year renewable crediting period (period from 01/12/2014 to 30/11/2021).

It is EPIC responsibility to express an independent verification statement and opinion on the reported GHG emission reductions from the project activity during the covered monitoring period.

The project activity is implemented and has operated at the CRR landfill. In accordance with related project design information made available in the latest version of the Project Design Document (PDD) for the 2nd 7-year crediting period, the operation of the project activity resulted in permanent and real mitigation of methane (CH_4) emissions during the considered monitoring period through collection and destruction of landfill gas (LFG) by combustion under controlled conditions in a high temperature enclosed flare and its utilization for electricity generation in the new electricity generation facility. While LFG is rich in CH_4, as established in the registered PDD for the project activity, in the absence of the project activity (baseline scenario) it is assumed that the largest share of LFG collected and destroyed by the project activity would be directly emitted into the atmosphere. Moreover, the project also promoted emission reductions resulting from the displacement of an equivalent amount of electricity generated by the project activity which would otherwise be generated by existing grid-connected power plants, including fossil-fuel fired power plants (and addition of new power generation units) within the National Electricity Grid of Brazil).

The host-country project participant and project operator Biogas Riograndense Ltda. has been responsible for gathering of monitoring data in accordance with the monitoring plan of the registered PDD. While supported by hired external CDM consultants, Biogas Riograndense Ltda. has been responsible for calculating and reporting GHG emissions reductions achieved by the project activity during the considered monitoring period.

The EPIC verification team performed the verification assessment and provided its verification opinion on the basis of the provisions and requirements of the CDM baseline and monitoring methodology ACM0001 - "Flaring or use of landfill gas" (version 15.0), the monitoring plan included in the registered PDD for the 2nd 7-year crediting period of the project activity (version 9.2, dated 16/06/2017) and also as per the latest version of Monitoring Report for the considered monitoring period. The verification assessment performed by EPIC included:

i) checking whether the project activity was implemented and has operated in accordance with related project design details as described in the registered version of the Project Design Document (PDD) for the project activity;
ii) checking whether the provisions of both the applied CDM baseline and monitoring methodology and the monitoring plan (as per the registered PDD) were consistently and appropriately applied;
iii) assessment of all documented evidences which supports the reported data and claimed emission reductions during the considered monitoring period;
iv) checking whether the installed monitoring equipment/instrument required for measuring *ex-post* determined parameters required for calculating emission reductions were calibrated and have operated appropriately.

The EPIC verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. EPIC planned and performed the verification assessment by obtaining evidence, information and explanations that were considered necessary for providing reasonable assurance that reported GHG emission reductions are fairly

stated. All Corrective Action Requests (CARs) and/or Clarification Actions (CL) raised by EPIC as part of the performed verification assessment were confirmed to be adequately resolved.

It is the opinion of EPIC that reported GHG emission reductions for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" for the monitoring period from 01/01/2020 to 02/03/2020, as reported in the latest version of the Monitoring Report, are calculated and reported without material misstatements and in a correct manner. Moreover, EPIC has confirmed that all information presented in the latest version of the Monitoring Report and all applied calculations for the determination of emission reductions achieved during the considered monitoring period are under full conformance with provisions and requirements of the registered PDD, monitoring and baseline methodology ACM0001 - 'Flaring or use of landfill gas" (version 15.0) and applicable methodological tools.

EPIC Sustainability Services Pvt. Ltd. (EPIC) herewith confirms that GHG emission reductions were achieved by the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" during the monitoring period from 01/01/2020 to 02/03/2020 as follows:

Emission reductions for the monitoring period from 01/01/2020 to 02/03/2020:	43,183 tCO_2e

Prepared and submitted by
 (Marco A. Ratton) Verification Team Leader

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology (CDM baseline and monitoring methodology)
ANP	Brazilian National Agency of Petroleum, Natural Gas and Biofuels (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis)
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM-EB	Clean Development Mechanism Executive Board
CDM-M&P	Modalities and Procedures for Clean Development Mechanism
CDM-PCP-PA	Clean Development Mechanism Project Cycle Procedures for Project Activities
CDM-PS-PA	Clean Development Mechanism Project Standard for Project Activities
CDM-VVS-PA	Clean Development Mechanism Validation and Verification Standard for Project Activities
CER	Certified Emission Reduction
CETESB	Companhia Ambiental do Estado de São Paulo (Environmental Agency/Authority for São Paulo State in Brazil)
CH4	Methane
CL	Clarification Request
CMP	Meeting of Parties to the Kyoto Protocol
CO2	Carbon dioxide
CO2e	Carbon dioxide equivalent
COP/MOP	The Conference of the Parties to the United Nations Framework Convention on Climate Change serving as the Meeting of the Parties to the Kyoto Protocol
CRR	Central de Resíduos do Recreio (“Recreio Waste FAcility” when translated into English language)
DNA	Designated National Authority
DOE	Designated Operational Entity
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas
HDPE	High Density Polyethylene
INMETRO	Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (Brazilian “Institute for Metrology, Standardization and Industrial quality” when translated into English language). INMETRO is the Brazilian official agency for metrology and certification affairs
LFG	Landfill gas
LPG	Liquefied petroleum gas
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MR	Monitoring Report
MSW	Municipals solid waste
ONS	Operador Nacional do Sistema (Brazilian entity responsible for the coordination of the dispatch of power plants connected to the National Electricity Grid of Brazil)
PDD	Project Design Document
PLC	Programmable logic controller
PNRS	Política Nacional de Resíduos Sólidos (Brazilian National Policy on Waste Management as established by Federal Law No. 12,305/10 (the LPNRS).
PP	Project Participant
PPA	Power purchase agreement
QA/QC	Quality Assurance / Quality Control
SQL	Structured query language
UNFCCC	United Nations Framework Convention for Climate Change
US-EPA	Environmental Protection Agency of the U.S.A.
UV	Ultra violet

