




Validation report form for renewal of crediting period of component project activities

(Version 03.0)

BASIC INFORMATION			
Title and UNFCCC reference number of the programme of activities (PoA)	Caixa Econômica Federal Solid Waste Management and Carbon Finance Project (UNFCCC reference number 6573)		
Version number of the validation report	2.0		
Completion date of the validation report	30/09/2020		
Version numbers of PoA-DD to which this report applies	3.0		
Title and UNFCCC reference number of each CPA for renewal	CPA Ref. no.	Title	
	6573-0001	CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa	
Sectoral scopes for each CPA	CPA Ref. no.	Sectoral scopes (indicate mandatory and conditional sectoral scopes)	
	6573-0001	Sectoral scope 13 – Waste handling and disposal (mandatory) Sectoral scope 1 – Energy industries (renewable - / non-renewable sources) (conditional)	
Applied methodologies and standardized baselines for each CPA	CPA Ref. no.	Applied methodologies and standardized baselines	
	6573-0001	ACM0001 – Flaring or use of landfill gas (version 19.0)	
Number and duration of the next crediting period (CP)	CPA Ref. no.	No. of CP	Duration of the CP
	6573-0001	2	05/10/2019 to 04/10/2026
Coordinating/managing entity (CME)	Caixa Econômica Federal		
Host Parties	Brazil		
Estimated amount of annual average greenhouse gas (GHG) emission reductions or GHG removals by sinks in the next crediting period (tCO₂e), per CPA	CPA Ref. no.	Annual emission reductions or removals (tCO₂e)	
	6573-0001	1,147,291	
Name and UNFCCC reference number of the DOE	LGA Technological Center, S.A. (Applus+ Certification) UNFCCC Ref. No.: E-0032		
Name, position and signature of the approver of the validation report	Mr. Juan Sendín Caballero Applus+ Certification Business Unit Managing Director Signature: 		

SECTION A. Executive summary

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LGA Technological Center, S.A., accredited DOE E-0032 (hereinafter referred to as *Applus+ Certification*) was commissioned to perform the validation assessment of the renewal of 7-year crediting period of the registered Component Project Activity (CPA) “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (hereinafter referred to as “CPA-1 Santa Rosa”). CPA-1 Santa Rosa is located in Brazil and it was previously included as a CPA of the Programme of Activity (PoA) “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573) (hereinafter referred to as “Caixa’s PoA”¹) on 05/10/2012. CPA-1 Santa Rosa is registered under UNFCCC with ref. no. 6573-0001 and under a renewable crediting period of 7 years. The expired 1st 7-year crediting period of CPA-1 Santa Rosa encompassed the period from 05/10/2012 to 04/10/2019. The 2nd 7-year crediting period of the CPA is to encompass the period from 05/10/2019 to 04/10/2026.

CPA design:

The original design of CPA-1 Santa Rosa encompasses promotion of collection and destruction/utilization of landfill gas (LFG) at the CTR Santa Rosa landfill. One of the greenhouse gas (GHG) abatement/mitigation measures encompassed by CPA-1 Santa Rosa is methane destruction through combustion of collected LFG occurring in the following methane destruction devices:

- High temperature enclosed flares²
- a set of internal combustion gas engine-generator sets of which, as per the original CPA design configuration, were expected to be gradually implemented within the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa and within its 2nd 7-year crediting period³.

¹ While the assessed CPA is in the both updated CPA-DD ^{/2/} and in this Validation Report as “CPA-1 Santa Rosa”, the PoA of which the assessed CPA is part of is termed in the both updated CPA-DD ^{/2/} and in this Validation Report as “Caixa’s PoA”.

² As confirmed by the Applus+ Certification’s validation team, while both the CPA-DD valid for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa (CPA-DD version 7.5, dated 11/09/2015) ^{/3/} and the updated CPA-DD ^{/2/} valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa do not refer to a number (quantity) of high temperature enclosed flares to be installed as part o the CPA, currently CPA-1 Santa Rosa is under operation with 4 flares installed. Specification details for such 4 flares are correctly included in the updated CPA-DD ^{/2/}.

³ As appropriately outlined in the assessed updated CPA-DD ^{/2/}, as per the previously considered original CPA design configuration, the final total combined nameplate installed capacity for the CPA’s electricity generation infrastructure is forecasted to be 25.47 MW. This final total combined nameplate installed capacity was at the time of the occurred CPA design conceptualization forecasted to be reached through the gradual/phased installation of 6 packages encompassing 3 engine-generator sets each package (with each engine-generator set having nameplate installed capacity of 1.415 MW) as follows:

- Period from year 2013 to year 2014: forecasted installation of 1 package of 3 engine-generator sets, representing an initial total combined installed capacity for the whole CPA’s electricity generation infrastructure of 4.425 MW.
- Period from year 2015 to year 2016: forecasted installation of 1 additional package of 3 engine-generator sets, representing total combined installed capacity for the whole CPA’s generation infrastructure of 8.490 MW.
- Period from year 2017 to year 2018: forecasted installation of 1 additional package of 3 engine-generator sets, representing total combined installed capacity for the whole CPA’s electricity generation infrastructure of 12.735 MW.
- Period from year 2019 to year 2020: forecasted installation of 1 additional package of 3 engine-generator sets, representing total combined installed capacity for the whole whole CPA’s electricity generation infrastructure of 16.980 MW.
- Period from year 2021 to year 2022: forecasted installation of 1 additional package of 3 engine-generator sets, representing total combined installed capacity for the whole whole CPA’s electricity generation infrastructure of 21.225 MW.
- Period from year 2023 to year 2027: installation of 1 additional package of 3 engine-generator sets upon confirmation of availability of enough LFG in the CTR Santa Rosa landfill, representing forecasted final and total combined installed capacity for the whole CPA’s electricity generation infrastructure of 25.470 MW.

Differently than forecasted at the time of the CPA initial design conceptualization, no LFG utilization infrastructure promoting utilization of LFG for electricity generation was gradually implemented within the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa. While the CPA’s electricity generation infrastructure was not

- methane destruction/utilization device(s) which is/are remotely located at consumer(s) facility(es) and to which upgraded LFG were to be supplied through natural gas distribution network serving the region where CPA-1 Santa Rosa is located⁴.

CPA-1 Santa Rosa (under its original design configuration) thus promotes destruction of methane (CH₄) that otherwise would be emitted into the atmosphere in the absence of the CPA (baseline scenario). LFG (which is rich in methane (CH₄)) has been historically generated at the CTR Santa Rosa landfill as a result of the anaerobic decomposition of municipal solid waste (MSW) disposed in such landfill site through the utilization of appropriate MSW landfilling techniques and procedures. As an additional GHG abatement/mitigation measure, CPA-1 Santa Rosa (under its original design configuration) also encompasses electricity generation using collected LFG as gaseous fuel with generated electricity being exported through the electricity grid to which CPA-1 Santa Rosa is connected to. While utilization of LFG as gaseous fuel for electricity generation represents generation of electricity using renewable energy source, CPA-1 Santa Rosa thus also promotes carbon dioxide (CO₂) through displacement of generation of equivalent amount of electricity that would otherwise be generated by existing grid-connected electricity generation facilities (including fossil fuel fired power generation sources) and addition of new sources under the baseline scenario (absence of CPA-1 Santa Rosa). CPA-1 Santa Rosa thus also promotes emission reductions due to displacement of a more-GHG-intensive service.

All electricity demand of CPA-1 Santa Rosa is to be met by electricity generated by the CPA's electricity generation infrastructure and/or through imports of grid-sourced electricity. As per the project design, no fossil fuel is to be used for any purpose.

As per the previously conceived original design configuration for CPA-1 Santa Rosa, displacement

implemented as per its originally conceived design configuration (in terms of forecasted capacities and time plan), the CPA's electricity generation infrastructure was finally implemented under a different design configuration and under significantly reduced total combined nameplate installed capacity of 4.245 MW (installation of 3 engine-generator sets engines with 1.415 MW).

As also outlined in the updated CPA-DD for the CPA-1 Santa Rosa, upon the successful renewal of the crediting period of CPA-1 Santa Rosa, a new version of the CPA-DD valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa will be compiled for addressing this and other permanent design changes (which are valid for the 2nd crediting period). Such yet to be completed revised version of the CPA-DD for the 2nd 7-year crediting period of CPA-1 Santa Rosa will then be opportunely validated as per applicable rules and procedures for addressing post-registration changes of CPAs.

⁴ As also appropriately outlined in the assessed updated CPA-DD ^{/2/}, as per the previously considered original CPA design configuration, the CPA's infrastructure for upgrading and supplying collected LFG to consumer (through natural gas distribution network) was previously forecasted to have LFG processing capacity of 5,000 Nm³/h and with starting of its operations being previously forecasted to occur in year 2014. Also as per the CPA original design conceptualization, upgrading of collected LFG for its utilization by consumer(s) would occur in a LFG upgrading infrastructure (encompassing efficient removal of carbon dioxide (CO₂), nitrogen (N₂) and other components from collected LFG (in order to enrich its CH₄ content and meet applicable requirements in terms of contaminants for technically ensuring its utilization as gaseous fuel displacing fossil fuels (e.g. natural gas)).

Differently than forecasted at the time of the CPA initial design conceptualization, no LFG utilization infrastructure promoting supply of upgraded LFG to consumer(s) through natural gas distribution network was implemented within the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa. In January/2020 (already within the 2nd 7-year crediting period of the CPA), the CPA's infrastructure for upgrading and supplying collected LFG to consumer was finally implemented, however under a differentiated design configuration (with significantly higher total combined LFG processing capacity of up to 20,000 Nm³/h). It is also relevant to note that the previously considered supplying of upgraded LFG to consumer(s) through natural gas distribution network was also replaced by the supply by using trucks (road transportation). Furthermore, in order to make the supply of LFG to consumer(s) by using trucks, LFG has been further compressed in an appropriated LFG compression infrastructure (also implemented as part of CPA-1 Santa Rosa) prior of its transportation with LFG decompression occurring at the LFG delivery point(s). As also outlined in the updated CPA-DD for the CPA-1 Santa Rosa, upon the successful renewal of the crediting period of CPA-1 Santa Rosa, a new version of the CPA-DD valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa will be compiled for addressing this and other permanent design changes (which are valid for the 2nd crediting period). This yet to be completed new CPA-DD for the 2nd 7-year crediting period of CPA-1 Santa Rosa will then be opportunely validated as per applicable rules and procedures for addressing post-registration changes of CPAs.

of natural gas and/or any other fossil fuel) due to the supply of upgraded LFG to consumer(s) (through natural gas distribution network) as part of the operation of the CPA is not regarded as GHG abatement/mitigation measure (and related potential GHG emission reductions are thus not claimable as part of CPA-1 Santa Rosa).

The CTR Santa Rosa landfill is located in Seropédica, a municipality which is near the city of Rio de Janeiro the capital of the Rio de Janeiro State, in Brazil.

This Validation Report summarizes the findings from the validation assessment performed on the basis of UNFCCC criteria for CDM, as well as criteria given by the latest version of the CDM Validation and Verification Standard for Programme of Activities (CDM-VVS-PoA) (version 02.0) ^{/1/}, CDM Project Cycle Procedure for Programme of Activities (CDM-PCP-PoA) (version 02.0) ^{/16/} and CDM Project Standard for Programme of Activities (CDM-PS-PoA) (version 02.0) ^{/15/}. The use of complementary standard auditing techniques for validation assessments (as referred to in section 7.1.3.1 of the CDM-VVS-PoA ^{/1/}) was systematically applied/considered as part of the performed validation assessment in light 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 31/12/2020) ^{/20/}.

Scope and objective of the validation assessment for renewal of crediting period of CPA(s):

The scope of the validation of renewal of crediting period of CPA(s) is to provide an independent and objective validation assessment of the Component Project Activity Design Document (CPA-DD) for CPA(s) which was updated for a subsequent 7-year crediting period (hereinafter referred to as updated CPA-DD). The validation assessment for renewal of crediting period includes assessment of the baseline scenario, estimated emission reductions, design of the monitoring plan and starting date of the 2nd 7-year crediting period of the CPA by using the most recent version of the applicable CDM baseline and monitoring methodology + methodological tools applicable to the CPA(s) + applicable CDM guidance and rules.

The validation opinion provided by Applus+ certification is based on the assessment of the updated CPA-DD for CPA-1 Santa Rosa ^{/2/} and by applying standard auditing techniques including, but not limited to, document reviews, follow-up actions (e.g. telephone and/or e-mail interview) and also the conduct of review of the applicable CDM baseline and monitoring methodology + applicable methodological tools and underlying formulae and calculations. The validation assessment was carried out in accordance with the latest version of the CDM-VVS-PoA (version 02.0) ^{/1/} and the CDM-PS-PoA (version 02.0) ^{/15/}. It is also relevant to note that for this particular validation assessment, other standard auditing techniques for validation, as referred to in sections 7.1.3.1 of the CDM-VVS-PoA (version 02.0) ^{/1/} were applied in light 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 (period from 23/03/2020 to 23/06/2020) because of COVID-19 (+ decision also agreed by the CDM-EB to extend the relaxation of mandatory site visits until 31/12/2020) ^{/20/}. The validation assessment was performed by also considering/assessing the following issues:

- a) The impact of eventually new relevant national and/or sectoral policies and circumstances over the previously derived baseline scenario for CPA-1 Santa Rosa by taking into account relevant guidance from the CDM-EB applicable to renewal of the crediting period of this particular CPA;
- b) The correctness of the application of the CDM baseline and monitoring methodology selected for the determination of the continued validity of the baseline (ACM0001 (version 19.0) ^{/5/}) + methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} applicable to the 2nd 7-year crediting period of the Caixa's PoA or its update, and the estimation of emission reductions for the applicable crediting period of CPA-1 Santa Rosa.
- c) The correctness of the designed monitoring plan valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa (based on the application of ACM0001 (version 19.0) ^{/5/} + applicable methodological tools ^{/10/ /11/ /12/ /13/ /20/}).

The objective of the validation assessment for renewal of crediting period of a CPA is to have an independent evaluation being performed by a Designated Operational Entity (DOE) of the updated version of the CPA-DD of a previously included CPA for a subsequent 7-year crediting period in terms of its compliance with relevant UNFCCC requirements for the renewal of the crediting period of CPAs (as per the latest guidance from the CDM-EB, as set out in the CDM-PS-PoA ^{/15/}, CDM-PCP-PoA ^{/16/}, and other relevant guidance).

The validation assessment aims to confirm whether the previously derived baseline scenario for the CPA-1 Santa Rosa is still valid and/or has been appropriately updated by, if applicable, taking into account of new data and/or circumstance. In particular, the CPA's baseline scenario, monitoring plan and the CPA's compliance with relevant UNFCCC requirements and host Party criteria are validated in order to confirm the overall correctness of the application of the approved baseline methodology, including estimation of the emission reductions to be achieved by CPA-1 Santa Rosa within the new 7-year crediting period.

In particular, to reassess the validity of the original baseline scenario for CPA-1 Santa Rosa and/or its update (through an assessment of the impact of new relevant national and/or sectoral policies and circumstances over the previously derived baseline scenario, and the correctness of the application of an approved baseline methodology) for the determination of the continued validity of such previously derived baseline scenario and/or its update, as well as the estimation of emission reductions for the new crediting period.

A validation assessment for renewal of 7-year crediting period of a CPA will result in a conclusion as to whether the request for renewal of crediting period has a positive validation opinion or not.

The validation assessment for renewal of 7-year crediting period of CPA(s) is not meant to provide any type of technical consulting and/or advisory towards the CME or CPA implementer of the PoA or CPA(s). However, stated requests for clarifications and/or corrective actions may provide input(s) for improvement of the CPA design description as outlined in the updated CPA-DD.

The validation assessment for renewal of crediting period of CPA-1 Santa Rosa was carried out on the basis of the following rules and requirements that are applicable for the CPA:

- Article 12 of the Kyoto Protocol ^{/6/},
- Guidelines for the implementation of Article 12 of the Kyoto Protocol ^{/6/} as presented in the Marrakech Accords under decision 3/CMP.1 ^{/7/} 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 Programme of Activities (CDM-VVS-PoA) (version 02.0) ^{/1/},
- The monitoring plan of the updated CPA-DD ^{/2/} applicable for the 2nd 7-year crediting period of CPA-1 Santa Rosa,
- The CDM baseline and monitoring methodology ACM0001 "Flaring or use of landfill gas" (version 19.0) ^{/5/},
- Updated version of the CPA-DD valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa ^{/2/}
- The following methodological tools, which are referred in the updated CPA-DD ^{/2/}:
 - "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}
 - "Project emissions from flaring" (version 03.0) ^{/10/}

- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) ^{/12/}
- "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) ^{/13/}
- "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1) ^{/24/}
- "Emissions from solid waste disposal sites" (version 08.0) ^{/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 31/12/2020) ^{/20/}.