Appendix 2. Competence of team members and technical reviewers

All personnel being engaged in CDM verification assessments performed by EPIC are qualified based on the established procedures of EPIC to assure the resource requirements that satisfy all the requirements of competence criteria of the CDM Accreditation Standard for operational entities. EPIC is accredited as a DOE and holds the full responsibility on decision-making regarding the verification in accordance with the accreditation requirements of the CDM-EB.

The following verification team has been assigned to carry out the verification of the project.

Name	**Mr Marco A. Ratton**	**Mr. R. Vijayaraghavan**
Role	Lead Auditor	Technical Reviewer
Competence in relevant sectoral scope(s):	Sectoral scope 1 and 13	Sectoral scope 1 and 13
Responsibility	Performance of document review, online watching (and later further assessing/reviewing) the produced live videos (movies) (of which details are included in Section D.2), preparation of initial list of findings, assessment of responses from the project participants for all list of findings and assessment of updated/corrected documents, preparation of the and draft Verification Report, addressing comments from the performed technical review and preparation of final Verification Report.	Performance of Technical review

Mr. Marco A. Ratton is based in Brazil and has acted as a CDM auditor since 2007. He holds vast experience with independent assessments of CDM project activities within the area of solid waste management and effluent treatment implemented in Latin America and other regions. He also has previous working experience with planning of municipal waste management as well as educational background in mechanical fabrication & manufacturing technologies, economics and environmental management & policy. He has undergone extensive training on CDM validation and verification and is a qualified Lead Auditor for Sectoral Scope 13 under Technical Area “Waste handling and disposal” and Sector Scope 1 in accordance with procedures of EPIC sustainability services Pvt. Ltd. He also has previous experience on conducting ISO 9001/14001 assessments.

Mr. R. Vijayaraghavan holds BE in Mechanical Engineering, M.Tech in Energy Conservation and Management and MBA in Technology Management. He is certified as Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has 10 years of working experience in energy sector including validation / verification of fifty CDM and VCS/GS projects and has undergone extensive training on CDM validation and verification and has been qualified as Lead Auditor and Technical Reviewer with Sectoral Scope 1 and 13. He is also an ISO 26000 lead auditor certified by Professional Evaluation and Certification Board (PECB).

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
/1/	UNFCCC/CDM-EB	Clean Development Mechanism Validation and Verification Standard for Project Activities (CDM-VVS-PA), (version 02.0).	Dated 29/11/2018. Available online: https://cdm.unfccc.int/Reference/Standards/index.html	Others
/2/	Biogas Riograndense Ltda.	Project Design Document (PDD) for the 2nd 7-year renewable crediting period for the CDM project activity: "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)", version 9.2.	Dated 16/06/2017. Available online: http://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/view	Project Participants
/3/	Biogas Riograndense Ltda.	Monitoring Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" - monitoring period from 01/01/2020 to 02/03/2020, version 2.0.	Dated 31/08/2021.	Project Participants
/4/	Biogas Riograndense Ltda.	Monitoring Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" - monitoring period from 01/01/2020 to 02/03/2020, version 1.0.	Dated 09/04/2021. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/view	Project Participants
/5/	Biogas Riograndense Ltda.	Emission reduction calculation spreadsheet for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" - monitoring period from 01/01/2020 to 02/03/2020. Monthly emission reduction spreadsheets + summarized emission reduction spreadsheet. File names: "202001.xlsx" "202002.xlsx" "202003.xlsx" "MR 19 - Recreio - V.2.xlsx" "MR 19 - Recreio - V.2 - FE.xlsx"	Dated 31/08/2021.	Project Participants
/6/	Biogas Riograndense Ltda.	Input data for the emission reduction calculation spreadsheets for the project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" - monitoring period from 01/01/2020 to 02/03/2020. File names:	Dated 06/04/2021.	Project Participants

		"Jan.2020.xlsx" "Feb.2020.xlsx" "Mar.2020.xlsx"		
/7/	UNFCCC/CDM-EB	Consolidated baseline and monitoring methodology ACM0001 - "Flaring or use of landfill gas¨, version 15.0 as per EB 67.	Dated 08/11/2013. Available online: https://cdm.unfccc.int/methodologies/DB/LZK7FFF1UVA2IILFNAQ0I0CUCW3RJJ	Others
/8/	UNFCCC	Kyoto Protocol to the United Nations Framework Convention on Climate Change	Dated 1998. Available online: http://unfccc.int/resource/docs/convkp/kpeng.pdf	Others
/9/	UNFCCC	Decision 3/CMP. 1 (Marrakesh – Accords)	Dated 30/03/2006. Available online: https://cdm.unfccc.int/Reference/COPMOP/08a01.pdf	Others
/10/	SIRIM QAS INTERNATIONAL SDN.BHD	"Validation Report for Renewal of Crediting Period (RCP)" for the project activity Central de Resíduos do Recreio Landfill Gas Project (CRRLGP), Version 2.0.	Dated 15/10/2015. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/view	Others
/11/	IPCC	1996 IPCC Guidelines for National Greenhouse Gas Inventories: workbook; 2006 IPCC Guidelines for National Greenhouse Gas Inventories: workbook.	Available online: http://www.ipcc-nggip.iges.or.jp/public/gl/invs5.html http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.html	Others
/12/	UNFCCC/CDM-EB	"Project emissions from flaring", (version 02.0.0).	Dated 20/07/2012. Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v2.0.pdf/history_view	Others
/13/	UNFCCC/CDM-EB	"Tool to calculate baseline, project and/or leakage emissions from electricity consumption", (version 01).	Dated 16/05/2008. Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf/history_view	Others
/14/	UNFCCC/CDM-EB	¨Tool to determine the mass flow of a greenhouse gas in a gaseous stream¨, (version 02.0.0).	Dated 03/06/2011. Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v2.0.0.pdf/history_vie	Others