Validation process:

The validation process is an independent assessment performed by a Designated Operational Entity (DOE) that is based on applicable and valid guidelines described in the latest version of the CDM-VVS-PoA (version 02.0) ^{/1/}. In addition to that, standard auditing techniques have been applied by the validation team appointed by Applus+ Certification. As part of the validation assessment, the Applus+ Certification's validation team initially performed a desk review on all validation related documents, followed by interview conducted with representatives of the CME Caixa Econômica Federal and CPA Implementer SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental.

The performed validation assessment encompassed (i) comprehensive review of the latest version of the CPA-DD valid for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa (CPA-DD version 7.5, dated 11/09/2015) ^{/3/}, (ii) review of the updated CPA-DD for the 2nd 7-year crediting period + supporting documents; (ii) conduction of interview with representatives of the CME and CPA implementer; (iii) resolution of all eventually identified outstanding issues (raised Corrective Action Request(s) (CAR) and/or Clarification Request(s) (CL) and/or Forward Action Request(s) (FAR), if applicable) and, finally, (iv) issuance of the Validation Report.

As part of the validation process, the validation findings and observations from the performed document desk review and interview with representative of the CME and CPA implementer. 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 CME and CPA implementer and receipt of updated version of the CPA-DD ^{/2/} and/or supporting documents and finally preparing the Validation Report. The draft version of the Validation Report undergoes a technical review by Applus+ Certification prior to its submission to the CDM-EB.

Validation assessment conclusion and summary of the validation opinion:

As part of the conducted validation assessment, there were no outstanding issues which were raised/identified by the Applus+ Certification's validation team (e.g. Corrective Action Requests (CAR), Clarification Request (CL) and/or Forward Action Request (FAR)). Thus, there was not need to have the CME and/or CPA implementer compiling a revised version of the updated CPA-DD ^{/2/} for the 2nd 7-year crediting period of CPA-1 Santa Rosa and/or providing additional explanations.

In summary, it is the opinion of Applus+ Certification that CPA-1 Santa Rosa, as described in the updated version of the CPA-DD (version 8.0, dated 10/08/2020) ^{/2/}, meets all relevant UNFCCC requirements for the renewal of its 7-year crediting period (including requirements for completing the CPA-DD form) and correctly applies the CDM baseline and monitoring methodology ACM0001 (version 19.0) ^{/5/} + applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}.

Applus+ Certification thus requests the CDM Executive Board (CDM-EB) to renew the 7-year crediting period for CPA-1 Santa Rosa.

SECTION B. Validation team, technical reviewer and approver**B.1. Validation 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	Validation findings
1.	Lead Auditor / Technical Expert	EI	Tavares	Luis Filipe	Applus+ Certification	Y	N/A	Y	Y

Note: EI: External Individuals

Demonstration how the Applus+ Certification's validation team meets the competence required for the performance of the validation assessment of renewal of crediting period is included in Appendix 2.

B.2. Technical reviewer and approver of the validation report for RCP

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 / Technical Expert (13.1)	EI	Shen	Simon	Applus+ Certification
2.	Report Approver	IR	Sendín	Juan	Applus+ Certification

Note: IR: Internal Resources, EI: External Individuals,

Demonstration how the appointed validation team meets the competence required for the performance of the validation assessment of renewal of crediting period is included in Appendix 2.

SECTION C. Means of validation

C.1. Desk/document review

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A detailed document review on the updated CPA-DD for CPA-1 Santa Rosa^{/2/}, applied CDM baseline and monitoring methodology^{/5/} and applicable methodological tools^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} and all other associated documentation and references were performed by the Applus+ Certification's validation team through application of standard auditing techniques in order to assess the quality of information provided. The performed document review encompassed the following:

- Comprehensive review of data and information to verify the correctness, credibility and interpretation of presented information;
- Cross checks between information provided in the updated CPA-DD for CPA-1 Santa Rosa^{/2/} and information from other sources (not limited to those provided by the CME and/or CPA implementer)
- Reference to available information relating to other project-based initiatives and/or technologies identical or similar to the one adopted by CPA-1 Santa Rosa
- Review and evaluation, based on the applied CDM baseline and monitoring methodology^{/5/} and applicable methodological tools^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}, of the appropriateness/correctness of formulae, calculation approaches and monitoring approaches as referred in the updated CPA-DD for CPA-1 Santa Rosa^{/2/}.

The following documents were assessed:

- Latest version of the CPA-DD applicable to the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa (CPA-DD version 7.5, dated 11/09/2015)^{/3/}
- Validation Report for the registration of the Caixa's PoA and inclusion of the CPA-1 Santa Rosa^{/8/}, Validation Opinion Report for previously occurred post-registration changes in the Caixa's PoA^{/48/} and Validation Report for the previously occurred renewal of 7-year crediting period of the Caixa's PoA^{/47/}
- Verification Reports and Monitoring Reports for all previously performed (concluded) periodic verifications of the Caixa's PoA within its currently expired 1st and 2nd 7-year crediting periods (including CPA-1 Santa Rosa)^{/22/ /25/ /26/ /27/ /29/ /30/ /31/ /32/ /33/ /34/ /35/ /36/ /37/ /38/ /39/ /40/}.
- Relevant decisions, clarifications and guidance from the CMP and the CDM-EB
- Relevant regional and national and sectoral policies dealing with solid waste and landfill gas (LFG) management

A list of all documents reviewed or referred to in the course of this validation is included in Appendix 3.

C.2. On-site inspection

Duration of on-site inspection: DD/MM/YYYY to DD/MM/YYYY				
No.	Activity performed on-site	Site location	Date	Team member
1.				

No physical on-site inspection (with presence of the Applus+ Certification's validation team) was conducted as part of the performed validation assessment for renewal of crediting period of CPA-1 Santa Rosa.

While performing an on-site inspection to the CPA as part its validation assessment for renewal of crediting period would normally be expected to occur, as a result of recently raised travelling restrictions related to the COVID-19 pandemic, the Applus+ Certification's validation team has discussed the issue with representatives of CME Caixa Econômica Federal and CPA implementer SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental by taking

into account not only travelling restriction related to official decisions and recommendations from local authorities (i.e. restrictions and recommendations from the Government of Rio de Janeiro State and Federal Government of Brazil), but also related corporate travelling restriction policy announced by Applus+ for its operations worldwide. As part of the discussion, the representatives of the CME and CPA implementer highlighted to the Applus+ Certification's validation team that they could not agree with and/or accept any potential postponing of the on-site inspection since the deadline for renewing the 7-year crediting period of CPA-1 Santa Rosa is 05/10/2020 as established by applicable CDM rules. Due to that, for the particular case of the validation assessment of renewal of the 7-year crediting period of CPA-1 Santa Rosa, Applus+ Certification assumed as deemed reasonable to regard the required on-site inspection to the project site (as part of the validation assessment of renewal of crediting period of CPA-1 Santa Rosa) as a task that could not be eventually postponed by taking into account the regulatory deadline for the completion of the assessment.

By thus (i) acknowledging that the required on-site inspection could not be performed as part of the validation assessment due to the COVID-19 pandemic, (ii) by also assuming that such on-site inspection could not be postponed either (due to the above-summarized reason) 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 (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 31/12/2020))^{/41/}; the Applus+ Certification's validation team performed, as part of the validation assessment, the tasks of document review and interviews with representatives of the CME and CPA implementer (steps further detailed in Sections C.1 and C.3 respectively) by incorporating (adding) of the following additional checking's/assessments (as complementary auditing measures):

- Assessment of a set of recently produced pictures (dated 24/09/2020)^{/42/} with relevant details of different areas/sections of both the CTR Santa Rosa landfill and CPA-1 Santa Rosa (e.g. landfill's Municipal Solid Waste (MSW) disposal area, CPA's infrastructure promoting collection and destruction/utilization of LFG). This set of pictures was produced on 24/09/2020 as a direct response to a request from the Applus+ Certification's validation team made during the conduction of interviews with representatives of the CME and CPA implementer⁵.
- Assessment of the content of the latest versions of the recently issued Monitoring Report^{/22/} and Verification Report^{/26/} valid for the latest completed periodic verification assessment for CPA-1 Santa Rosa (monitoring period from 01/01/2018 to 04/10/2019). These recently issued documents (dated 10/07/2020 and 27/08/2020 respectively) were recently submitted to UNFCCC by the DOE in charge of related verification assessment as part of a CER issuance request valid for such monitoring period. While these documents were not yet made publicly available (available online) at the time of the performance of the validation assessment by Applus+ Certification, copies of such documents were made available to the Applus Certification's validation team by the CME and CPA implementer.

Besides of the above-summarized complementary auditing measures, as part of its assessment, the Applus+ Certification's validation team also took into consideration that, in the particular case of CPA-1 Santa Rosa, there is no relevant information required for the validation assessment of renewal of its 7-year crediting period that would only be assessable and/or confirmable upon the performance of a physical on-site inspection by the Applus+ Certification's validation team.

In this particular context, it is also relevant to note that, as further assessed in other Sections of this Validation Report, all information provided in the updated CPA-DD^{/2/} was verified (during the performed desk-review and interview phases of the validation assessment) against deemed credible

⁵ As outlined in Section C.3, as part of conducted interviews with representatives of the CME and CPA implementer, the Applus+ Certification's validation team has explicitly requested such representatives to produce and make available a set of pictures^{/42/} that could allow clear, transparent and complete visualization of both current operation the CTR Santa Rosa landfill and the current implementation status of CPA-1 Santa Rosa. As agreed while being interviewed by the Applus+ Certification's team on 24/09/2020, the interviewed representatives produced the set of pictures right after being interviewed by the Applus+ Certification's validation team and submitted all pictures to the team in the same day.

sources. Sufficient documented evidences related to the original design and operation of CPA-1 Santa Rosa were made available to the Applus+ Certification's validation team. It is also relevant to note that comparable and credible project design information is included in the updated CPA-DD for the 2nd 7-year crediting period of CPA-1 Santa Rosa⁶ and in the more recently issued Monitoring Report ^{/22/} for the latest performed periodic verification assessment for this particular CPA (monitoring period from 01/08/2018 to 04/10/2019) (with correctness of related information being confirmed in the corresponding Verification Report ^{/26/}). Details about description of the original CPA design included in the updated CPA-DD ^{/2/} were confirmed as not being changed when compared to the related descriptions in the CPA-DD for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa (with exception of references and details for the yet to be addressed post-registration permanent changes in the CPA design (which are all valid/applicable for the yet to be renewed 2nd 7-year crediting period of CPA-1 Santa Rosa and which will be opportunely addressed through compilation of a revised version of the CPA-DD with related validation opinion as per applicable CDM rules and procedures for addressing post-registration changes in CPAs being opportunely made by a DOE)).

Moreover, based on assessment of documented evidences ^{/82/}, while no changes in operational aspects of the CTR Santa Rosa landfill has occurred and no changes in applicable related regulatory/legal framework for LFG management at this landfill site has occurred either, as further assessed in Section D.4, the baseline scenario information/description valid for CPA-1 Santa Rosa was sufficiently demonstrated not to be changed.

In summary, by taking all the above-presented performed additional auditing measures and aspects into account vis-à-vis applicable requirements established in CDM-VVS-PoA (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 31/12/2020)) ^{/41/}, the Applus+ Certification judged that not performing a physical on-site inspection to the project site and performing additional/complementary assessment tasks instead (as above-summarized) as a deemed acceptable, reasonable and complete (with the consideration of the above-presented performed complementary auditing measures being regarded as deemed sufficient to have the required overall quality and completeness of the performed validation assessment not being negatively affected by the occurred non-performance of physical on-site inspection to the project site).

C.3. Interviews

⁶ As outlined in Section D.2, all related CPA design description information included in the updated CPA-DD ^{/2/} was confirmed by the Applus+ Certification's validation team as being materially the same as that of the CPA-DD applicable to the currently expired 1st 7-year crediting period for CPA-1 Santa Rosa.

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Takase	Caio	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	24/09/2020	Skype conference interview encompassing the following topics: - Implementation and operational status of CPA-1 Santa Rosa + confirmation of existence of post-registration change valid for CPA-1 Santa Rosa that are yet to be validated upon successful renewal of its 7-year crediting period. - Meeting of applicability conditions/requirements of the selected CDM baseline and monitoring methodology + applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} as well as conformance with PoA-DD valid for the 2 nd 7-year crediting period of the Caixa's PoA for the renewal of the 7-year crediting period of CPA-1 Santa Rosa ^{/49/} .	Luis Filipe A. Tavares
2.	Barbosa	Nuno	UniCarbo - Energia e Biogás Ltda. ⁷	24/09/2020		

⁷ As confirmed by the Applus+ Certification, UniCarbo Energia e Biogás Ltda. is a CDM consulting and advisory service company that has supported the CME Caixa Economica Federal and CPA implementer SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental with CDM related issues (inter alia completion of the updated CPA-DD ^{/2/}). This CDM consulting and advisory service company is thus confirmed as not being a project participant for CPA-1 Santa Rosa.

					<ul style="list-style-type: none"> - Applicable national policies and regulations and their eventual impacts in terms of changing of the previously derived baseline scenario and baseline emissions for CPA-1 Santa Rosa. - Application of updated and/or eventual new values for ex-ante determined (fixed) parameters in the updated CPA-DD ^{/2/} (when compared to the CPA-DD valid for the currently expired 1st 7-year crediting period of the CPA). - Design of the monitoring plan for the CPA (as per applicable requirements of the selected CDM baseline and monitoring methodology + applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} and requirements in the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/}). - Additional checkings /assessments (as complementary assessment tasks) by acknowledging that the required on-site 	
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					inspection could not be performed as part of the validation assessment due to the COVID-19 pandemic (and by taking into consideration all guidance and requirements of 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 31/12/2020) ^{/41/})).	
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C.4. Sampling approach

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Not applicable.

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

Area of validation findings (0)	No. of CL	No. of CAR	No. of FAR
CPAs to be renewed and corresponding generic CPAs	-	-	-
Compliance with CPA-DD form	-	-	-
Application and selection of methodologies and standardized baselines	-	-	-
Validity of original baseline or its update	-	-	-
Demonstration of eligibility of the CPAs	-	-	-
Estimated emission reductions or net anthropogenic removals	-	-	-
Validity of monitoring plan	-	-	-
Crediting period	-	-	-
CME and project participants	-	-	-
Post-registration changes	-	-	-
Others (please specify)	-	-	-
Total	-	-	-

SECTION D. Validation findings

D.1. CPAs to be renewed and corresponding generic CPAs

Title and UNFCCC reference number of the CPA	Version number of the CPA-DD	Host Party	Title and reference number of the corresponding generic CPA	Version number of the PoA-DD on which the RCP is based
CPA-1: "Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa" ⁸ ; CPA ref. no. 6573-0001	8.0	Brazil	Single generic CPA (as made available in the PoA-DD valid for the 2 nd 7-year crediting period of the Caixa's PoA ^{49/})	3.0

D.2. Compliance with CPA-DD form

Means of validation	As per applicable requirements of the CDM-VVS-PoA (version 02.0) ^{1/} , the validation team appointed by Applus+ Certification checked if the CME and CPA implementer used the latest valid version of the CPA-DD form for completing the updated CPA-DD for CPA-1 Santa Rosa ^{2/} . The Applus+ Certification's validation team also determined whether CPA design information transferred to such latest version of the CPA-DD form was materially the same as that previously included in the CPA-DD applicable for the currently expired 1 st 7-year crediting period of CPA-1 Santa Rosa. The validation team also determined whether the CME and CPA implementer completed the updated the CPA-DD ^{2/} under conformance with details and guidelines included in the generic CPA of the PoA-DD valid for the 2 nd 7-year crediting period of the Caixa's PoA ^{49/} (PoA which CPA-1 Santa Rosa is part of).
Findings	No findings (CAR(s), CL(s) and/or FAR(s)) were raised regarding the compliance with completion guidance and requirements of the CPA-DD form.
Conclusion	<p>The Applus+ Certification's validation team was able to confirm that the updated CPA-DD^{2/} was completed by correctly applying the latest version of the CDM-CPA-DD form (version 09.0)^{17/} with all applicable guidance and requirements for its completion being sufficiently and appropriately followed.</p> <p>Applicable guidance and requirements for completing the CDM-CPA-DD form (version 9.0)^{17/} (as established by the attachment to the CDM-CPA-DD form (version 9.0) "Attachment. Instructions for completing this form"^{17/}) were confirmed by the Applus+ Certification's validation team to be correctly met/considered.</p> <p>Relevant rules and requirements as per the CDM-PS-PoA (version 02.0)^{15/} were also confirmed to be sufficiently met/considered in the completion of the updated CPA-DD^{2/}.</p> <p>All previously issued versions of the CPA-DD valid for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa apply the CDM baseline and monitoring methodology ACM0001 (version 11)^{28/} and some specific methodological tools⁹.</p>

⁸ Termed in the both updated CPA-DD^{2/} and in this Validation Report as "CPA-1 Santa Rosa".