			w	
/15/	UNFCCC/CDM-EB	"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", (version 02).	Dated 02/08/2008. Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf/history_view	Others
/16/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 8th verification (monitoring period from 15/09/2014 to 30/11/2014).	Dated 29/03/2016 Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/EPIC_Sust1452232294.46/view	Others
/17/	UNFCCC/CDM-EB	"Tool to calculate the emission factor for an electricity system", (version 04.0).	Dated 04/10/2013. Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf/history_view	Others
/18/	UNFCCC/CDM-EB	CDM Project Standard for Project Activities (CDM-PS-PA), (version 02.0).	Dated 29/11/2018. Available online: https://cdm.unfccc.int/Reference/Standards/index.html	Others
/19/	UNFCCC/CDM-EB	Clean Development Mechanism Project Cycle Procedure for Project Activities (CDM-PCP-PA), (version 02.0)	Dated 29/11/2018. Available online: https://cdm.unfccc.int/Reference/Procedures/index.html	Others
/20/	Biogas Riograndense Ltda.	Emission reduction calculation spreadsheet for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" - monitoring period from 01/01/2020 to 02/03/2020. Monthly emission reduction spreadsheet + summarized emission reduction spreadsheet. File names: "202001.xlsx" "202002.xlsx" "202003.xlsx" "MR 19 - Recreio - V.1.xlsx" "MR 19 - Recreio - V.1 - FE.xlsx"	Dated 06/04/2021.	Project Participants
/21/	EPIC / Biogas Riograndense Ltda.	Comparative emission reduction calculation spreadsheets for the project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" - monitoring period from 01/01/2020 to 02/03/2020.	Dated 09/08/2021.	Project Participants

		Created as part of the Data authenticity checking procedure performed during the verification. File names: “202001 - for checking.xlsx” “202002 - for checking.xlsx” “202003 - for checking.xlsx” “MR 19 - Recreio - V.2 - for checking.xlsx” “MR 19 - Recreio - V.2 – FE - for checking.xlsx”		
/22/	EPIC / Biogas Riograndense Ltda.	Comparative spreadsheets with monitoring records for the project activity “Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)” – monitoring period from 01/01/2020 to 02/03/2020. Created as part of the Data authenticity checking procedure partially performed during the time the live videos (movies) (of which details are included in Section D.2) was produced/watched. File names: “Jan.2020 – for checking.xlsx” “Feb.2020 – for checking.xlsx” “Mar.2020 – for checking.xlsx”	Dated 10/05/2021.	Others
/23/	Biogas Riograndense Ltda.	Blank version of the emission reduction calculation spreadsheets applied for the project activity “Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)” - monitoring period from 01/01/2020 to 02/03/2020. File names: “YYYYMM - blank.xls ” “MR 19 - Recreio - V.1 - blank.xlsx” “MR 19 - Recreio - V.1 – FE - blank.xlsx”	Dated 06/04/2021.	Project Participants
/24/	Biogas Riograndense Ltda.	Internal service and maintenance log book (with details about historical of interventions, service and instrument/equipment calibration and replacement in the project activity “Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)”).	Available at the project’s data control room.	Project Participants
/25/	Biogas Riograndense Ltda.	Completed Modalities of Communication (MoC) form for the CDM project activity “Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)”.	Latest version dated 29/10/2014. Available online: http://cdm.unfccc.int/Projects/DB/DNV-CUK1134509951.62/view?cp=1	Project Participants
/26/	EPIC	EPIC: Working procedures for	Dated 01/08/2014.	Others

		performance of CDM verification assessments, Issue No. 2, Rev No. 1.		
/27/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 7th verification (monitoring period from 01/01/2014 to 14/09/2014, version 1.0.	Dated 11/05/2016 Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/EPIC_Sust1450764884.62/view	Others
/28/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 9th verification (monitoring period from 01/12/2014 to 31/12/2015.	Dated 11/05/2016 Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1457940036.51/view	Others
/29/	Germanischer Lloyd Certification GmbH	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 2nd periodic verifications (monitoring period from 11/12/2008 to 20/10/2009). GLC Report No. 054, Rev 08.	Dated 31/07/2012. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/Germanischer1265124397.97/view	Others
/30/	Companhia Estadual de Distribuição de Energia Elétrica – CEEE-D)	Monthly additional invoices/reports for consumption of grid-sourced electricity by the infrastructure of the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" for the period from January/2020 to March/2020.	-	Others
/31/	Fazit – Controle e Automação de Processos Industriais Ltda	Calibration certificate for the installed CH_4 content gas analyzer unit with S/N N1-C8-283. Calibration Certificate 4896-19B. Calibration event date: 23/08/2019.	Certificate issuance date: 23/08/2019.	Others
/32/	LABELO - Laboratórios Especializados em Eletroeletrônica Calibração e Ensaios.	Calibration certificate for electricity meter Serial No. 00008150. Certificate No. E0684/2016. Calibration event date: 25/03/2016.	Certificate issuance date: 25/03/2016.	Others
/33/	SGS United Kingdom Ltd.	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 1st verification (verification period from 01/12/2007 to 10/12/2008. Issue 5.1 CDM.VER0446.	Dated 09/03/2011. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/SGS-UKL1232979270.24/view	Others

/34/	Biogas Riograndense Ltda.	Project Design Document (PDD) for the 2nd 7-year renewable crediting period for the CDM project activity: "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)", version 9.1.	Dated 14/09/2015. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/view	Project Participants
/35/	EPIC	Validation Opinion Report for Post-Registration Changes for the CDM project activity Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". Version 1.0	Dated 16/06/2017. .	Others
/36/	SGS do Brasil Ltda.	Calibration certificate for the installed pressure sensor with S/N 249692. Certificate No. 6624/2019. Calibration event date: 13/06/2019.	Certificate issuance date: 13/06/2019.	Others
/37/	SGS do Brasil Ltda.	Calibration certificate for the installed temperature sensor with S/N 57235. Certificate No. 12694/2019. Calibration event date: 13/06/2019.	Certificate issuance date: 13/06/2019.	Others
/38/	CEIME - Comércio e Metrologia Ltda.	Calibration certificate for the pressure signal + data transmission unit of the installed LFG flow meters used for measuring flow of LFG sent to the engine-generator sets: - Unit with S/N 3K646614027669. Certificate No. TRP-0283393/19. Calibration event date: 10/06/2019. - Unit with S/N 3K646614027628. Certificate No. TRP-0483393/19. Calibration event date: 10/06/2019. - Unit with S/N 3K646614027627. Certificate No. TRP-0683393/19. Calibration event date: 10/06/2019. - Unit with S/N 3K646614027625. Certificate No. TRP-0770157/16. Calibration event date: 10/06/2019. - Unit with S/N 3K646614027626. Certificate No. TRP-1083393/19. Calibration event date: 10/06/2019. - Unit with S/N	 Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance	Others

		3K646614027629. Certificate No. TRP-1283393/19. Calibration event date: 10/06/2019.	date: 10/06/2019.	
/39/	SGS do Brasil Ltda.	Calibration certificate for the installed thermocouple TT-04. Calibration Certificate No. 6779/2019. Calibration event date: 27/03/2019.	Certificate issuance date: 27/03/2019.	Others
/40/	SGS do Brasil Ltda.	Calibration certificate for the installed thermocouple TT-05. Calibration Certificate No. 6780/2019. Calibration event date: 27/03/2019.	Certificate issuance date: 27/03/2019.	Others
/41/	Honeywell Analytics Ltd.	Specification sheet for the C7061A Dynamic Self-Check Ultra-Violet Flame Detector.	Available online: https://customer.honeywell.com/resources/techlit/TechLitDocuments/65-0000s/65-0223.pdf	Others
/42/	CEIME - Comércio e Metrologia Ltda.	Calibration certificate for the installed temperature sensors used for measuring temperature of LFG sent to the engine-generator sets: - Temperature sensor with S/N E14PT0680. Certificate No. 0183393/19. Calibration event date: 10/06/2019. - Temperature sensor with S/N E14PT0678. Certificate No. 0283393/19. Calibration event date: 10/06/2019. - Temperature sensor with S/N E14PT0677. Certificate No. 0383393/19. Calibration event date: 10/06/2019. - Temperature sensor with S/N E14PT0675. Certificate No. 0483393/19. Calibration event date: 10/06/2019. - Temperature sensor with S/N E14PT0676. Certificate No. 0583393/19. Calibration event date: 10/06/2019. - Temperature sensor with S/N E14PT0679. Certificate No. 0683393/19. Calibration	 Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019.	Others

		event date: 10/06/2019.		
/43/	CDM-EB	Decision agreed by the CDM Executive Board (CDM-EB) to relax mandatory site visits by DOEs (valid for a 3-month period (from 23/03/2020 to 23/06/2020) because of COVID-19 pandemic (+ decision also agreed by the CDM-EB to extend the relaxation of mandatory site visits until 31/12/2021)	Available online: https://cdm.unfccc.int/newsroom/latestnews/releases/2020/01041_index.html	Others
/44/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 10th verification (monitoring period from 01/01/2016 to 31/07/2016, version 4.0.	Dated 23/06/2017. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1491298424.51/view	Others
/45/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 7th verification (monitoring period from 01/01/2014 to 14/09/2014.	Dated 11/05/2016 Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/EPIC_Sust1450764884.62/view	Others
/46/	Biotérmica Energia S.A.	Monthly receipts of commercialization of net electricity generated by the the power generation infrastructure of the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" during the period from January/2020 to March/2020.	-	Others
/47/	5EC Engenharia Ltda.	Report on initial verification of the electricity meters Ello, model 2106, with Serial Numbers 00008150 and 00045288	Dated 08/02/2012.	Others
/48/	Cia. Ultragaz S.A.	Communication explaining the adopted procedure at Liquigás Distribuidora S.A. for measuring quantity of LPG regularly delivered to Biogas Riograndense Ltda. including confirmation of supplied amount of LPG during the period from January 2020 to March 2020.	Dated 20/04/2021.	Others
/49/	Hirsa Sistemas de Automação e Controle Ltda.	Certificate of Calibration for the installed LFG flow meter with S/N 282572 - calibration event performed on 14/03/2019. Certificate No. 2262/2019.	Certificate issuance date: 14/03/2019.	Others