⁹ As confirmed by the Applus+ Certification validation team, the latest version of the CPA-DD valid for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa (CPA-DD version 7.5, dated 11/09/2015)^{3/} refers only to the following methodological tool:

- "Tool for determining methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
- "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 02)
- "Tool to determine project emissions from flaring gases containing methane" (version 01)
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01)
- "Tool to calculate the emission factor for an electricity system" (version 02.2.1)
- "Tool for the demonstration and assessment of additionality" (version 05.2.1)

The updated CPA-DD ^{/2/} applies the CDM baseline and monitoring methodology ACM0001 – Flaring or use of landfill gas (version 19.0) ^{/5/} + applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/ 10}.

The Applus+ Certification's validation team was able to confirm that some sections of the updated CPA-DD ^{/2/} were appropriately and correctly completed through direct transfer of project design description information elements from the latest versions of the CPA-DD applicable for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa (CPA-DD version 7.5, dated 11/09/2015) ^{/3/} with related requirements and guidance of the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/} being sufficiently considered/met and with some information elements from such PoA-DD being also directly transferred into the updated CPA-DD ^{/2/} ¹¹.

The Applus+ Certification's validation team was also able to confirm that, by taking into account specific requirements applicable for PoAs from both the ACM0001 (version 19.0) ^{/5/} and the CDM-PS-PoA (version 02.0) ^{/15/} as well as the baseline scenario for LFG management at the CTR Santa Rosa landfill; CPA-1 Santa Rosa is correctly indicated in its updated CPA-DD ^{/2/} as representing CPA design scenario 4.2 of the Caixa's PoA. This is deemed correct and under conformance with the applicable guidance from the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/}. As per the such PoA-DD, each CPA to be encompassed by the Caixa's PoA is to consist in one of 8 (eight) potentially identified CPA design scenarios (CPA design scenario 1.1, 1.2, 2.1, 2.2, 3.1, 3.2, 4.1 and 4.2). It is relevant to note that such potential design scenarios were however not defined at the time of the previously occurred inclusion of CPA-1 Santa Rosa in the Caixa's PoA.

While as per the CDM-PCP-PoA (version 02.0) ^{/16/}, it is not required to obtain a new letter of approval (LoA) from involved Parties in the context of the renewal of crediting period for a CPA of a PoA, the Applus+ Certification's validation team confirmed anyway that indication of the host-country and names of the CME and CPA implementer are correctly included in the updated CPA-DD ^{/2/}.

In summary, the Applus+ Certification's validation team is able to confirm that information made available in the updated CPA-DD ^{/2/} is sufficiently accurate, complete, and provides clear understanding of CPA- 1 Santa Rosa.

¹⁰ As confirmed by the Applus+ Certification validation team, the updated CPA-DD ^{/2/} refers to the following methodological tools:

- "Emissions from solid waste disposal sites" (version 08.0) ^{/14/}
- "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}
- Project emissions from flaring (version 03.0) ^{/10/}
- Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0.0) ^{/12/}
- Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period (version 03.0.1) ^{/24/}
- Combined tool to identify the baseline scenario and demonstrate additionality (version 07.0) ^{/13/}
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 03.0) ^{/20/}

¹¹ As confirmed by the Applus+ Certification's validation team, the starting and ending dates for the CPA-1 Santa Rosa match with the starting and ending dates of the 2nd 7-year crediting period of the Caixa's PoA. Due to that, requirements and guidance of the PoA-DD valid for the 2nd 7-year crediting period the Caixa's PoA were systematically followed/met.

D.3. Application and selection of methodologies and standardized baselines

Means of validation	As per applicable requirements of the CDM-VVS-PoA (version 02.0) ^{/1/} , the validation team appointed by Applus+ Certification checked whether the CME and CPA implementer had used the valid and/or correct version of the CDM baseline and monitoring methodology ^{/5/} and had sufficiently demonstrated the CPA design is under conformance with details and guidelines included in the generic CPA of the PoA-DD valid for the 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA which CPA-1 Santa Rosa is part of).
Findings	No findings (CAR(s), CL(s) and/or FAR(s)) were raised regarding the selection and application of CDM baseline and monitoring methodology + applicable methodological tools.
Conclusion	<p>All previously issued versions of the CPA-DD ^{/3/} valid for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa apply the CDM baseline and monitoring methodology ACM0001 (version 11) ^{/28/}.</p> <p>The updated CPA-DD ^{/2/} applies the CDM baseline and monitoring methodology ACM0001 (version 19.0) ^{/5/}. As confirmed by the Applus+ Certification's validation team, version 19.0 represents the version of ACM0001 applied in the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}. Thus, the selection of ACM0001 (version 19.0) ^{/5/} for completing the updated CPA-DD ^{/2/} is confirmed as being correct. The Applus+ Certification's validation team had also checked the current list of valid standardized baselines as outlined in the applicable section of the UNFCCC CDM website ^{/18/}, and confirmed that there is no standardized baseline that would be applicable to CPA-1 Santa Rosa and/or to the Caixa's PoA.</p> <p>The Applus+ Certification's validation team also confirmed that the selected CDM baseline and monitoring methodology ^{/5/} and all applicable methodological tools ^{/10/} ^{/11/ /12/ /13/ /14/ /20/ /24/} were correctly applied with respect to the following:</p> <ul style="list-style-type: none"> – Meeting of applicability conditions/criteria (assessment details included in Appendix 5 below) – Delineation of project boundary and selection of emission sources and Greenhouse gases (GHGs) (assessment details included below in this Section); – Baseline identification (assessment details included in Section D.4) – Algorithms and/or formulae used to determine emission reductions (assessment details included in Appendix 6 below) – Selection and definition of values for ex-ante determined (fixed) parameters (assessment details included in Appendix 7 below) – Monitoring plan (including selection and definition of parameters monitored ex-post and monitoring approaches for such parameters (assessment details included in Appendix 8 below) <p><u>Assessment of meeting of applicability conditions/criteria for the selected CDM baseline and monitoring methodology + applicable methodological tools:</u></p> <p>The updated CPA-DD ^{/2/} was completed under full conformance with the selected CDM baseline and monitoring methodology ^{/5/} + applicable methodological tools ^{/10/} ^{/11/ /12/ /13/ /14/ /20/ /24/}.</p> <p>As outlined in Section Appendix 3 of the updated CPA-DD ^{/2/}, all applicability criteria/requirements for this CDM baseline and monitoring methodology and applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} are demonstrated to be sufficiently met. Details for the assessment performed by the Applus+ Certification's validation team of how such applicability criteria/requirements are met is summarized in Appendix 5 of this Validation Report.</p> <p>As confirmed by the Applus+ Certification's validation team, the applied CDM baseline and monitoring methodology and applicable methodological tools represent the versions of such methodological sources which are applied in the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p>

Assessment of the definition of the project boundary as per the updated CPA-DD:

As established by the applied methodology ^{/5/}, the project boundary for CPA-1 Santa Rosa under its original design configuration is correctly identified in the updated CPA-DD ^{/2/} as the site where LFG is captured and combusted. Since the electricity demand of the project activity is met by imports of grid-sourced electricity from the National Electricity Grid of Brazil, the CPA implementer has correctly included National Electricity Grid of Brazil as the spatial boundary for the project activity.

All GHG emission sources and GHG gases included in the project boundary are correctly outlined in Section B.2 of the updated CPA-DD ^{/2/} as summarized below:

GHG emission sources included in the project boundary:

	GHGs included	Description
Baseline scenario	CO ₂	Included. Generation of electricity by CPA-1 Santa Rosa represents displacement of electricity that would otherwise be generated by existing grid-connected electricity generation facilities (incl. fossil fuel fired power plants) for which, as established by ACM0001 (version 19.0) ^{/5/} , CO ₂ emissions represents important emission reduction source in the particular case of CPA-1 Santa Rosa. While CO ₂ emissions from decomposition of organic waste are not accounted since the CO ₂ is also released under the project activity. CO ₂ emissions from electricity generation are accounted for determination of related baseline emissions.
	CH ₄	Included. Methane in LFG is generated as a result of anaerobic decomposition of the organic fraction of the municipal solid waste (MSW) disposed in the CTR Santa Rosa landfill since it started to operate. It is relevant to note that since as per the previously conceived original design configuration for CPA-1 Santa Rosa, displacement of natural gas and/or any other fossil fuel) due to the supply of upgraded LFG to consumer(s) (through natural gas distribution network) as part of the operation of the CPA is not regarded as GHG abatement/mitigation measure (and related potential GHG emission reductions are thus not claimable as part of CPA-1 Santa Rosa), related emissions are thus not considered. It is also to note that CH ₄ emissions from flaring (under the project scenario) are addressed as part of the determination of baseline emissions for the CPA as established by ACM0001 (version 19.0).
	N ₂ O	Excluded for simplification. This emission source is assumed to be very small.
Project scenario	CO ₂	Included. Grid-sourced electricity consumption by CPA-1 Santa Rosa represents emissions from consumption of electricity due to the operation of the project activity for which, as established by ACM0001 (version 19.0) ^{/5/} , CO ₂ emissions represents important emission source in the particular case of the CPA. Furthermore, Liquefied Petroleum Gas (LPG) may be consumed by CPA-1 Santa Rosa. While combustion/utilization of LFG rich in CH ₄ promotes CO ₂ emissions, such emissions are not accounted since combusted LFG is regarded as originated from biogenic (natural) source.

	CH ₄	Not included. Minor fugitive CH ₄ emissions are expected to occur from flaring (residual CH ₄ in the exhaust gas of the flares) as part of the normal operation of the CPA-1 Santa Rosa. It is however important to note that as per ACM0001 (version 19.0) ^{/5/} , such emissions are to be considered in the context of the calculation of baseline emissions.
	N ₂ O	Excluded for simplification. This emission source is assumed to be very small.
<p>The selected emission sources and GHGs are correct and are appropriately justified for CPA-1 Santa Rosa.</p> <p>No leakage emissions are considered as leakage emissions are not required to be accounted as per applied CDM baseline and monitoring methodology ^{/5/}.</p> <p>In summary, the identified project boundary is confirmed by the Applus+ Certification's validation team as being under compliance with the selected CDM baseline and monitoring methodology ^{/5/} + applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}. The definition of the project boundary is sufficiently justified in the updated CPA-DD ^{/2/}.</p> <p>The Applus+ Certification's validation team also confirms that there are no GHG emission sources, which are not addressed by the applied methodology, and which are expected to contribute more than 1% of the overall expected annual average emission reductions.</p> <p>It was also confirmed by the Applus+ Certification's validation team that all main GHG emission sources, the physical delineation of the CPA, and other relevant project and baseline emission sources covered in the applied methodology are included within the project boundary for the purpose of calculating project and baseline emissions for CPA-1 Santa Rosa.</p> <p>In summary, the identified project boundary and the selected sources and gases are correctly justified in the updated CPA-DD ^{/5/}.</p>		

D.4. Validity of original baseline or its update

Means of validation	In accordance with applicable requirements of the CDM-VVS-PoA (version 02.0) ^{/1/} , the validation team appointed by Applus+ Certification assessed the validity of the previously identified baseline scenario for CPA-1 Santa Rosa as per applicable requirements of methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1) ^{/24/} (hereinafter referred to as "baseline validity tool" as also referred in Section B.3 of the updated CPA-DD ^{/2/}) and its conformance with details and guidelines included in the generic CPA of the PoA-DD valid for the 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA which CPA-1 Santa Rosa is part of).
Findings	No findings (CAR(s), CL(s) and/or FAR(s)) were raised regarding the demonstration of the validity of the previously determined baseline scenario for the project activity.
Conclusion	<p>Section B.3 of the updated CPA-DD ^{/2/} includes the complete application of the stepwise approach of the baseline validity tool for demonstrating the validity of the previously derived baseline scenario for CPA-1 Santa Rosa.</p> <p>As confirmed by the Applus+ Certification's validation team, the baseline scenario for CPA-1 Santa Rosa was previously initially determined and assessed (at the time of the inclusion of CPA under Caixa's PoA (in year 2012) as the all LFG generated at the CTR Santa Rosa landfill being directly emitted into the atmosphere (with no share of generated LFG being combusted in pre-project conventional passive LFG venting drains that would otherwise remain being installed and under unmanaged operation across the CTR Santa Rosa in the absence of CPA-1 Santa Rosa (baseline scenario)).</p> <p>The demonstration of validity of the baseline scenario is performed by presenting in Section B.3 of the updated CPA-DD ^{/2/} the whole determination of the baseline</p>

scenario by following applicable guidance and stepwise procedure of the selected CDM baseline and monitoring methodology ACM0001 (version 19.0) ^{/5/} + applicable related methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}.

The steps of the baseline validity tool ^{/24/} were appropriately applied as per the following assessment details:

Step 1: Assess the validity of the current baseline for the next crediting period:

The following sub-steps are appropriately applied in the updated CPA-DD ^{/2/}:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies:

The Applus+ Certification's validation team confirmed that as per the CPA-DD applicable for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa, the baseline scenario (in terms of emissions of methane) is determined as ("Atmospheric release of the LFG or partial capture of LFG and destruction to comply with regulations or contractual requirements, or to address safety and odors concerns").

As confirmed by the Applus+ Certification's validation team, CPA-1 Santa Rosa meets the requirements and conditions for the effective continuation of the validity of the previously identified baseline scenario.

While ACM0001 (version 19.0) ^{/5/} supersedes ACM0001 (version 11.0) ^{/28/} and while ACM0001 (version 19.0) ^{/5/} is applied in the PoA-DD for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/}, the updated CPA-DD ^{/2/} was completed by correctly and sufficiently considering specific provisions and requirements of the applied more recent version of ACM0001 (version 19.0) ^{/5/} methodology regarding the determination of the baseline scenario.

As confirmed by the Applus+ Certification's validation team, Section B.4.1 of the updated CPA-DD ^{/2/} includes the application of the stepwise approach of the applied methodology ^{/5/} for the determination of the amount of methane that would have been captured and destroyed in the baseline scenario (absence of CPA-1 Santa Rosa) at the CTR Santa Rosa. As confirmed by the Applus+ Certification's validation team, although there is still no regional or national legal requirement in Brazil establishing LFG to be collected and destroyed in landfills, in the particular case of the CTR Santa Rosa landfill, no share of generated LFG was previously combusted in such landfill site. Thus, the Applus+ Certification's validation team was able to confirm that the demonstration of continuation of the baseline scenario for CPA-1 Santa Rosa is under full compliance with mandatory national, regional and/or sectorial policies and requirements.

Step 1.2: Assess the impact of circumstances

By assuming the continuation of the validity of the previously identified baseline scenario in the context of the renewal of the crediting period of CPA-1 Santa Rosa, it is thus assumed that there is no need to assess the impact of circumstances (such as availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions) and/or sectoral policies which have come into effect after inclusion of CPA-1 Santa Rosa under Caixa's PoA and are applicable at the time of requesting renewal of the crediting period of the CPA. This is deemed reasonable and acceptable.

The updated CPA-DD ^{/2/} appropriately emphasizes that the previously identified baseline scenario for CPA-1 Santa Rosa is demonstrated as not changed at the time of requesting renewal of the crediting period. The Applus+ Certification's validation team had confirmed that there are indeed no relevant mandatory national and/or sectoral policies which have come into

effect after the inclusion of CPA-1 Santa Rosa under Caixa's PoA or prior to the submission of the request for renewal of the crediting period that would be applicable at the time of requesting its renewal of the crediting period.

The conditions used to determine the baseline emissions in the previous crediting period are confirmed as also still being valid/applicable in the context of the renewal of the crediting period of CPA-1 Santa Rosa.

In summary, the conditions and circumstances considered or taken into account to determine the baseline emissions for the previous 7-year crediting period of CPA-1 Santa Rosa are correctly assumed as still being valid/applicable for the next 7-year crediting period.

It is thus correctly assumed that, in the absence of CPA-1 Santa Rosa, LFG generated at the CTR Santa Rosa landfill would still be freely emitted into the atmosphere (with no share of generated methane being destroyed in conventional passive LFG venting drains existent at the CTR Santa Rosa landfill site).

It is also sufficiently demonstrated that there is no change in the market or regulatory characteristics/aspects (including legal requirements) or new market or regulatory circumstances that would demand any type of re-assessment or re-evaluation for the determination of the baseline scenario for the 2nd 7-year crediting period of CPA-1 Santa Rosa.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewable is requested.

While the baseline scenario previously identified at the inclusion of CPA-1 Santa Rosa under Caixa's PoA was not selected as *"the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology"*, application of step 1.3 is thus correctly regarded as not applicable.

Step 1.4: Assessment of the validity of the data and parameters

The Applus+ Certification's validation team confirmed that, while the CPA-DD valid for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa ^{/3/} applies not any longer valid version of the CDM baseline and monitoring methodology ACM0001 (version 11) ^{/28/}, some methodological requirements, ex-ante selected data and monitoring parameters as per this previous CPA-DD version are no longer valid/applicable for the 2nd 7-year crediting period since the selected CDM baseline and monitoring methodology is a more recently issued version of ACM0001 (version 19.0) ^{/5/}. As outlined in the updated CPA-DD ^{/2/}, the selected CDM baseline and monitoring methodology and the related methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} contain differentiated applicable methodological approaches (when compared to the previously applied versions of ACM0001 (version 11)).