/50/	Mettler-Toledo Inc.	User manual for the weight scale IND560.	Available online: http://se.mt.com/se/sv/home/supportive_content/product_documentation/operating_instructions/IND560_User_Guide/jcr:content/download/file/file.res/71209396_R05_IND560_UG_EN.pdf	Others
/51/	Fluid Components International (FCI)	Technical Specification sheet for the ST98 flow meter.	Available online: http://www.fluidcomponents.com/Industrial/Products/MassFlowMeters/ProdST98.asp	Others
/52/	SMAR Equipamentos Ind. Ltda.	Technical Catalogue for the installed data transmitter of the temperature sensor model TT301.	Available online: http://www.smar.com/brasil/produto/tt301-transmissor-inteligente-de-temperatura-4-a-20-ma-hart	Others
/53/	Intermountain CHP Application Center	Designing a Landfill Gas to Energy Project: Rules of Thumb and Questions to Ask. Intermountain Workshop. CHP Bioenergy for Landfills and for and Wastewater Treatment Plants. SCS Engineers.	Dated 11/08/2005.	Others
/54/	Solid Waste Association of North America (SWANA)	Landfill Gas Collection System Efficiencies (2007).	Report dated 2007.	Others
/55/	California Environmental Protection Agency	Evaluation of Landfill Gas Collection Efficiency. Appendix D.	Dated year 2009. Available online: http://www.arb.ca.gov/regact/2009/landfills09/appd.pdf	Others
/56/	SMAR Equipamentos Ind. Ltda.	Specification details for the pressure sensor model LD301.	Available online: http://www.smar.com/brasil/produto/ld301-hart-4-to-20-ma-transmissores-inteligentes-de-pressao	Others
/57/	Consistec Controles e Sistemas de Automação	Technical Catalogue for the installed thermal-resistance of the temperature sensor model RTD PT100.	Available online: http://www.consistec.com.br/	Others
/58/	Siemens AG	Technical Catalogue for the installed CH_4 content gas analyser unit Ultramat 23.	Available online: http://w3.siemens.com/mcms/sensor-systems/en/process-analytics/gas-analyzer-gas-	Others

			analysis/extractive/ir-active-components/pages/ultramat-23.aspx	
/59/	Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA.	Technical Report for the determination of methane destruction efficiency in the flare of the project activity “Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)”. Report title: “RELATÓRIO BIOTEC_0620219.pdf”.	Report dated 20/08/2019.	Others
/60/	Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA.	Technical Report for the determination of methane destruction efficiency in the flare of the project activity “Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)”. Report title: “RELATÓRIO BIOTEC_14012020.pdf”.	Report dated 13/02/2020.	Others
/61/	Brazil’s Interministerial Commission on Global Climate Change (DNA of Brazil)	CO2 emission factor for electricity generation in Brazil National Interconnected System.	Available online: http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_despacho.html	Others
/62/	ECIL Met Tec Ltda.	Specification sheet for the thermocouple ATC-204, type N.	Available online: http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/fatoresdeemissao/emissao_despacho.html	Others
/63/	Cepollina Engenheiros Consultores Ltda.	Declaration document reporting the outcome of the technical evaluations performed at the CRR landfill comparing the management practices at the CRR landfill vis-a-vis the previously conceived design of the landfill.	Document dated 13/01/2021.	Others
/64/	Biogas Riograndense Ltda.	Set of live videos (movies) produced by the operational staff of the project activity “Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)” showing implementation and operational aspects of the project activity.	Dated 10/05/2021	Project Participants
/65/	Empresa Brasileira de Pesquisa Energética (EPE)	Balanço Energético Nacional 2020. Brazilian Energetic Balance Report year 2020.	Available online: https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/pu	Others

			blicacao-479/topico-528/BEN2020_sp.pdf	
/66/	GSA Engenharia	Declaration documents reporting the outcome of the technical evaluations performed at the CRR landfill comparing the management practices at the CRR landfill vis-a-vis the previously conceived design of the landfill.	Documents dated 03/06/2019 and 14/01/2020.	Others
/67/	INMETRO	Decree No. 431.	Dated 04/12//2007. Available online: http://www.inmetro.gov.br/legislacao/rtac/pdf/RTAC001248.pdf	Project Participants
/68/	Brazilian National Agency of Petroleum, Natural Gas and Biofuels (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis - ANP)	Resolution 15.	Dated 18/05/2005. Available online: http://nxt.anp.gov.br/nxt/gateway.dll/leg/resolucoes_anp/2005/maio/ranp%2015%20-%202005.xml	Others
/69/	INMETRO	Decree No. 587.	Dated 05/11/2012. Available online: http://www.inmetro.gov.br/legislacao/detalhe.asp?seq_classe=1&seq_ato=1929	Others
/70/	LABELO - Laboratórios Especializados em Eletroeletrônica Calibração e Ensaios.	Calibration certificate for electricity meter Serial No. 00045288. Certificate No. E0685/2016. Calibration event date: 25/03/2016.	Certificate issuance date: 25/03/2016.	Others
/71/	INMETRO	Certificate of Calibration valid for weight scale used by Liquigás Distribuidora S.A. for measuring mass of delivered LPG cylinders in 2018 (as per communication/clarification issued by Liquigás Distribuidora S.A.).	Dated 23/03/2018.	Others
/72/	Gordon J. Van Wylen, Richard E. Sonntag and Borgnakke:	Fundamentals of Classical Thermodynamics; 4th Edition, John Wiley & Sons, Inc. Table A-4: Saturated Water-Temperature.	Available online: https://pt.scribd.com/doc/133363365/Fundamentals-of-Engineering-Thermodynamics-4th-Ed-Solutions-Manual-M-J-Moran-H-N-Shapiro	Others

/73/	INMETRO	Accreditation scopes of the inspection service company Biotec Estudos e Avaliacoes de Emissoes Atmosfericas LTDA vis-a-vis accreditation requirements from INMETRO.	-	Others
/74/	UNFCCC / CDM-EB	Monitoring Report Form (CDM-MR-FORM). Version 08.0.	Dated 06/04/2021. Available online: https://cdm.unfccc.int/Reference/PDDs_Forms/index.html	Others
/75/	Germanischer Lloyd Certification GmbH	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 3rd periodic verification (monitoring period from 21/10/2009 to 31/10/2011). GLC Report No. 244, Rev 06.	Dated 05/02/2013. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/Germanischer1333372036.55/view	Others
/76/	Germanischer Lloyd Certification GmbH	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 4th periodic verification (monitoring period from 01/11/2011 to 31/08/2012). GLC Report No. 295, Rev 06.	Dated 22/04/2013. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/Germanischer1349207269.06/view	Others
/77/	Germanischer Lloyd Certification GmbH	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 5th periodic verification (monitoring period from 01/09/2012 to 31/12/2012). GLC Report No. 309, Rev 06.	Dated 08/07/2013. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/Germanischer1361951091.71/view	Others
/78/	Germanischer Lloyd Certification GmbH	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 6th periodic verification (monitoring period from 01/01/2013 to 31/12/2013). GLC Report No. 368, Rev 05.	Dated 14/08/2014. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/iProcess/Germanischer1392879494.15/view	Others
/79/	Liquigás Distribuidora S.A.	Internal working procedure " Calibração e Aferição de Balanças (Calibration and admeasurement of weigh scales)". Doc. Code: PP-1LQ-00004-A.	Dated 13/07/2012.	Others
/80/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 17th verification (monitoring period from 01/02/2019 to 30/04/2019, version 1.0.	Dated 09/06/2019. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1	Others

			557836245.03/view	
/81/	UNFCCC/CDM-EB	"Guideline – Application of materiality in verifications", version 02.0, as per EB82.	Dated 20/02/2015.	Others
/82/	Rosemount Inc.	Technical Specification sheet for the Rosemount 485 Annubar.	Available online: http://www2.emersonprocess.com/siteadmincenter/PM%20Rosemount%20Documents/00813-0500-4485.pdf	Others
/83/	ABB S.p.A.	Technical Specification sheet for the pressure signal processing + data transmission unit ABB model 2600T.	Available online: https://library.e.abb.com/public/31adfc9b081dae11c1257b9e005271e8/OI_266FF-EN-B-03_2012.pdf	Others
/84/	Elsi s.r.l.	Technical Specification sheet for the temperature sensor Elsi model Y1-SEM203/P.	Available online: http://www.elsi.it/it/trasmettitori.php	Others
/85/	Ello Sistemas Eletrônicos S/A	Technical Specification sheet for the electricity meter Ello 2106.	Available online: http://www.elonet.com.br/wp-content/uploads/2017/12/Elo-2106LD.pdf	Others
/86/	Schneider Electric	Technical Specification sheet for the electricity meter Schneider model 8650;	Available online: http://www.schneider-electric.com/en/product-range/61053-powerlogic-ion8650/	Others
/87/	CEIME - Comércio e Metrologia Ltda.	Certificates of Calibration for the installed pressure sensors used for measuring pressure of LFG sent to the engine-generator sets. - Pressure sensor with S/N 3K646614027622. Certificate No. TRP-0183393/19. Calibration event date: 10/06/2019. - Pressure sensor with S/N 3K646614027620 Certificate No. TRP-0383393/19. Calibration event date: 10/06/2019. - Pressure sensor with S/N 3K646614027619. Certificate No. TRP-0583393/19. Calibration event date: 10/06/2019. - Pressure sensor with S/N 3K646614027617. Certificate No. TRP-0783393/19. Calibration event date: 10/06/2019.	Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019.	Others

		- Pressure sensor with S/N 3K646614027618. Certificate No. TRP-0983393/19. Calibration event date: 10/06/2019. - Pressure sensor with S/N 3K646614027621. Certificate No. TRP-1183393/19. Calibration event date: 10/06/2019.	Certificate issuance date: 10/06/2019. Certificate issuance date: 10/06/2019.	
/88/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 11th verification (monitoring period from 01/08/2016 to 31/12/2016, version 4.0.	Dated 23/06/2017. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1491298637.74/view	Others
/89/	Fazit – Controle e Automação de Processos Industriais Ltda	Calibration certificate for the installed CH_4 content gas analyzer unit with S/N N1-C8-283. Calibration Certificate 5551-20A. Calibration event date: 20/01/2020.	Certificate issuance date: 20/01/2020.	Others
/90/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 13th verification (monitoring period from 01/05/2017 - 31/01/2018, version 2.0.	Dated 16/05/2018. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1523543973.33/view	Others
/91/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 14th verification (monitoring period from 01/02/2018 - 30/04/2018, version 3.0.	Dated 26/07/2018. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1527574667.2/view	Others
/92/	Brazilian Chamber of Electric Energy Commercialization (CCEE).	Monthly spreadsheets with monitoring records of electricity generated and grid-electricity consumed by the project activity. File names: "BIOTERMICA RECREIO_Janeiro_2020.xlsx" "BIOTERMICA RECREIO_Fevereiro_2020.xlsx" "BIOTERMICA RECREIO_Março_2020.xlsx"	-	Others
/93/	3C Services	Calibration certificate for the	Certificate issuance	Others