New data and ex-ante determined parameters are confirmed as being applied in the context of the demonstration of the validity of the previously derived baseline scenario and also applied in the ex-post determination of baseline emissions for the 2nd 7-year crediting period.

Further assessment of the application of the methodological approach for the demonstration of validity of the previously derived baseline scenario is included below under Step 2 of the stepwise approach of the baseline validity tool ^{/24/}. The application of the methodological approach to determine baseline emissions for the 2nd 7-year crediting period as per the selected CDM baseline and monitoring methodology ^{/5/} is further assessed under Appendix 6.

Step 2: Update the current baseline and the data and parameters:

The following sub-step is appropriately applied in the updated CPA-DD ^{/2/}:

Step 2.1 Update the current baseline

As appropriately outlined in the updated CPA-DD ^{/2/}, while the previously determined baseline scenario is still valid for the 2nd 7-year crediting period, this Step is thus not applicable for the renewal of crediting period of CPA-1 Santa Rosa. Nonetheless, while the methodological approaches for the determination of baseline scenario and baseline emissions as per the selected CDM baseline and monitoring methodology ^{/5/} is indeed different than the previously applied version of methodology ACM0001 (version 11), for completeness reasons, the updated CPA-DD ^{/2/} includes the whole determination of the baseline scenario and baseline emissions as per the applicable guidance and requirements and stepwise approaches of selected CDM baseline and monitoring methodology regardless the fact that the baseline scenario remains being the same.

Assessment of the determination of the baseline scenario (in order to demonstrate the continuation of previously identified baseline scenario) by following applicable stepwise procedure of the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality"):

The continuation of the previously identified baseline scenario for CPA-1 Santa Rosa is confirmed by the Applus+ Certification's validation team as being correctly presented and demonstrated in the updated CPA-DD ^{/2/} through the application of the stepwise approach for determining baseline scenario as per the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) ^{/13/} as required by selected CDM baseline and monitoring methodology (ACM0001 (version 19.0) ^{/5/}) as per the following assessment details:

Step 0: Demonstration whether the proposed project activity is the First-of-its-kind:

As correctly indicated in the updated CPA-DD ^{/2/}, this optional step is correctly regarded as not applicable/valid for the renewal of the crediting period of CPA.

Step 1: Identification of alternative scenarios:

As part of application of Step 1, all applicable alternatives which are specified by ACM0001 (version 19.0) ^{/5/} were correctly and sufficiently considered and analysed as assessed follows:

Step 1a: Define alternative scenarios to the proposed CDM CPA:

The following alternatives for LFG management at the CTR Santa Rosa landfill are correctly initially considered in the updated CPA-DD ^{/2/}:

LFG1: The CPA (i.e. capture of landfill gas and its flaring and/or its use) being undertaken without being registered as a CDM CPA. This is a plausible alternative scenario, however involves significant investment and additional costs of landfill operations with no associated revenues (in the case of flaring of collected LFG as its unique measure).

LFG2: Atmospheric release of the landfill gas or partial capture of landfill gas and destruction only in order to comply with regulations or contractual requirements, and/or to address safety and odor concerns. This scenario is correctly identified as corresponding to the continuation of the pre-project situation (CPA-1 Santa Rosa or any other alternatives are not implemented).

LFG3: Atmospheric release of the LFG or capture of LFG in an unmanaged

SWDS and destruction through flaring in order to comply with regulations and/or contractual requirements, to address safety and odor concerns, and/or for other reasons. While the CTR Santa Rosa landfill is a well-managed SWDS, this alternative is correctly regarded as not applicable

LFG4: LFG is partially not generated because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS;

LFG5: LFG is partially not generated because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS

LFG6: LFG generation is partially avoided because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS.

As correctly outlined in the updated CPA-DD ^{/2/}, scenarios LFG3, LFG4, LFG5 and LFG6 were not taken into account under the application of Step 1a since no changes in the operation of the CTR Santa Rosa landfill have occurred as a result of the implementation of CPA-1 Santa Rosa during its currently expired 1st 7-year crediting period and neither are changes expected to occur during its 2nd 7-year crediting period. Therefore, it is deemed appropriate to exclude LFG3, LFG4, LFG5 and LFG6 from the list of alternative scenarios.

As further assessed in Appendix 5, the occurred implementation and operation of CPA-1 Santa Rosa have never represented (and they are not expected to represent) any driver or incentive for the promotion of any kind of quantitative or qualitative reduction in the amount of organic waste that would be recycled, aerobically degraded and/or incinerated at the CTR Santa Rosa landfill and/or at any other existent or potential (hypothetical) waste treatment or utilization facility under the area of influence of this particular landfill in the absence of the project activity (baseline scenario). The prevailing waste management practices pertinent to organic solid waste recycling in the region attended by the CTR Santa Rosa landfill were also assessed by the Applus+ Certification's validation team. As verified, detailed information (including aspects, facts and statistics related to recycling of organic fraction of MSW in the region of influence of the CTR Santa Rosa landfill and in other regions of Brazil) are included in the related documented evidences assessed by the Applus+ Certification's validation team. Such data sources confirm the non-existence of any facility with relevant scale/size to promoting aerobic degradation, incineration, utilization or recycling of organic fraction of solid waste (such as a solid waste composting plant) in the region of the project site. The Applus+ Certification's validation team also assessed the amount of organic waste currently being recycled or utilized in the region and whether such amount has ever been potentially negatively impacted by the previously occurred implementation of CPA-1 Santa Rosa. Available and credible statistical data and information sources were assessed by the Applus+ Certification's validation team ^{/44/ /45/ /46/}.

Furthermore, the following disclaimer (justifying non-promotion of any qualitative or quantitative change in Municipal Solid Waste (MSW) disposal and/or waste recycling and/or waste incineration related activities in the region of influence of the CTR Santa Rosa landfill) is confirmed by the Applus+ Certification's validation team as being appropriately added in the updated CPA-DD ^{/2/}:

"CPA-1 Santa Rosa was previously implemented at a landfill site (well-managed SWDS) whose purpose is the final disposition of municipal solid waste (MSW) by adopting of landfilling practices and techniques. CPA-1 Santa Rosa has not previously promoted (and it is not expected to promote) any qualitative or quantitative change in MSW disposal and/or waste recycling and/or waste incineration related activities in the region of influence of the CTR Santa Rosa landfill. In this context, it is crucial to note that with or without CPA-1 Santa Rosa being implemented, no recycling and/or incineration of the organic fraction of waste to be disposed at the CTR Santa Rosa landfill would occur. The same applies to alternative treatments such as aerobic treatment, incineration of waste streams have at this particular landfill and/or in any other landfill, or recycling station located within the region of influence of the CTR Santa Rosa landfill.

Furthermore, while the CTR Santa Rosa landfill is regarded as a well-managed SWDS, it is also crucial to note that with or without CPA-1 Santa Rosa being implemented, no MSW stream would be directed to an unmanaged SWDS. Thus, alternative scenarios LFG3, LFG4, LFG5 and LFG6 are hereby automatically excluded in the context of the application of the stepwise approach for the identification of baseline alternatives. Such exclusions are under full conformance with applicable guidance of ACM0001 (version 19.0).

In fact, recycling of organic matter, aerobic treatment and incineration of MSW (under magnitude/scale comparable to the amount of MSW disposed at the CTR Santa Rosa landfill) has not been common practice in Brazil. The occurred implementation and operation of CPA-1 Santa Rosa has never promoted (and it is not expected to promote) any quantitative change (including reduction) in the amount of organic solid waste that could or would be eventually recycled. This is an applicability condition/criteria of ACM0001 (version 19.0). Furthermore, no change in MSW disposal (changing of MSW disposal site from the CTR Santa Rosa landfill to an unmanaged SWDS) is expected to occur."

Regarding the identification of alternatives for the utilization of LFG for electricity and/or heat generation, the following alternative scenarios for electricity generation are considered in the updated CPA-DD ^{/2/}:

- E1: Electricity generation from LFG, undertaken without being registered as CDM project activity;
- E2: Electricity generation in existing or new renewable or fossil fuel based captive power plant(s);
- E3: Electricity generation in existing and/or new grid-connected power plants.

As correctly outlined in the updated CPA-DD ^{/2/}, scenario E2 is directly excluded since all electricity demand of the CTR Santa Rosa landfill has been historically met by a reliable supply of grid-sourced electricity (since the start of operations of the landfill) and the utilization of a captive electricity generator to supply electricity for the landfill site (using renewable or fossil energy sources) never occurred and it is not foreseen to occur in the project scenario either.

While the design of CPA-1 Santa Rosa does not encompass any utilization of collected LFG as gaseous fuel for heat generation, alternative scenarios for heat generation are thus correctly indicated as not identified. This is deemed correct and in accordance to ACM0001 (version 19.0) ^{/5/}. Therefore, scenarios H1 through H7 are not considered either. This is also in accordance with ACM0001 (version 19.0) ^{/5/}.

Regarding identification of alternatives for the supply of LFG to consumer(s) through natural gas distribution network, although CPA-1 Santa Rosa (under its original design configuration) encompasses supply of upgraded LFG to consumer(s) through natural gas distribution network, it is relevant that, as also appropriately outlined in the updated CPA-DD ^{/2/}, displacement of natural gas and/or any other fossil fuel) due to the supply of upgraded LFG to consumer(s) (through natural gas distribution network) as part of the operation of the CPA is not regarded as GHG abatement/mitigation measure (and related potential GHG emission reductions are thus not claimable as part of CPA-1 Santa Rosa). Therefore, no alternative for the supply of LFG to natural gas distribution network is considered on the particular case of the presented identification of the baseline scenario for CPA-1 Santa Rosa. This is under conformance with ACM0001 (version 19.0)..

Outcome of Step 1a:

As outcome of application of Step 1a of the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) ^{/13/} the realistic and credible alternatives remained (as defined by ACM0001 (version

19.0) ^{/5/} are identified as LFG1, LFG2, E1 and E3. The Applus+ Certification's validation team confirmed the list of realistic and credible alternatives after the application of Step 1a of the methodological tool as being complete, correct and appropriate.

Step 1b: Consistency with mandatory applicable laws and regulations:

As correctly outlined in the updated CPA-DD ^{/2/}, the list of alternatives left after application of Step 1b of the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) ^{/13/} is the same as after application of Step 1b of the methodological tool: LFG1, LFG2, E1 and E3.

The following related statement is correctly indicated in the updated CPA-DD ^{/2/}:

"(...) So far, there are still no legal restrictions or requirements for LFG collection and destruction in Brazil, neither for passive venting of LFG. Moreover there are still no legal restrictions or requirements for the utilization of LFG as gaseous fuel for electricity generation. Therefore, the remaining alternatives LFG1, LFG2, E1 and E3 are thus all under compliance with all applicable mandatory laws and regulations."

The Applus+ Certification's validation team was able to confirm that indeed there is no regional or national legislation requiring the collection and destruction/utilization of LFG in Brazil. Moreover, the validation team was also able to confirm that collection and destruction/utilization of LFG is not forbidden in Brazil either.

Outcome of Step 1b:

As outcome of application of Step 1b of the "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) ^{/13/}, the realistic and credible alternatives left (as defined by the selected CDM baseline and monitoring methodology) ^{/5/} are identified as LFG1, LFG2, E1 and E3. The validation team confirmed the list of realistic and credible alternatives after the application of Step 1b of the methodological tool as being correct, complete and appropriate.

Step 2: Barrier analysis + Step 3: Investment analysis + Step 4: Common practice analysis:

The following is correctly and appropriately outlined in the updated CPA-DD ^{/2/}:

"As per the applicable methodological guidance of both ACM0001 (version 19.0) and the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0), determining baseline scenario for a LFG collection and destruction/utilization initiative proposed as a CPA of a PoA is somehow combined with assessing and demonstrating additionality for such proposed CPA.

While in the particular situation of the renewal of the 7-year crediting period of a previously registered/included CPA, it is not required to assess and demonstrate the validity of the previously assessed/demonstrated additionality (of which in the particular case of CPA-1 Santa Rosa was previously assessed and demonstrated as outlined the latest version of the CPA-DD for its currently expired 1st 7-year crediting period (CPA-DD version 7.5, 11/09/2015), the application of STEP 2, STEP 3 and STEP 4 of the methodological tool are thus automatically regarded as not applicable in the particular context of the demonstration of the continuation of the previously identified baseline scenario for the CPA along its 2nd 7-year crediting period (as a requirement for the renewal of its 7-year crediting period).

This is in accordance with applicable guidance of the methodological tool "Assessment of the validity of the original/current baseline and to update the

baseline at the renewal of a crediting period" and other applicable CDM guidelines and rules."

The Applus+ Certification's validation team was able to confirm that, like previously demonstrated and assessed as part of the previously occurred inclusion of CPA-1 Santa Rosa under the Caixa's PoA, the CPA remains not being economically or financially feasible without revenues from sale of CERs to be generated by the CPA registered under the CDM. Thus, as outlined in the updated CPA-DD ^{/2/}, alternative scenario LFG1 + E1 is also correctly excluded as an alternative scenario and the only remaining alternative is alternative LFG2 (atmospheric release of the LFG or partial capture of LFG and destruction to comply with regulations or contractual requirements, or to address safety and odors concerns) + E3 (electricity generation in existing and/or new grid-connected power plants).

Conclusion about the determination of baseline scenario:

As a conclusion, the Applus+ Certification's validation team was able to confirm that alternative LFG2 (atmospheric release of the landfill gas or, eventually, partial capture of landfill gas and destruction to comply with regulations or contractual requirements, or to address safety and odour concerns) + alternative E3 (electricity generation in existing and/or new grid-connected power plants) are correctly identified as the only realistic alternatives valid for the 2nd 7-year crediting of CPA-1 Santa Rosa (under its original design configuration which is the design configuration valid for its renewal of crediting period).

As further assessed under assessment details for the determination of $F_{CH_4,BL,y}$, it is correctly assumed that in the absence of the project activity LFG would have been released/emitted into the atmosphere with no share of generated LFG being combusted in conventional passive LFG venting drains that would otherwise be under operation in the absence of the CPA-1 Santa Rosa in order to address any hypothetical existent requirement of methane to be destroyed at the CTR Santa Rosa.

The identified baseline scenario valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa is correctly determined as per applicable guidance of the selected CDM baseline and monitoring methodology ^{/5/} and the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 07.0) ^{/13/}. The application of guidance of the selected CDM baseline and monitoring methodology (ACM0001 (version 19.0) ^{/5/}) in the context of the determination of the continuation of the previously identified baseline scenario for CPA-1 Santa Rosa is deemed transparent and correct. The identified baseline scenario reasonably represents what would occur in the absence of CPA-1 Santa Rosa in the opinion of the Applus+ Certification's validation team. It is also the opinion of the Applus+ Certification's validation team that the application of the stepwise approach of the baseline validity tool ^{/24/} for demonstrating the validity of the previously derived baseline scenario for the project activity" is deemed reasonable and correct.

In summary, under conformance with applicable requirements from the CDM-VVS-PoA (version 02.0) ^{/1/}, the Applus+ Certification's validation team confirmed that the application of the stepwise approach of the baseline validity tool ^{/24/} (for demonstrating the validity of the previously derived baseline scenario for the CPA) is deemed reasonable and correct. It is sufficiently demonstrated that the previously determined baseline scenario for CPA-1 Santa Rosa (scenario that represents GHG emissions that would occur in the absence of the CPA) is still valid.

While the previously performed identification of the baseline scenario for CPA-1 Santa Rosa (as reported in the CPA-DD ^{/3/} applicable for its currently expired 1st crediting period) is also correctly identified and reported in the updated CPA-DD ^{/2/}, the validation team has verified that the procedure contained in the selected CDM baseline and monitoring methodology to identify the most reasonable baseline scenario was thus correctly and reasonably applied in the updated CPA-DD ^{/2/}.

D.5. Demonstration of eligibility of the CPAs

Means of validation	In accordance with applicable requirements of both the CDM-VVS-PoA (version 02.0) ^{/1/} and CDM-PS-PoA (version 02.0) ^{/15/} , the Applus+ Certification's validation team appointed by Applus+ Certification reviewed how CPA-1 Santa Rosa complies with applicable eligibility criteria for the Caixa's PoA (PoA which CPA-1 Santa Rosa is part of).
Findings	No findings (CAR(s), CL(s) and/or FAR(s)) were raised regarding the compliance of CPA-1 Santa Rosa with applicable eligibility criteria as per the PoA-DD valid for the 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Conclusion	<p>The Applus+ Certification's validation team was able to confirm that, as appropriately outlined in the updated CPA-DD ^{/2/}, at the time of its occurred inclusion in the Caixa's PoA, it was sufficiently demonstrated and assessed that CPA-1 Santa Rosa complied with each eligibility criterion for the inclusion of CPA in the Caixa's PoA made available in the PoA-DD for the currently expired 7-year crediting period of the PoA ^{/50/}, including the conditions that the CPA-1 Santa Rosa met the requirement pertaining to the demonstration of additionality.</p> <p>As also confirmed by the Applus+ Certification's validation team, Section F of the updated CPA-DD ^{/2/} appropriately includes the following relevant disclaimers:</p> <p><i>"While this CPA-DD is valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa (of which starting and ending dates match with the starting and ending dates of the 1st 7-year crediting period of the Caixa's PoA), information about category, required condition, supporting evidence for inclusion of eligibility criterion of the Caixa's PoA refer to related content included in the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA.</i></p> <p><i>Details and demonstration on how both CPA-1 Santa Rosa (under its original design configuration) and the CTR Santa Rosa landfill have previously met all previously defined eligibility criteria for its inclusion in the Caixa's PoA are included in the CPA-DD for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa (CPA-DD version 7.5, dated 11/09/2015) and corresponding Validation Report (dated 28/09/2012)."</i></p> <p>(...)</p> <p><i>"The CPA-DD valid for the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa includes the following related to eligibility of the CPA to be included in the Caixa's PoA:</i></p> <p><i>"The CPA is eligible to be included in the Caixa PoA because:</i></p> <ul style="list-style-type: none"> - <i>SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental has confirmed with the letter of intent (LoI) their voluntary participation to the proposed PoA coordinated by Caixa, and that the CTR Santa Rosa is neither registered as an individual CDM project activity nor included as part of another registered PoA.</i> - <i>The CTR Santa Rosa is a Regional sanitary landfill project, receiving municipal solid waste from Rio de Janeiro, Seropédica and Itaguaí municipalities.</i> - <i>The baseline scenario consists of the total or partial release of LFG to the atmosphere;</i> - <i>The project activity intends to collect LFG to be flared, used for energy generation and used to supply consumers through a natural gas distribution network.</i> - <i>The solid waste disposal site where the waste would be dumped can be clearly identified;</i> - <i>Only municipal solid waste will be received at the site as per the technical specifications of the concession; additionally hazardous wastes are not allowed to be disposed at the site, therefore the site is eligible under this PoA,</i>

	<ul style="list-style-type: none"> - SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental has agreed to conduct the stakeholder consultation as required by Brazil's DNA, and as outlined in Section C of this document, - SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental will take responsibility for operating and monitoring the CPA-1 CTR Santa Rosa as per the CDM rules and guidelines provided by Caixa; - Additionality analysis is performed at the CPA level, following a financial analysis and demonstrating that the project is not viable unless it is registered as a CDM project; - SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental has confirmation from Caixa, where future carbon revenues have been presented for the loan evaluation and are a partial guarantee to repay the loan. <p>The CPA-1 CTR Santa Rosa is additional, meeting the eligibility criteria listed above and justified as follows:</p> <ul style="list-style-type: none"> - There should not be any existing operating LFG collection system – CTR Santa Rosa landfill is still being constructed and there are no plans to implement a LFG collection system without CDM registry. - The costs for installation of the LFG collection and use systems should be prohibitive without CDM revenues. Estimated costs necessary to implement the LFG capture system, flaring system, electricity generators and LFG upgrading and distribution station exceeds R\$ 90 million, making this project not viable without CDM revenues. (...)" <p>In summary, it is sufficiently demonstrated that CPA-1 Santa Rosa (under its original design configuration) complies with applicable eligibility criteria for the Caixa's PoA.</p>
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D.6. Estimated emission reductions or net anthropogenic removals

Means of validation	In accordance with applicable requirements of the CDM-VVS-PoA (version 02.0) ^{/1/} , the Applus+ Certification's validation team appointed by Applus+ Certification reviewed the whether the calculation approach applied for determination of emission reductions (incl. ex-ante estimates of emission reductions to be achieved by CPA-1 Santa Rosa during its 2 nd 7-year crediting period) is correct and under conformance with applicable requirements and guidelines of both the applied methodology and the PoA-DD valid for the 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA which CPA-1 Santa Rosa is part of).
Findings	No findings (CAR(s), CL(s) and/or FAR(s)) were raised regarding the calculation of emission reductions (incl. ex-ante estimates of emission reductions to be achieved by CPA-1 Santa Rosa during its 2 nd 7-year crediting period).
Conclusion	<p>The Applus+ Certification's validation team was able to confirm that, as outlined in the updated CPA-DD ^{/2/}, calculations of GHG emissions reductions to be achieved by CPA-1 Santa Rosa during its 2nd 7-year crediting period are based on the application of the ACM0001 (version 19.0) ^{/5/} and the applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}.</p> <p>In accordance with the ACM0001 (version 19.0) ^{/5/}, while no leakage emissions are required to be accounted, GHG emissions reductions (ER_y) to be achieved by CPA-1 Santa Rosa during its 2nd 7-year crediting period are correctly defined in the updated CPA-DD ^{/2/} as the difference between baseline emissions (BE_y) and project emissions (PE_y). Assessment details for the determination of BE_y and PE_y are included in Appendix 6.</p> <p>The Applus+ Certification's validation team confirmed that application of algorithms and formulae for the determination of emission reductions achieved during the 2nd 7-year crediting period for CPA-1 Santa Rosa is correct and deemed reasonable.</p>

	<p>As confirmed by the Applus+ Certification's validation team, emission reductions (ER_y) to be achieved by CPA-1 Santa Rosa are correctly <i>ex-ante</i> estimated as the difference of <i>ex-ante</i> estimation of baseline emissions and <i>ex-ante</i> estimation of project emissions. ER_y are correctly estimated to be (on the average) 1,147,291 tCO₂e per year over the 2nd 7-year crediting period of CPA-1 Santa Rosa. Detailed calculation of <i>ex-ante</i> estimation of both baseline and project emissions, as provided in the emission reduction calculation spreadsheet ^{/4/} (which is enclosed to the updated CPA-DD ^{/2/}) are deemed correct and can be reproduced using data and parameter values provided in the updated CPA-DD ^{/2/} and supporting files submitted to the Applus+ Certification's validation team.</p> <p>Assessment details for the application of algorithms and formulae for the determination of emission reductions achieved during the 2nd 7-year crediting period of CPA-1 Santa Rosa are included below in Appendix 6.</p>
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D.7. Validity of monitoring plan

Means of validation	In accordance with applicable requirements of the CDM-VVS-PoA (version 02.0) ^{/1/} , the validation team appointed by Applus+ Certification reviewed whether monitoring plan described in the updated CPA-DD ^{/2/} for CPA-1 Santa Rosa is valid, correct and under conformance with the PoA-DD valid for the 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA which CPA-1 Santa Rosa is part of).
Findings	No findings (CAR(s), CL(s) and/or FAR(s)) were raised regarding the validity and design of the monitoring plan of CPA-1 Santa Rosa.
Conclusion	<p>As established by the ACM0001 (version 19.0) ^{/5/} and applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}, in the context of the ex-post determination of baseline emissions to be achieved by CPA-1 Santa Rosa (under its original design configuration) during its 2nd 7-year crediting period, the monitoring system for the CPA basically consists of measuring the amount of methane actually combusted (destroyed) in methane destruction devices which are to be encompassed by the CPA (high temperature enclosed flares a, set of internal combustion gas engines and measuring the amount of methane supplied to consumer(s) (for which upgraded LFG is supplied through natural gas distribution network) + monitoring of the status of such methane destruction devices (including the operational status of the infrastructure for upgrading and supplying LFG to consumer(s)) + assessment of the operational conditions of the CTR Santa Rosa landfill + monitoring amount of net electricity to be generated by the CPA and exported through the electricity grid the CPA is connected to (via measurements/monitoring of the parameters monitored <i>ex-post</i> which are summarized in a table included in Appendix 8).</p> <p>Project emissions resulting from flaring of collected LFG (PE_{flare,y}) will also be calculated as part of the determination of baseline emissions for CPA-1 Santa Rosa by following applicable measurements and calculations requirements as defined in the tool "Project emissions from flaring" (version 03.0) ^{/10/}. Finally, project emissions due to the consumption by the project activity of grid-sourced electricity will be determined by applying related monitoring requirements as per the applicable methodology. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p> <p>As appropriately indicated in the updated CPA-DD ^{/2/} and in conformance with currently applicable guidance for completing the CDM-CPA-DD form ^{/17/}, all the monitoring equipment and instruments will be maintained and managed in accordance with maintenance (service), calibration requirements and as per recommendations defined by the equipment/instrument manufacturers and/or relevant regulatory requirement(s) (when applicable). As also outlined in the updated CPA-DD ^{/2/}, measurement checking and calibration of the monitoring equipment/instruments will be performed on a regular basis as per manufacturer's related requirements and/or relevant regulatory requirement(s), if applicable, in order to ensure the correct measurement of data to be monitored.</p>

The high temperature enclosed flares will be maintained as per recommendations of the equipment manufacturer. Monitoring information/data of such methane destruction devices will be recorded and reported as required by the selected CDM baseline and monitoring methodology ^{/5/} and by the methodological tool "Project emissions from flaring" (version 03.0) ^{/10/}.

It is the opinion of the Applus+ Certification's validation team that monitoring plan, as described in the updated CPA-DD ^{/2/}, will give opportunity for real measurements of emission reductions achieved by CPA-1 Santa Rosa.

All data pertaining to monitoring parameters will be archived for at least two years after the end of the crediting period. General details of data to be collected, frequency of data recording, and the project management responsibilities are also clearly defined in the monitoring plan of the updated CPA-DD ^{/2/}.

It is the opinion of the Applus+ Certification's validation team that the monitoring plan, as described in the updated CPA-DD ^{/2/}, is feasible for the CME and CPA implementer.

As outlined in the updated CPA-DD ^{/2/}, maintenance service and routines for project's equipment and instruments include all required preventive and corrective actions in order to ensure appropriate functioning of all project related equipment. Related maintenance activities include visual control of the equipment status and real-time check of displayed parameters; cleaning up the equipment and the sensors; lubrication and greasing; replacement or overhauling of defective parts (including regular welding service in the HDPE pipelines and manifolds). Furthermore, as also outlined in the updated CPA-DD ^{/2/}, spare units for some of the monitoring instruments/equipment may be kept on-site.

As also appropriately outlined in the updated CPA-DD ^{/2/}, an appropriate project's operational and management structure is considered for the 2nd 7-year crediting period of CPA-1 Santa Rosa. Such operational and management structure will rely on staff with responsibilities to be clearly defined; where all collaborators and employees involved with operation of project and/or monitoring will receive appropriate training. Training of operational and management staff will encompass general competence development about LFG generation and collection; combustion and utilization of LFG, review of equipment operational principles; maintenance and calibration requirements for project's related equipment; procedures for monitoring data gathering and handling as well as emergency and safety procedures.

In summary, it is the opinion of the Applus+ Certification's validation team that the description and design of the monitoring plan for the CPA, as described in the updated CPA-DD ^{/2/} for CPA-1 Santa Rosa, fully complies with all the monitoring requirements of the ACM0001 (version 19.0) ^{/5/} and applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}. Such description is also under conformance with currently applicable guidelines for completing the CDM-CPA-DD form ^{/17/}. It is also the opinion of the Applus+ Certification's validation team that the CME and CPA implementer will be able to implement and operate the monitoring plan for CPA-1 Santa Rosa during its 2nd 7-year crediting period. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.

Assessment of information added in the CPA-DD regarding parameters to be monitored ex-post:

The updated CPA-DD ^{/2/} correctly includes in Sections B.4.1 and B.4.3 details about all parameters to be monitored *ex-post* during the 2nd 7-year renewable crediting period of CPA-1 Santa Rosa. Related assessment is also included in Appendix 7 of this report.

As established by ACM0001 (version 19.0) ^{/5/} and the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) ^{/12/} and also appropriately outlined in the updated CPA-DD ^{/2/}, the volumetric or mass flow of landfill gas captured ($V_{t,wb,j}$ or $V_{t,db,j}$ or $M_{t,db,j}$) and the methane fraction in the

landfill gas (VCH_{4,t,wb,j} or VCH_{4,t,db,j}) will be continuously measured in the same basis (dry or wet). The selection of parameters monitored *ex-post* and their monitoring procedures, as outlined in updated CPA-DD ^{/2/}, are deemed complete, transparent and under full conformance with requirements established by the selected CDM baseline and monitoring methodology and related applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}.

Assessment details for the selection and definition of parameters to monitored *ex-post* and applied monitoring approaches are included in Appendix 8 of this Validation Report.

Assessment of information added in the updated CPA-DD regarding management system and quality assurance for the monitoring process:

The description of the monitoring plan for CPA-1 Santa Rosa, as outlined in the updated CPA-DD ^{/2/}, includes inter alia, sufficient details about the following management and quality related aspects:

- General description of the staff responsibilities and authorities for project management;
- General description about procedures for data gathering and data reconciliation and reporting;
- General description about monitoring equipment/instruments;
- General information about calibration requirements of monitoring equipment/instruments;
- General information about data quality control, training, data management system, reporting and verification of data (data reconciliation).

A general and sufficient description of the monitoring plan process is elaborated in the updated CPA-DD ^{/2/} under conformance with related requirements of selected CDM baseline and monitoring methodology^{/5/} and applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}. The monitoring plan has been established in order to enable subsequent verification of emission reductions CPA-1 Santa Rosa during its 2nd 7-year crediting period for which periodic verification assessments are yet to be performed. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.

The application of the selected CDM baseline and monitoring methodology ^{/5/} and applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} is deemed transparent. By taking into account the content of all previously issued Monitoring Reports valid for the the currently expired 1st 7-year crediting period of CPA-1 Santa Rosa ^{/22/ /25/ /30/ /32/ /34/ /36/ /38/ /40/}, the Applus+ Certification's validation team considers the CME and CPA implementer potentially able and competent enough to monitor the CPA as per the monitoring plan valid for its 2nd 7-year crediting period.

The description of the monitoring plan as per the updated CPA-DD ^{/2/} indicates that all monitoring instruments and equipment will remain being calibrated as per manufacturer recommendations and/or as per international standards. Operational data relevant for emission reduction accounting for CPA-1 Santa Rosa will remain being logged continuously by using automated computerized data logger and storage system.

For the 2nd 7-year crediting period of CPA-1 Santa Rosa, data records will remain being stored on an appropriate computer software or data recording system where daily log-sheet files will serve for backup and crosscheck purpose, being archived at project site. Monthly project performance reports will be made available at both the project site and administrative office in both electronic and hard copy formats in order to ensure required data integrity. All monitoring data will be kept up to 2 years after the end of crediting period.

Training of operational staff for the relevant data record keeping, operation and maintenance related procedures are also considered. Moreover, project's staff will continue to be trained on procedures for applicable corrective actions.

It is the opinion of the Applus+ Certification's validation team that the description of the monitoring procedures for CPA-1 Santa Rosa, as outlined in the updated CPA-DD ^{/2/}, is deemed complete, reasonable and its implementation is potentially feasible for the CME and CPA implementer.

Through document check and interview conducted with representative of the CME and CPA implementer, it is verified that the monitoring plan description, as outlined in the updated CPA-DD ^{/2/}, provides sufficient information and it is described under full compliance with the applied CDM baseline and monitoring methodology ^{/5/}, applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} as well as under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.

As a conclusion, the Applus+ Certification's validation team has confirmed that the description of the monitoring plan included in the updated CPA-DD ^{/2/} (as well as other sections of the CPA-DD that describes the approaches to be applied for the determination of related baseline and project emissions) is correctly completed and under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}. It is the opinion of the Applus+ Certification's validation team that the descriptions of the monitoring plan (and descriptions in related sections of the updated CPA-DD ^{/2/} describing the approaches for determining baseline and project emissions) do not negatively affect the accuracy and correctness of the determination of baseline emissions.

The description of the monitoring plan for CPA-1 Santa Rosa, as outlined in Section B.4.1 and B.4.3 of the updated CPA-DD ^{/2/}, sufficiently meets all requirements and criteria of the applied CDM baseline and monitoring methodology ^{/5/}, applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} as well as the requirements and criteria of PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.

Sections B.4.1 and B.4.3 of the updated CPA-DD ^{/2/} were also confirmed by the Applus+ Certification's validation team to be completed under full compliance with applicable guidance and guidelines for completing the latest version of the CDM-CPA-DD form (version 09.0) ^{/17/}.

Assessment of applicability of the selected CDM baseline and monitoring methodology + applicable methodological tools:

While the CPA-DD ^{/2/} applies the CDM baseline and monitoring methodology ACM0001 (version 19.0) ^{/5/} and applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}, the validation assessment has also assessed the compliance of CPA-1 Santa Rosa with the applicability criteria and requirements for such methodology and methodological tools that the updated CPA-DD ^{/2/} refers to.

Through the performed document checking and background research, it was confirmed by the Applus+ Certification's validation team that the selected methodology ACM0001 (version 19.0) ^{/5/} + all applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} are correctly applied in the context of the completion of the updated CPA-DD ^{/2/}. Details about the assessment of meeting of applicability conditions of such methodology and methodological tools are included in Appendix 5.