		electricity meter Serial No. RSARELUBREC01P. Calibration event date: 20/08/2018.	date: 20/08/2018.	
/94/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 15th verification (monitoring period from 01/06/2018 to 31/01/2019, version 2.0.	Dated 26/07/2018. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1528297322.45/view	Others
/95/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)". 12th verification (monitoring period from 01/01/2017 - 30/04/2017, version 3.0.	Dated 02/08/2017. Available online: https://cdm.unfccc.int/Projects/DB/DNV-CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1495694361.05/view	Others
/96/	Toledo do Brasil Industria de Balanças Ltda.	User manual for the weight scale IND560. Rev. 02-12-16.	Dated 02/12/2016 Available online: https://cdn.toledobrasil.com.br/app/institucional/files/manuais/MU%20IND560%20-%203474375%20-%20Rev.%2002-12-16.pdf	Others
/97/	INMETRO	Manual "Orientações sobre verificação intermediária das balanças" (Guidance on intermediate verification of scales). Doc. ref DOQ-CGCRE-036, Revision 00	Dated December/2012 Available online: http://www.inmetro.gov.br/Sidoq/pesquisa_link.asp?seq_tipo_documento=5&cod_uo_numeracao=00774&num_documento=036	Others
/98/	Elbia Melo and others	Peer-reviewed paper "The Brazilian Electricity Model: An Overview of the Current Structure and Market Design".	Dated May/2011. Available online: https://www.researchgate.net/publication/228701847_The_Brazilian_Electricity_Model_An_Overview_of_the_Current_Structure_and_Market_Design	Others
/99/	STEMAC Grupos Geradores S.A.	Specification technical sheet for the electricity generator model BB046 with 180 kVA of nameplate installed capacity.	Deted July/2019 Available online: https://www.stemac.com.br/uploads/20190711153123_carenagem-fechada.pdf	Others
/100/	EPIC	CDM Verification and Certification Report for the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)".	Dated 09/06/2019. Available online: https://cdm.unfccc.int/Projects/DB/DNV-	Others

		18th verification (monitoring period from 01/05/2019 to 31/12/2019, version 1.0.	CUK1158844635.31/CP/5PKG0Y6459SJ6Q6HYXRLEMV4T1H9XW/iProcess/EPIC_Sust1557836245.03/view	
/101/	Biogas Riograndense Ltda.	CER delivery/forwarding schedule valid for the project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" as per related contractually established agreement (Emission Reduction Purchase Agreement (ERPA)) set between CDR Pedreira Centro de Disposição de Resíduos Ltda. and Unicarbo Energia e Biogas Ltda.	Dated: 31/08/2020	Project Participant
/102/	Companhia Estadual de Distribuição de Energia Elétrica – CEEE-D)	Monthly additional invoices/reports for consumption of grid-sourced electricity by the infrastructure of the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" for period January/2020 to March/2020.	-	Others
/103/	Biotérmica Energia S.A.	Monthly receipts of commercialization of net electricity generated by the the power generation infrastructure of the CDM project activity "Central de Resíduos do Recreio Landfill Gas Project (CRRLGP)" during the period from January/2020 to March/2020.	-	Others
/104/	STEMAC Grupos Geradores S.A.	Specification technical sheet for the electricity generator model BB046 with 180 kVA of nameplate installed capacity.	Deted July/2019 Available online: https://www.stemac.com.br/uploads/20190711153123_carenagem-fechada.pdf	Others

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verifications

FAR ID		**Section no.**		**Date:** DD/MM/YYYY
Description of FAR				
There are no FARs from validation and/or previous verifications to be considered.				
Project participant response				**Date:** DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				**Date:** DD/MM/YYYY

Table 2. CL from this verification

CL ID	1	**Section no.**		**Date:**
Description of CL				
There are no CLs to be considered for this verification.				
Project participant response				**Date:**
Documentation provided by project participant				
DOE assessment				**Date:**

Table 3. CAR from this verification

CAR ID	1	**Section no.**	E.1.	**Date:** 30/07/2021
Description of CAR				
The approval date for the first performed PRC assessment for the project activity (PRC reference number PRC-0648-001) is wrongly indicated in the initial version of the Monitoring Report.				
Project participant response				**Date:** 31/08/2021
As a response to the raised CAR, the approval date for the first PRC assessment performed for the project activity was corrected in the revised version of the Monitoring Report.				
Documentation provided by project participant				
No additional documentation was provided.				
DOE assessment				**Date:** 07/09/2021
The EPIC verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently addresses the raised CAR. This CAR is thus closed.				