In summary, the Applus+ Certification's validation team confirmed that the description of the description of the monitoring plan valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa is under conformance with the applied CDM baseline and monitoring methodology ^{/5/}, applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} and PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.

D.8. Crediting period

Means of validation	In accordance with applicable requirements of the CDM-VVS-PoA (version 02.0) ^{/1/} , the validation team appointed by Applus+ Certification reviewed whether the starting date and length of the 2 nd 7-year crediting period of CPA-1 Santa Rosa, as outlined in the updated CPA-DD ^{/2/} , meets all applicable requirements for renewal of 7-year crediting period.
Findings	No findings (CAR(s), CL(s) and/or FAR(s)) were raised regarding the selected starting date for the 2 nd 7-year crediting period of CPA-1 Santa Rosa.
Conclusion	The 2 nd 7-year crediting period of CPA-1 Santa Rosa is correctly defined in the updated CPA-DD ^{/2/} as starting on 05/10/2019 and ending on 04/10/2026. As part of its assessment, the Applus+ Certification's validation team confirmed the consideration of expected operational lifetime for pre-project equipment installed at the project site is not relevant/applicable in the particular context of the determination of the length of the 2 nd 7-year crediting period of CPA-1 Santa Rosa. The Applus+ Certification's validation team thus confirms that having the indication in the updated CPA-DD ^{/2/} of the 2 nd 7-year crediting period of CPA-1 Santa Rosa starting on 05/10/2019 and ending on 04/10/2026 is deemed correct and under full compliance with all applicable CDM requirements.

D.9. CME and project participants

Means of validation	In accordance with applicable requirements of the CDM-VVS-PoA (version 02.0) ^{/1/} , the validation team appointed by Applus+ Certification checked the names of the CME, CPA implementer and additional project participants included in the updated CPA-DD ^{/2/} against the names included in the latest version of the completed Modalities of Communication (MoC) form for the Caixa's PoA as per information made available in the UNFCCC website
Findings	No findings (CAR(s), CL(s) and/or FAR(s)) were raised regarding the correctness of corporate identity of CME, CPA implementer and additional project participants as included in the updated CPA-DD for the 2 nd 7-year crediting period of CPA-1 Santa Rosa ^{/2/} against information included in the latest version of the completed Modalities of Communication (MoC) form ^{/21/} for the Caixa's PoA.
Conclusion	The Applus+ Certification's validation team has confirmed the correctness of reporting corporate identity of CME, CPA implementer and additional project participants included in the updated CPA-DD ^{/2/} (" <i>Caixa Econômica Federal</i> ", " <i>SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental</i> ", " <i>Nordic Environment Finance Corporation</i> ", " <i>Swedish Energy Agency</i> ", " <i>International Bank for Reconstruction and Development acting as the Trustee of the Carbon Partnership Facility</i> " and " <i>Kingdom of Spain – Ministry for the Ecological Transition & Ministry of Economy and Business</i> ") against information included in the latest version of the completed Modalities of Communication (MoC) form ^{/21/} for the Caixa's PoA.

D.10. Post-registration changes

Type of post-registration changes (PRCs)	Confirmation (Y/N)	Validation report for PRCs	
		Version	Completion date
Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents ¹²	N	N/A	N/A
Corrections	N	N/A	N/A
Changes to the start date of the crediting period of component project activity	N	N/A	N/A
Inclusion of monitoring plan	N	N/A	N/A
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from applied methodologies, standardized baselines, or other methodological regulatory documents	N	N/A	N/A
Changes to the project design	N	N/A	N/A
Changes specific to afforestation and reforestation activities	N	N/A	N/A
Others (please specify)	N	N/A	N/A

As confirmed by the Applus+ Certification's validation team, there are no identified actual or planned post-registration changes (PRCs) for CPA-1 Santa Rosa to be encompassed by (to be submitted together with) its validation assessment for renewal of crediting period. As also confirmed by the Applus+ Certification's validation team and as appropriately outlined in the updated CPA-DD ^{/2/}, there are indeed post-registration permanent changes in CPA design that are to be later opportunely and appropriately addressed as part of an independent validation opinion assessment¹³.

¹² 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).

¹³ As confirmed by the Applus+ Certification's validation team, the following related disclaimer is appropriately added in the updated CPA-DD ^{/2/}:

"It is crucial to note that in January/2020 (already within the 2nd 7-year crediting period of the CPA), the CPA's electricity generation infrastructure was finally implemented under a different design configuration and under significantly reduced total combined nameplate installed capacity of 4.245 MW (installation of 3 engine-generator sets engines with 1.415 MW) when compared to the CPA's original design configuration.

(...)

It is crucial to note that in January/2020 (already within the 2nd 7-year crediting period of the CPA), the CPA's infrastructure for upgrading and supplying collected LFG to consumer was finally implemented under a differentiated design configuration (with significantly higher total combined LFG processing capacity of up to 20,000 Nm³/h). It is relevant to note that the previously considered supplying of upgraded LFG to consumer(s) through natural gas distribution network was also replaced by the supply by using trucks (road transportation). In order to make the supply of LFG to consumer(s) by using trucks, LFG has been further compressed in an appropriated LFG compression infrastructure (also implemented as part of CPA-1 Santa Rosa) prior of its transportation with LFG decompression occurring at the LFG delivery point(s).

Upon the successful renewal of the crediting period of CPA-1 Santa Rosa, a new version of the CPA-DD valid for the 2nd 7-year crediting period of CPA-1 Santa Rosa will be compiled for addressing this and other permanent design changes (which are valid for the 2nd crediting period). This yet to be completed new CPA-DD for the 2nd 7-year crediting period of CPA-1 Santa Rosa will then be opportunely assessed/validated by a Designated Operational Entity (DOE) as per applicable rules and procedures for addressing post-registration changes of CPAs."

As confirmed by the Applus+ Certification's validation team, the decision of the CME and CPA implementer of addressing the above-summarized permanent changes in CPA design (which occurred after the starting of the 2nd 7-year crediting period of CPA-1 Santa Rosa) under an independent validation opinion assessment (validation assessment not to be submitted together with validation assessment for renewal of crediting period of the CPA) is deemed correct and under conformance with applicable CDM rules.

SECTION E. Internal quality control

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As a final step for validation assessment for renewal of 7-year crediting period of CPA(s), the final documentation, including the Validation Report, has to undergo an internal quality control by the Technical Reviewer(s) previously approved by Applus+ Certification.

Details of the previously appointed Technical Reviewer(s) are provided in Section B.2 and Appendix 2 of this Validation Report for further references of knowledge and capability to conduct the quality checking.

After the Technical Review process, the final documentation has to undergo a final quality checking process called Administrative Review, done by the Applus+ Certification's Project Manager and/or Technical Support.

For final approval, the final set of documents are prepared by the DOE's Technical Manager or its deputy and signed by the authorized signatory of the DOE.

In case any of the persons performing this final internal quality control approval process has acted as a part of the Assessment Team or Technical Review team, the approval can only be given by DOE's personnel who are not part of those teams.

If the final set of documents has been satisfactorily approved, a request of renewal of crediting of CPA(s) is to submitted to the UNFCCC CDM EB along with the relevant documents.

SECTION F. Validation opinion

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LGAi Technological Center, S.A. (Applus+ Certification) has performed the validation assessment for the updated Component Project Activity Design Document (CPA-DD) valid for the 2nd 7-year crediting period of the component project activity (CPA) titled “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (CPA-1 Santa Rosa) in the context of its renewal of the crediting period (2nd 7-year crediting period for CPA-1 Santa Rosa starting on 05/10/2019 and ending on 04/10/2026). CPA-1 Santa Rosa was previously successfully included under the Programme of Activity (PoA) titled “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (Caixa’s PoA) on 05/10/2012 (submitted at the time of requesting registration of the PoA) with UNFCCC ref. no. 6573-0001.

The validation assessment was performed in accordance with applicable requirements of the CDM Validation and Verification Standard for Programme of Activities (CDM-VVS-PoA) (version 02.0) and included performance of assessment of the following issues:

- Evaluation of impact(s) of related new relevant national and/or regional policies, circumstances and regulations (if applicable and valid at the time of requesting renewal of crediting period of the CPA) on the previously identified baseline scenario for CPA-1 Santa Rosa, thus confirming of the validity of the previously derived baseline scenario by taking into account relevant guidance from the CDM Executive Board (CDM-EB) with regards to renewal of the crediting period of CPA;
- Evaluation the completion of the updated CPA-DD for CPA-1 Santa Rosa under conformance with details and guidelines included in the generic CPA of the PoA-DD valid for the 2nd 7-year crediting period of the Caixa’s PoA (PoA which CPA-1 Santa Rosa is part of);
- Assessment of calculations and reporting of estimates of emission reductions to be achieved by CPA-1 Santa Rosa during its 2nd 7-year crediting period as outlined in the updated CPA-DD.
- Assessment of demonstration of eligibility and description of baseline and monitoring plan as outlined in the updated CPA-DD.

The performed desk-review of the updated CPA-DD (version 8.0, dated 10/08/2020) and the subsequently performed follow-up interview with representative of the coordinating/managing entity (CME) and CPA implementer (including additional checking’s/assessments (as complementary auditing measures)) have provided the validation team appointed by Applus+ Certification sufficient information and evidences to determine/confirm the continuation of the validity of the previously identified baseline scenario for CPA-1 Santa Rosa (under its original design configuration).

The Applus+ Certification’s validation team also confirmed that the updated CPA-DD for CPA-1 Santa Rosa correctly applies the selected CDM baseline and monitoring methodology ACM0001 (version 19.0) + applicable methodological tools and it is completed under conformance with details and guidelines included in the generic CPA of the PoA-DD valid for the 2nd 7-year crediting period of the Caixa’s PoA (PoA which CPA-1 Santa Rosa is part of). The Applus+ Certification’s validation team also assessed a spreadsheet with calculations of *ex-ante* estimations of emission reductions to be achieved by CPA-1 Santa Rosa during its 2nd 7-year crediting period. Such spreadsheet is enclosed to the updated CPA-DD and was confirmed to be correctly elaborated.

The validation team appointed by Applus+ Certification is of the opinion that CPA-1 Santa Rosa has the potential to achieve GHG emission reductions during its 2nd 7-year crediting period as per *ex-ante* estimates of emission reductions reported in the updated CPA-DD (version 8.0, dated 10/08/2020). As verified by the Applus+ Certification’s validation team, all explanations and justifications provided by the CME and CPA implementer regarding information and assumptions included in the updated CPA-DD are deemed reasonable and acceptable.

It is thus the opinion of Applus+ Certification that CPA-1 Santa Rosa meets all the relevant requirements for the renewal of its 7-year crediting period. Hence Applus+ Certification recommends the renewal of the crediting period of this CPA.

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology (CDM baseline and monitoring methodology)
Caixa	Caixa Econômica Federal
Caixa's PoA	PoA "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project"
CAR	Corrective Action Request
CDM-EB	CDM Executive Board (the board)
CDM-PCP-PoA	CDM Project Cycle Procedure for Programme of Activities
CDM-PS-PoA	CDM Project Standard for Programme of Activities
CDM-VVS-PoA	CDM Validation and Verification Standard for Programme of Activities
CER	Certified Emission Reduction
CH ₄	Methane
CL	Clarification Request
CME	Coordinating managing entity
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
COVID-19	Coronavirus disease (infectious disease caused by a new virus that caused a worldwide pandemic in year 2020).
CPA-1 Santa Rosa	CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa
CPA-DD	Component project activity design document
DOE	Designated Operational Entity
ER	Emission Reduction
GHG	Greenhouse gas(es)
LFG	Landfill gas
LGAI Tech. Center S.A.	LGAI Technological Center, S.A. (Applus+ Certification)
MP	Monitoring Plan
MR	Monitoring Report
PP	Project Participants
PRC	Post-registration change
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change

Appendix 2. Competence of team members and technical reviewers

According to the applicable sectoral scope / technical area and experience in the sectoral or national business environment, Applus+ Certification has composed an assessment team in compliance with the Contract Review and Assessment Team appointment rules in the internal Quality Management System of Applus+ Certification as well as in compliance with the applicable requirements in the Accreditation Standard.

The composition of the Assessment Team (Applus+ Certification's validation team) has been approved by Applus+ Certification during the Contract Review process ensuring that the required skills and capabilities are covered.

The qualification levels for Assessment Team members that are assigned by aforementioned appointment rules are as presented below:

- Lead Auditor (LA).
- Auditor (A).
- Technical Expert (TE).
- Technical Reviewer (TR).
- Any of the above mentioned roles in training (iT, e.g. AiT for auditor in training).

The Sectoral Scope / Technical Area required knowledge linked to the applied methodology(ies) is covered by the Assessment Team as shown below:

Name	Role	SS/TA Knowledge	Financial Expertise	Attendance to on-site visit
Mr. Luis Filipe Aboim Tavares	LA/ TE	YES (13.1 / 1.1)	<i>n/a</i>	<i>n/a</i>
Mr. Simon Shen	TR /TE	YES (13.1 / 1.1)	<i>n/a</i>	<i>n/a</i>

A brief Curriculum Vitae (CV) of the Assessment Team members is provided below:

Mr. Luis Filipe Aboim Tavares:

Luis Filipe Aboim Tavares holds a Bachelor's Degree in Metallurgical Engineering and has twenty three years' experience in steel production industry covering utilities (water, steam, and wastewater treatment) and environment control (air emissions, wastewater and solid waste management).

He has acted as a GHG auditor since year 2002. He holds vast experience with 3rd-party independent assessments of GHG emission reduction project activities within the area of renewable energy, solid waste management and wastewater treatment implemented in Latin America and other regions. He has experience in validation and verification of numerous CDM projects in Latin America.

His technical qualification and experience under the CDM includes sectors/industries such as iron and steel; metal production; oil and gas industry, electricity and steam generation from renewable energy sources; solid waste handling and disposal as well as animal waste management.

He has undergone extensive training for the performance of GHG validation and verification assessments and he is currently qualified expert for Sectoral Scope 13 under Technical Area "Waste management" and Sectoral Scope 1, among others in accordance with procedures of Applus+ Certification. He also has years-long previous experience on conducting ISO 9001/14001 assessments. Mr. Luis Filipe Aboim Tavares is based in Rio de Janeiro, Brazil.

Mr. Simon Shen:

Mr. Simon Shen (Master's Degree in Thermal Energy Engineering, Bachelor's Degree in Environmental Engineering) is an Auditor appointed by Applus+ LGAI for GHG project assessments, audits and technical reviews. He has more than 6 years of work experience in CDM/GS4GG/VCS project assessment and review while collaborating with Applus+, besides of previous years of

experience while working as GHG Auditor and ISO 9001/14001 assessor for the DOE TÜV SÜD South Asia Private Limited (TÜV SÜD) (for about 3.5 years prior of joining Applus+). Mr. Simon Shen has extensive experience also as former Applus+ CDM Technical Manager based in Shanghai. Mr. Simon Shen is currently based in Shanghai, China.

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
/1/	UNFCCC/CDM-EB	CDM Validation and Verification Standard for Programme of Activities (CDM-VVS-PoA), version 02.0	Dated 29/11/2018. Available online: http://cdm.unfccc.int/ReferenceStandards/index.html	Others
/2/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Component Project Activity Design Document (CPA-DD) valid for the 2 nd 7-year crediting period of CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001) (version 8.0).	Dated 10/08/2020.	CPA implementer ¹⁴
/3/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Latest version of the Component Project Activity Design Document (CPA-DD) valid for the currently expired 1 st 7-year crediting period of CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001) (version 7.5)	Dated 11/09/2015. Available online: https://cdm.unfccc.int/ProgrammeOfActivities/gotoCPA?id=XQMN648JU5LVRAC2OBFE3H1PW0KG79	CPA implementer
/4/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Emission reduction calculation spreadsheet with <i>ex-ante</i> estimations of emission reductions to be achieved by the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001) during its 2 nd 7-year crediting period. (version 8.0).	Dated 10/08/2020.	CPA implementer
/5/	UNFCCC/CDM-EB	Consolidated baseline and monitoring methodology ACM0001 – “Flaring or use of landfill gas” (version 19.0)	Dated 14/06/2019. Available online: https://cdm.unfccc.int/filestore/H/E/J/HEJ2MD41GB0PUZISL9FNTAYQV3875O/EB103_repan01_ACM0001.pdf?t=SGF8cWg2bnc0fDAeSOaGs4c4Utj2-IQ0p0oW	Others
/6/	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

¹⁴ All document with provider indicated as “CPA Implementer” were sourced by the CPA implementer and project owner SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental

/7/	UNFCCC	Decision 3/CMP. 1 (Marrakesh – Accords)	Dated 30/03/2006. Available online: https://cdm.unfccc.int/Referece/COPMOP/08a01.pdf	Others
/8/	Bureau Veritas Certification Holding SAS	Validation Report for the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Report No. BRAZIL-val/03745/2010-SPL. Rev. 3.2	Dated 28/09/2012. Available online: https://cdm.unfccc.int/filestorage/g/9/8AGN9B2S4RIOFD/EPVWJ10T7M36ZKQL.pdf/PoA%20Caixa%20Economica%20Federal%20rev.03.1%20-%20Validation_Report_FINAL_CLEAN.pdf?t=MIF8cWg2bzFwDASpcHjWCgf5PF-aDRWe1OF	Others
/9/	IPCC	1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book; 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book.	Available online: http://www.ipcc-nggip.iges.or.jp/public/gl/inv5.html http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.html	Others
/10/	UNFCCC/CDM-EB	Methodological tool “Project emissions from flaring” (version 03.0).	Dated 28/03/2019. Available online: https://cdm.unfccc.int/methodologies/Pamethodologies/tools/am-tool-06-v3.0.pdf/history_view	Others
/11/	UNFCCC/CDM-EB	Methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0).	Dated 22/09/2017. Available online: https://cdm.unfccc.int/methodologies/Pamethodologies/tools/am-tool-05-v3.0.pdf	Others
/12/	UNFCCC/CDM-EB	Methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0).	Dated 27/11/2015. Available online: http://cdm.unfccc.int/methodologies/Pamethodologies/tools/am-tool-08-v3.0.pdf	Others
/13/	UNFCCC/CDM-EB	“Combined tool to identify the baseline scenario and demonstrate additionality”, (version 07.0)	Dated 22/09/2017. Available online: https://cdm.unfccc.int/methodologies/Pamethodologies/tools/am-tool-02-v7.0.pdf/history_view	Others
/14/	UNFCCC/CDM-EB	Methodological tool “Emissions from solid waste disposal sites” (version 08.0).	Dated 04/05/2017. Available online: https://cdm.unfccc.int/methodologies/Pamethodologies/tools/am-tool-04-v8.0.pdf	Others

/15/	UNFCCC/CDM-EB	CDM Project Standard for Programme of Activities (CDM-PS-PoA) (version 02.0).	Dated 29/11/2018. Available online: http://cdm.unfccc.int/Reference/Standards/index.html	Others
/16/	UNFCCC/CDM-EB	CDM Project Cycle Procedure for Programme of Activities (CDM-PCP- PA) (version 02.0).	Dated 29/11/2018. Available online: http://cdm.unfccc.int/Reference/Procedures/index.html#proj_cycle	Others
/17/	UNFCCC	Component project design document form for CDM Component Project Activities (CPAs) (incl. the Attachment. Instructions for completing this form" (version 09.0).	Dated 31/05/2019. Available online: https://cdm.unfccc.int/Reference/PDDs_Forms/index.html	Others
/18/	UNFCCC/CDM-EB	List of valid standardized baselines applicable for CDM project activities.	Available online: https://cdm.unfccc.int/methodologies/standard_base/new/sb7_index.html	Others
/19/	UNFCCC/CDM-EB	Standard for application of the global warming potentials to clean development mechanism project activities and programmes of activities for the second commitment period of the Kyoto Protocol. (version 01.0).	Dated 13/09/2012. Available online: https://cdm.unfccc.int/faq/Reference/Standards/meth/regstan02.pdf	Others
/20/	UNFCCC/CDM-EB	Methodological tool "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" (version 03)	Dated: 04/10/2013 Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf	Others
/21/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Completed Modalities of Communication (MoC) form for the CDM Programme of Activities "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project" (UNFCCC reference number 6573).	Latest version dated 28/08/2019. Available online: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/Q9LW74OKAXMUZPCE3IJBVS16025HDT/view?cp=1	CPA implementer
/22/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Monitoring Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project" (UNFCCC reference number 6573), including the CPA "CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa" (Reference number	Dated 10/07/2020	CPA implementer

		6573-0001). Monitoring period from 01/01/2018 to 04/10/2019 (version 2).		
/23/	Gordon J. Van Wylen, Richard E. Sonntag and Borgnakke	Fundamentals of Classical Thermodynamics; 4 th Edition, John Wiley & Sons, Inc. Table A-4: Saturated Water-Temperature.	Dated 1996. Available online: http://fireflylabs.com/disted/courses/m275-data(all%20years)/SaturatedWaterTables-T&P.pdf	Others
/24/	UNFCCC/CDM-EB	Methodological tool "Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period", (version 03.0.1)	Dated 02/03/2012. Available online: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf	Others
/25/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Monitoring Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project" (UNFCCC reference number 6573), including the CPA "CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa" (Reference number 6573-0001). Monitoring period from 01/07/2017 to 31/12/2017 (version 3).	Dated 11/10/2018 Available online: https://cdm.unfccc.int/PoAIsuance/iss_db/poais921658963/view	CPA implementer
/26/	RINA Services S.p.A. (RINA)	CDM Verification and Certification Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project" (UNFCCC reference number 6573), including the CPA "CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa" (Reference number 6573-0001). Monitoring period from 01/01/2018 to 04/10/2019 (version 2).	Dated 27/08/2020	Others
/27/	RINA Services S.p.A. (RINA)	CDM Verification and Certification Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project" (UNFCCC reference number	Dated 17/10/2018 Available online: https://cdm.unfccc.int/PoAIsuance/iss_db/poais921658963/view	Others

		6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/07/2017 to 31/12/2017 (version 1.0Aa).		
/28/	UNFCCC/CDM-EB	CDM baseline and monitoring methodology ACM0001 – “Consolidated baseline methodology for landfill gas project activities” (version 11)	Dated 28/05/2009 Available online: https://cdm.unfccc.int/filestorage/U/J/B/UJBDVFYLQKSEWCM73XG14Z692TRHO0/EB47_repan06_ACM0001_ver11.pdf?t=c1R8cWg2cHlxfDCXegu_l4yc2EjJiYCHeAJ3	Others
/29/	RINA Services S.p.A. (RINA)	CDM Verification and Certification Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/01/2017 to 30/06/2017 (version 2.0Aa).	Dated 18/01/2018 Available online: https://cdm.unfccc.int/PoAIsuance/iss_db/poais370187463/view	Others
/30/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Monitoring Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/01/2017 to 30/06/2017 (version 4).	Dated 16/01/2018 Available online: https://cdm.unfccc.int/PoAIsuance/iss_db/poais370187463/view	CPA implementer
/31/	RINA Services S.p.A. (RINA)	CDM Verification and Certification Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project”	Dated 16/05/2017 Available online: https://cdm.unfccc.int/PoAIsuance/iss_db/poais606976954/view	Others

		(UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/07/2016 to 31/12/2016 (version 1.0Aa).		
/32/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Monitoring Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/07/2016 to 31/12/2016 (version 2).	Dated 19/04/2017 Available online: https://cdm.unfccc.int/PoAIsuance/iss_db/poais606976954/view	CPA implementer
/33/	RINA Services S.p.A. (RINA)	CDM Verification and Certification Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/01/2016 to 30/06/2016 (version 2.0).	Dated 10/01/2019 Available online: https://cdm.unfccc.int/PoAIsuance/iss_db/poais206005926/view	Others
/34/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Monitoring Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/01/2016 to 30/06/2016 (version 4).	Dated 10/01/2019 Available online: https://cdm.unfccc.int/PoAIsuance/iss_db/poais206005926/view	CPA implementer

/35/	RINA Services S.p.A. (RINA)	CDM Verification and Certification Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/01/2015 to 31/12/2015 (version 1.1Aa).	Dated 22/06/2016 Available online: https://cdm.unfccc.int/PoAs/suance/iss_db/poais355110601/view	Others
/36/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Monitoring Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/01/2015 to 31/12/2015 (version 3).	Dated 13/06/2016 Available online: https://cdm.unfccc.int/PoAs/suance/iss_db/poais355110601/view	CPA implementer
/37/	TÜV NORD CERT GmbH	CDM Verification and Certification Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/01/2014 to 31/12/2014. Report No: 11568 – 15/014 (Rev. 2).	Dated 16/09/2015 Available online: https://cdm.unfccc.int/PoAs/suance/iss_db/poais540919416/view	Others
/38/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Monitoring Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number	Dated 11/09/2015 Available online: https://cdm.unfccc.int/PoAs/suance/iss_db/poais540919416/view	CPA implementer

		6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 01/01/2014 to 31/12/2014 (version 6).		
/39/	TÜV NORD CERT GmbH	CDM Verification and Certification Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 05/10/2012 to 31/12/2013. Report No: 10477 – 14/025 (Rev. 0).	Dated 08/07/2014 Available online: https://cdm.unfccc.int/PoAs/suance/iss_db/poaiss17396377/view	Others
/40/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental	Monitoring Report for the latest verification performed within the currently expired 1 st 7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573), including the CPA “CPA-1: Landfill gas recovery, energy generation and biogas distribution from CTR Santa Rosa” (Reference number 6573-0001). Monitoring period from 05/10/2012 to 31/12/2013 (version 3.4).	Dated 07/07/2014 Available online: https://cdm.unfccc.int/PoAs/suance/iss_db/poaiss17396377/view	CPA implementer
/41/	CDM-EB	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 31/12/2020))	Dated March/2020 Available online: https://cdm.unfccc.int/newsroom/latestnews/releases/2020/01041_index.html	Others
/42/	SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL	Set of pictures allowing visualization of the current implementation and operation of the CTR Santa Rosa landfill and the CPA “CPA-1: Landfill gas recovery, energy	Dated: 24/09/2020	CPA implementer

	S.A./CICLUS Ambiental	generation and biogas distribution from CTR Santa Rosa" (Reference number 6573-0001).		
/43/	Mayer-Brown / Taul & Chequer	Legal update / interpretation: Regulation of Brazil's National Policy on Waste Management	Available online: http://www.taulchequer.com.br/publications/article.asp?id=10261&nid=13012	Others
/44/	Brazilian Ministry of Regional Development	Diagnóstico do Manejo de Resíduos Sólidos Urbanos – 2017" (title translated into English language as "Diagnostics of Urban Solid Waste Management - 2017"	Dated year 2017 Available online: http://www.snis.gov.br/diagnostico-residuos-solidos/diagnostico-rs-2017	Others
/45/	Federal Republic of Brazil ,Ministry of Science and Technology	The second Brazilian Greenhouse Gases Emissions Inventory Report."	Dated 2010. Available online: http://www.mct.gov.br/upd_blob/0213/213909.pdf	Others
/46/	ABRELPE	"Panorama dos Resíduos Sólidos no Brasil - 2018/2019" (title translated into English language as " <i>Outlook of Solid Waste Sector in Brazil – years 2018/2019</i> ").	Available online: https://abrelpe.org.br/download-panorama-2018-2019/	Others
/47/	KBS Certification Services Pvt. Ltd.	Validation Report for the renewal of 7-year crediting period of the PoA "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project" (UNFCCC reference number 6573). (version 01)	Dated 10/01/2020. Available online: https://cdm.unfccc.int/filestorage/T/A/5/TA5L3GU0NHWOBR29PIFZ7MQ4SEC6VJ/FVR_PoA_Caixa.pdf?t=ajR8cWg2b2FfDCU7es2CSdP2NjzUV5TGrrO	Others
/48/	EPIC Sustainability Services Pvt. Ltd.	Validation Report for Post-Registration Changes in the PoA "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project" (UNFCCC reference number 6573) (version 04.0)	Dated 26/11/2018. Available online: https://cdm.unfccc.int/filestorage/U/M/4/UM4IF0Q175BYW3ZH92RCL8GTXNAKJP/6%20Dec%202018_Val%20Report%20for%20PRC%20Caixa%20PoA.pdf?t=Uk18cWg2b2YfDBEL3rewtil73yAEngcBLL6	Others
/49/	Caixa Econômica Federal	Programme of Activity Design Document (PoA-DD) for the 2 nd 7-year crediting period of the PoA "Caixa Econômica Federal Solid Waste Management and Carbon Finance Project" (UNFCCC reference number 6573). (version 3)	Dated 26/12/2019. Available online: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/Q9LW74OKAXMUZPCE3IJBVS16025HDT/view	Others
/50/	Caixa Econômica Federal	Programme of Activity Design Document (PoA-DD) for the 1 st	Dated 24/11/2018. Available online:	Others

		7-year crediting period of the PoA “Caixa Econômica Federal Solid Waste Management and Carbon Finance Project” (UNFCCC reference number 6573). (version 7.6)	https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/Q9LW74OKAXMUZPCE3IJBVS16025HDT/view?cp=1	
/51/	Brazil's Ministry of Mines and Energy / Empresa de Pesquisas Energéticas	“Anuário Estatístico de Energia Elétrica 2020 – Workbook” (<i>Brazil's Annual Statistics Workbook for Electricity – year 2020</i>)	Dated year 2020. Available online: https://www.epe.gov.br/pt/publicacoes-dados-abertos/publicacoes/anuario-estatistico-de-energia-eletrica	Others

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

Table 1. CL from this validation

CL ID	X	Section no.		Date: DD/MM/YYYY
Description of FAR				
No CLs were raised as part of the performed validation assessment.				
Project participant response				Date: DD/MM/YYYY
-				
Documentation provided by project participant				
-				
DOE assessment				Date: DD/MM/YYYY
-				

Table 2. CAR from this validation

CAR ID	X	Section no.		Date: DD/MM/YYYY
Description of CAR				
No CARs were raised as part of the performed validation assessment.				
Project participant response				Date: DD/MM/YYYY
-				
Documentation provided by project participant				
-				
DOE assessment				Date: DD/MM/YYYY
-				

Table 3. FAR from this validation

FAR ID	X	Section no.		Date: DD/MM/YYYY
Description of FAR				
No FARs were raised as part of the performed validation assessment.				
Project participant response				Date: DD/MM/YYYY
-				
Documentation provided by project participant				
-				
DOE assessment				Date: DD/MM/YYYY
-				

Appendix 5: Assessment of applicability conditions of the applied methodology

Under conformance with details and guidelines included in the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA which CPA-1 Santa Rosa is part of), the CPA has the applicability criteria/requirements of ACM0001 (version 19.0) ^{/5/} + applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} being sufficiently demonstrated as being met with related assessment details being summarized in the table below:

Applicability criteria of ACM0001 (version 19.0) ^{/5/}	Assessment by the validation team
<p><i>"The methodology is applicable under the following conditions:</i></p> <p>(a) <i>Install a new LFG capture system in a new or existing SWDS¹⁵ where no LFG capture system was installed prior to the implementation of the project activity; or</i></p> <p>(b) <i>Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that:</i></p> <p style="padding-left: 40px;">(i) <i>The captured LFG was vented or flared and not used prior to the implementation of the project activity; and</i></p> <p style="padding-left: 40px;">(ii) <i>In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available.</i></p> <p>(c) <i>Flare the LFG and/or use the captured LFG in any (combination) of the following ways:</i></p> <p style="padding-left: 40px;">(i) <i>Generating electricity;</i></p> <p style="padding-left: 40px;">(ii) <i>Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or</i></p>	<p>As per the CDM Project Standard for Programme of Activities (CDM-PS-PoA) ^{/15/}, in the context of the renewal of crediting period for a previously included CPA-1 Santa Rosa, the CPA-DD valid for its 2nd 7-year crediting period should be completed by applying the same version of the CDM baseline and monitoring methodology which was previously selected and applied in the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA of which the CPA in question is part of). As confirmed by the Applus+ Certification's team, the CPA-1 Santa Rosa and the Caixa's PoA were previously included and registered (respectively) under the CDM by applying the CDM baseline and monitoring methodology ACM0001 – "Consolidated baseline methodology for landfill gas project activities" (version 11) ^{/28/}. While ACM0001 (version 19.0) ^{/5/} represents the latest valid version of the ACM0001 baseline and monitoring methodology and by also taking into account that ACM0001 (version 11) ^{/28/} was previously replaced by newer versions of ACM0001, including its latest version (version 19.0), and by also taking into account that version 19.0 is the version of ACM0001 applied in the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/}; ACM0001 (version 19.0) ^{/5/} thus correctly represents the CDM baseline and monitoring methodology to be applied in the context of the renewal of crediting period for CPA-1 Santa Rosa.</p> <p>Applicability criteria (a) is correctly regarded as fulfilled, as the design of CPA-1 Santa Rosa considered for the purpose of renewal of its crediting period encompasses the installation of a new active (forced) LFG capture system where no LFG capture system was previously installed under the pre-project scenario. While condition (b) is correctly regarded as not applicable, condition (c-i) and (c-iii) are also fulfilled as the original design for CPA-1 Santa Rosa also encompasses utilization of collected LFG as gaseous fuel for electricity generation and the supply of upgraded LFG to consumer(s) through natural gas distribution network. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p> <p>Condition (d) is also correctly regarded as applicable as there have been no changes in the operation of the CTR Santa Rosa landfill as a result of the implementation of CPA-1 Santa Rosa and no change is expected to occur in the future either. These aspects and conditions are sufficiently explained and demonstrated in the updated CPA-DD ^{/2/}. As also appropriately</p>

¹⁵ SWDS = Solid Waste Disposal Site. In the particular case of CPA-1 Santa Rosa, the considered SWDS is the CTR Santa Rosa landfill.