Table 4. CAR from this verification

CAR ID	2	**Section no.**	E.6.2.	**Date:** 30/07/2021
Description of CAR				
The Monitoring Report includes incorrect monitoring details for the parameter “Management of SWDS” as monitored by the project participants and valid for the considered monitoring period.				
Project participant response				**Date:** 31/08/2021
As a response to the raised CAR, additional details about performed monitoring for the parameter “Management of SWDS” were added in the revised version of the Monitoring Report.				
Documentation provided by project participant				
No additional documentation was provided.				
DOE assessment				**Date:** 07/09/2021
The EPIC verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently addresses the raised CAR. This CAR is thus closed.				

Table 5. CAR from this verification

CAR ID	3	**Section no.**	E.8.1.	**Date:** 30/07/2021
Description of CAR				
The value for the calculation parameter $F_{CH4,PJ,y}$ reported in the summarized emission reduction calculation spreadsheet valid for the month of January/2020 is not in accordance with the value reported in the monthly emission reductions calculation spreadsheet for the month of January/2020.				
Project participant response				**Date:** 31/08/2021
As a response to the raised CAR, the correct value for the calculation parameter $F_{CH4,PJ,y}$ valid for the month of January/2020 was applied in the calculation of emission reductions in the summarized emission reductions calculation spreadsheet. As a consequence, baseline emissions of methane from the SWDS ($BE_{CH4,y}$) for the considered monitoring period were slightly reduced when compared to the value reported in the initial version of the Monitoring Report.				
Documentation provided by project participant				
No additional documentation was provided.				
DOE assessment				**Date:** 07/09/2021
The EPIC verification team confirmed that related amendment made in the revised version of the Monitoring Report and emission reductions calculation spreadsheets sufficiently addresses the raised CAR. This CAR is thus closed.				

Table 6. CAR from this verification

CAR ID	4	**Section no.**	E.8.1.	**Date:** 30/07/2021
Description of CAR				
The reported values for the parameter $EC_{BL,y}$ in both the Monitoring Report and the summarized emission reductions calculation spreadsheet are not in accordance with the values presented in the invoices/reports for consumption of grid-sourced electricity by the project activity infrastructure which were issued by Companhia Estadual de Distribuição de Energia Elétrica – CEEE-D.				
Project participant response				**Date:** 31/082021
As a response to the raised CAR, the values for the monitoring parameter $EC_{BL,y,}$ were corrected in both the revised version of the Monitoring Report and the summarized emission reductions calculation spreadsheet. As a consequence, baseline emissions associated with electricity generation for the considered monitoring period were slightly increased when compared to the value reported in the initial version of the Monitoring Report.				

Documentation provided by project participant
No additional documentation was provided.

DOE assessment	Date: 07/09/2021
The EPIC verification team confirmed that related corrections made in the revised version of the Monitoring Report and emission reductions calculation spreadsheets sufficiently addresses the raised CAR. This CAR is thus closed.	

Table 7. CAR from this verification

CAR ID	5	Section no.	E.8.2.	Date: 30/07/2021
Description of CAR				
The reported value for the parameter $EC_{PJ,captive,y}$ for the month of March/2020 in both the Monitoring Report and the summarized emission reductions calculation spreadsheet is not in accordance with primary monitoring records.				
Project participant response				**Date:** 31/082021
As a response to the raised CAR, the value for the monitoring parameter $EC_{PJ,captive,y}$ for the month of March/2020 was corrected in both the revised version of the Monitoring Report and the summarized emission reductions calculation spreadsheet.				
Documentation provided by project participant				
No additional documentation was provided.				
DOE assessment				**Date:** 07/09/2021
The EPIC verification team confirmed that related corrections made in the revised version of the Monitoring Report and emission reductions calculation spreadsheets sufficiently addresses the raised CAR. This CAR is thus closed.				

Table 8. CAR from this verification

CAR ID	6	Section no.	E.8.5.	Date: 30/07/2021
Description of CAR				
While during the considered monitoring period a significant amount of methane generated at the CRR landfill has not been collected and destroyed by the project activity due to the lack of LFG collection infrastructure covering all the area of the CRR landfill, such condition is not listed as one of the aspects/conditions which contributed to the significant difference between achieved emission reductions during the considered monitoring period and ex-ante estimation of emission reduction for the same period as per the PDD.				
Project participant response				**Date:** 31/082021
As a response to the raised CAR, the lack of LFG collection infrastructure covering all the area of the CRR landfill was listed as one of the aspects/conditions which represented a decrease factor of reported emission reductions for the considered monitoring period when compared against the ex-ante estimation of emission reduction for the same period as per the PDD in Section E.6. of the revised version of the Monitoring Report.				
Documentation provided by project participant				
No additional documentation was provided.				
DOE assessment				**Date:** 07/09/2021
The EPIC verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently addresses the raised CAR. This CAR is thus closed.				

Table 9. FAR from this verification

FAR ID		Section No.		Date:
Description of FAR				
No FARs were raised during this verification.				
Project participant response				**Date:**
Documentation provided by project participant				
DOE assessment				**Date:**

Document information

Version	*Date*	*Description*
04.0	6 April 2021	Revision to: • Reflect the "Clarification: Regulatory requirements under temporary measures for post-2020 cases" (CDM-EB109-A01-CLAR).
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM validation and verification standard for project activities" (CDM-EB93-A05-STAN); • Make structural and editorial improvements.
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the "CDM validation and verification standard for project activities" (version 01.0).
01.0	23 March 2015	Initial publication.

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