<p>(iii) <i>Supplying the LFG to consumers through a natural gas distribution network.</i></p> <p>(iv) <i>Supplying compressed/liquefied LFG to consumers using trucks;</i></p> <p>(v) <i>Supplying the LFG to consumers through a dedicated pipeline;</i></p> <p>(d) <i>Do not reduce the amount of organic waste that would be recycled in the absence of the project activity."</i></p>	<p>outlined and justified in the updated CPA-DD ^{/2/}, no change in the current practice of landfilling of MSW at the CTR Santa Rosa landfill has occurred after the implementation of CPA-1 Santa Rosa either. With or without CPA-1 Santa Rosa, no recycling of the organic fraction of the solid waste, neither aerobic treatment of solid waste, neither incineration of solid waste have occurred or are expected to occur at the CTR Santa Rosa landfill. Recycling of organic matter, aerobic treatment and incineration of solid waste is sufficiently demonstrated in the updated CPA-DD ^{/2/} not to be common practice in Brazil and in the region of influence of the CTR Santa Rosa landfill. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p> <p>As part of validation assessment, in order to confirm the applicability of the selected CDM baseline and monitoring methodology ACM0001 (version 19.0) ^{/5/} + applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/}, interviews were conducted with representatives of the CME Caixa Econômica Federal and CPA implementer SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental and it was confirmed that the design and/or operation of the CTR Santa Rosa landfill site is not expected to be changed under any aspect.</p> <p>By taking into account the content/rationale for the applicability condition (d) and based on assessment of detailed information made available in the updated CPA-DD ^{/2/} regarding how the condition (d) is met + assessment of credible documented information/evidences ^{/44/ /45/ /46/}, it is the opinion of the Applus+ Certification's validation team that the updated CPA-DD ^{/2/} sufficiently justifies the plausibility and correctness of related information made available. Therefore, the Applus+ Certification's validation team is of the opinion that it is sufficiently justified and demonstrated that the implementation and operation of CPA-1 Santa Rosa has never represented (and it is not expected to represent) any driver or incentive for the promotion of any kind of reduction in the amount of organic waste that would be recycled at the CTR Santa Rosa landfill and/or at any other existent or potential (hypothetical) waste treatment or utilization facility under the area of influence of this particular landfill in the absence of the CPA (baseline scenario).</p> <p>The prevailing waste management practices pertinent to organic solid waste recycling in the region attended by the CTR Santa Rosa landfill were also assessed by the Applus+ Certification's validation team. As verified, detailed information (including aspects, facts and statistics related to recycling of organic fraction of MSW in the region of influence of the CTR Santa Rosa landfill and in other regions of Brazil) are included in the related documented evidences assessed by the Applus+ Certification's validation team which are appropriately referred in the updated CPA-DD ^{/2/}. Such data sources confirm the non-existence of any facility with relevant scale/size to promoting utilization or recycling of organic fraction of solid waste (such as a solid waste composting plant) in the region of the project site.</p> <p>The Applus+ Certification's validation team also assessed the amount of organic solid waste currently being recycled or utilized in the region and whether such amount has ever been potentially negatively impacted by the previous implementation of CPA-1</p>
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	<p>Santa Rosa. Available and credible statistical data and information sources were assessed by the Applus+ Certification's validation team (including both related sources indicated in the updated CPA-DD ^{/2/} evidences as well as other credible sources selected by the validation team).</p> <p>Assessed data and information sufficiently confirm the suitability and plausibility of all related argumentation and explanations which are made available in the updated CPA-DD ^{/2/}.</p> <p>Furthermore, based on assessment of related construction and design documentation for the CTR Santa Rosa landfill and also based on interviews conducted with representatives of the CME Caixa Econômica Federal and CPA implementer SERB – SANEAMENTO E ENERGIA RENOVÁVEL DO BRASIL S.A./CICLUS Ambiental, the Applus+ Certification's validation team was also able to confirm that no initiative involving recycling of organic fraction of MSW (or any other type of solid waste) is currently expected to be implemented at the CTR Santa Rosa landfill or in any other site by the CME, CPA implementer or by any other party.</p> <p>Furthermore, by also taking into account the applicable regulatory framework and typical business environment for waste management services (as a public service) in Brazil, it is also the understanding and opinion of the Applus+ Certification's validation team (based on its sectoral expertise and performed assessment of related sectoral literature ^{/45/} ^{/46/}), that the previously occurred implementation of CPA-1 Santa Rosa in year 2012 has not represented (and it is not expected to represent) any potential incentive or driver for any administration of municipality(ies) in the region, for any other public entity or for any other relevant solid waste recycling practitioner (if existent in the future) for the promotion of eventual changes in existent regional policies, rules and practices involving recycling of organic fraction of solid waste in the region.</p> <p>As a conclusion, it is sufficiently demonstrated that under no circumstance the previously occurred implementation and operation of CPA-1 Santa Rosa would per se represent a driver or incentive to have any party reducing or even preventing the volume of organic solid waste stream that would be eventually recycled in the baseline scenario.</p> <p>In summary, it is sufficiently demonstrated in the updated CPA-DD ^{/2/} that condition (d) of the above-quoted applicability criteria is sufficiently met. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p>
<p><i>"The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is</i></p> <p>(a) <i>Atmospheric release of LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and</i></p>	<p>Applicability condition (a) is fulfilled since, as confirmed by the Applus+ Certification's validation team, the baseline scenario is confirmed to be directly identified as the release (free emission) of generated LFG into the atmosphere (with no share of LFG being sporadically combusted in conventional LFG venting drains available in the pre-project scenario and that would be available in the baseline scenario (absence of CPA-1 Santa Rosa). This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p> <p>While CPA-1 Santa Rosa (under its original design configuration) also promotes emission reductions due to generation of</p>

<p>(b) <i>In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln;</i></p> <p>(i) <i>For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and</i></p> <p>(ii) <i>For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary</i></p> <p>(c) <i>In the case of LFG supplied to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline, the baseline scenario is assumed to be displacement of natural gas.”</i></p> <p>(d) <i>In the case of LFG from a Greenfield SWDS, the identified baseline scenario is atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons.</i></p>	<p>electricity, condition (b-i) is also met. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p> <p>Furthermore, no on-site heat requirements at the CTR Santa Rosa landfill are identified in the description of the CPA design, CPA-1 Santa Rosa does not encompass generation of heat using LFG as fuel. Supply LFG for heat generation off-site is not considered either. Therefore, applicability conditions (b - i) and (b – ii) is not an applicable alternative. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p> <p>Applicability condition (c) and (d) are not applicable either, since the supply of LFG to the end-user(s) through natural gas distribution network does not promotes emission reductions to be accounted as part of CPA-1 Santa Rosa and the CTR Santa Rosa landfill does not represent a Greenfield SWDS¹⁶. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p>
<p>Non applicability condition:</p> <p><i>This methodology is not applicable:</i></p> <p>(a) <i>In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace;</i></p> <p>(b) <i>If the management of the SWDS in the project activity is deliberately changed during the</i></p>	<p>Condition (a) is not applicable as LFG captured by the CPA is not expected to displace fossil fuels in a kiln, air heater or glass melting furnace. Moreover, no baseline and monitoring methodology other than ACM0001 (version 19.0) ^{/5/} is applied.</p> <p>Condition (b) is not applicable either as no quantitative or qualitative changes in the operation of the CTR Santa Rosa landfill has so far occurred and/or are expected to occur as a direct or indirect result of the implementation and operation of CPA-1 Santa Rosa.</p> <p>As appropriately outlined in the updated CPA-DD ^{/2/}, with or without the implementation of CPA-1 Santa Rosa, no recycling of the organic fraction of solid waste, aerobic solid waste treatment or solid waste incineration are expected to occur. In fact, recycling of solid waste, solid waste aerobic treatment and solid waste incineration are not common practices in Brazil. During the performed validation assessment, interviews were conducted with representative of the CME and CPA implementer and it was confirmed that the CPA implementer and operator of the CTR</p>

¹⁶ As confirmed by the Applus Certification's validation team, the following disclaimer is appropriately included in the updated CPA-DD:

“It is relevant that as per the previously conceived original design configuration for CPA-1 Santa Rosa, displacement of natural gas and/or any other fossil fuel) due to the supply of upgraded LFG to consumer(s) (through natural gas distribution network) as part of the operation of the CPA is not regarded as GHG abatement/mitigation measure (and related potential GHG emission reductions are thus not claimable as part of CPA-1 Santa Rosa).”

<p><i>crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.</i></p>	<p>Santa Rosa landfill do not intend or plan to change the operation or design of the landfill site under any aspect. Moreover, as claimed by CPA implementer and described in the updated CPA-DD ^{/2/}, the operational conditions and the previously conceived design of the CTR Santa Rosa landfill are not expected to change in the future. It is important to note that as per monitoring requirements for the monitoring parameter Management of the SWDS, the design and operational conditions of the solid waste disposal site (SWDS) will be annually monitored on the basis of different sources, including inter alia:</p> <ul style="list-style-type: none"> – Original construction and operational design of the CTR Santa Rosa landfill; – Technical specifications and requirements for the management of the CTR Santa Rosa landfill; – Applicable local or national regulations dealing with management and operation of existing landfills. <p>As required by ACM0001 (version 19.0) ^{/5/}, any occurred or planned relevant change in terms of management of the landfill is to be reported and justified as part of the monitoring process for the project activity. This is also confirmed by the Applus+ Certification's validation team as being under conformance with the PoA-DD valid for the 2nd 7-year crediting period of Caixa's PoA ^{/49/}.</p>
<p>"The applicability conditions included in the tools referred to above also apply."</p>	<p>As confirmed by the Applus+ Certification's validation team, demonstration of meeting of applicability conditions for the following methodological tools is sufficiently demonstrated in Section B.2 of the updated CPA-DD ^{/2/}:</p> <ul style="list-style-type: none"> – "Project emissions from flaring" (version 03.0) ^{/10/} – "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/} – "Emissions from solid waste disposal sites" (version 08.0) ^{/14/} – "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) ^{/12/} – "Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period for renewal of crediting period" (version 03.0.1) ^{/24/} – Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 03) ^{/20/} – "Combined tool to identify the baseline scenario and demonstrate additionality" (version 7) ^{/13/} <p>As confirmed by the Applus+ Certification's validation team, the applied methodological tools represent the versions of such methodological sources which are also applied in the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>

Appendix 6: Assessment of GHG emission reduction calculations

As a result of the deemed acceptable and correct approach from the CME and CPA implementer on applying the CDM baseline and monitoring methodology ACM0001 (version 19.0) ^{/5/} + applied methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} for completing the updated version of the CPA-DD ^{/2/} under conformance with details and guidelines included in the generic CPA of the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA which CPA-1 Santa Rosa is part of); the appointed validation team confirmed the overall appropriateness and correctness of the application of related algorithms/formulae for determining emission reduction to be achieved by CPA-1 Santa Rosa along its 2nd 7-year crediting period vis-à-vis applicable requirements of both such CDM methodology + methodological tools and the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA (PoA which CPA-1 Santa Rosa is part of).

While as per ACM0001 (version 19.0) ^{/5/}, no leakage emissions are required to be accounted, GHG emissions reductions (ER_y) to be achieved by CPA-1 Santa Rosa during its 2nd 7-year crediting period are thus correctly defined (in tCO₂e) as the difference between baseline emissions (BE_y) and project emissions (PE_y), where assessment details for the approaches for the determination of BE_y and PE_y are presented below:

Assessment of the determination of baseline emissions:

As established by selected CDM baseline and monitoring methodology ACM0001 (version 19.0) ^{/5/} + applicable methodological tools ^{/10/ /11/ /12/ /13/ /14/ /20/ /24/} and correctly outlined in Section B.4.1 of the updated CPA-DD ^{/2/}, in the particular case of CPA-1 Santa Rosa (under its original design configuration) baseline emissions are directly and correctly determined as follows:

$$BE_y = BE_{CH_4,y}$$

Where:

BE_y Baseline emissions in year y (in tCO₂e/yr)

BE_{CH₄,y} Baseline emissions of methane from the SWDS in year y (in tCO₂e/yr)

The determination of baseline emissions correctly applies the stepwise procedure which is established by ACM0001 (version 19.0) ^{/5/} as follows:

Assessment of the determination of baseline emissions of methane from the SWDS (BE_{CH₄,y}):

Baseline emissions of methane from the CTR Santa Rosa landfill (BE_{CH₄,y}) are correctly determined ex-post based on the amount of methane that is captured in the project scenario and the amount of methane that is assumed as being captured and destroyed in the baseline scenario (absence of CPA-1 Santa Rosa). In addition, the effect of methane oxidation in the top layer section of the landfill in the baseline scenario (absent in the CPA) is also correctly taken into account as required by ACM0001 (version 19.0) ^{/5/}. BE_{CH₄,y} is thus calculated (in tCO₂e/yr) as follows:

$$BE_{CH_4,y} = ((1 - OX_{top_layer}) * F_{CH_4,PJ,y} - F_{CH_4,BL,y}) * GWP_{CH_4}$$

Where:

OX_{top_layer} Fraction of methane in the LFG that would be oxidized in the top layer of the considered SWDS in the baseline (dimensionless). As correctly outlined in Section B.4.2 of the updated CPA-DD ^{/2/}, OX_{top_layer} is correctly *ex-ante* determined as 10% (default values as per ACM0001 (version 19.0) ^{/5/}). Further related assessment details are included in Appendix 7.

$F_{CH_4,PJ,y}$	Amount of methane in the LFG which is flared and/or used by CPA-1 Santa Rosa in year y (in tCH_4/yr). $F_{CH_4,PJ,y}$ is determined ex-post by following the stepwise approach of ACM0001 (version 19.0) ^{/5/} as assessed below under the sub-section “ <i>Ex post determination of $F_{CH_4,PJ,y}$</i> ”.
$F_{CH_4,BL,y}$	Amount of methane in the LFG that would be flared in the baseline in year y (in tCH_4/yr). $F_{CH_4,BL,y}$ is also determined by following the stepwise approach of ACM0001 (version 19.0) ^{/5/} as assessed below under the sub-section “ <i>Assessment of the determination of $F_{CH_4,BL,y}$</i> ”.
GWP_{CH_4}	Global Warming Potential of CH_4 . GWP_{CH_4} is correctly ex-ante determined as 25 tCO_2e/tCH_4 . Further related assessment details are included in Appendix 7.

Assessment of the ex post determination of $F_{CH_4,PJ,y}$:

As assessed by the Applus+ Certification’s validation team, during the 2nd 7-year crediting period of CPA-1 Santa Rosa, $F_{CH_4,PJ,y}$ will be determined ex-post (in $tCH_4/year$) as the quantity of methane destroyed by the project’s methane destruction devices as follows:

$$F_{CH_4,PJ,y} = F_{CH_4,flared,y} + F_{CH_4,EL,y} + F_{CH_4,NG,y}$$

Where:

$F_{CH_4,EL,y}$	Amount of methane in the LFG which is used for electricity generation in year y (in tCH_4/yr)
$F_{CH_4,NG,y}$	Amount of methane in the LFG which is supplied to consumer(s) through natural gas distribution network and/or dedicated pipeline and/or using the trucks in year y (in tCH_4/yr).
$F_{CH_4,flared,y}$	Amount of methane in the LFG which is destroyed by flaring in year y (in tCH_4/yr). $F_{CH_4,flared,y}$ is determined as the difference between the amount of methane supplied to each one of the installed the flare and any methane emissions from the flare in question, as follows:

$$F_{CH_4,flared,y} = F_{CH_4,sent_flare,y} - (PE_{flare,y} / GWP_{CH_4})$$

Where:

$F_{CH_4,sent_flare,y}$	Amount of methane in the LFG which is sent to the flare in year y (in tCH_4/yr)
$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year y (in tCO_2e/yr)

Assessment of the determination of $F_{CH_4,sent_flare,y}$:

As established by ACM0001 (version 19.0) ^{/5/} and as appropriately outlined in the updated CPA-DD ^{/2/}, $F_{CH_4,sent_flare,y}$ is correctly determined by following applicable guidance of the methodological tool “Tool to determine the mass flow of greenhouse gas in a gaseous stream” (version 03.0) ^{/12/}. In the context of the application of such methodological tool for the ex-post determination of $F_{CH_4,sent_flare,y}$ the following set of defined requirements are also correctly regarded as applicable:

- The gaseous stream the tool shall be applied to is the LFG stream delivery pipeline to the high temperature enclosed flare. $F_{CH4,sent_flare,y}$ is thus calculated as the mass flow of methane to the flare(s).
- CH_4 is the greenhouse gas for which the mass flow should be determined;
- The flow of the gaseous stream should be measured on continuous basis;
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (applicable equations in the methodological tool).

Assessment of the determination of $F_{CH4,EL,y}$ and $F_{CH4,NG,y}$:

$F_{CH4,EL,y}$ and $F_{CH4,NG,y}$ are directly determined by following applicable guidance of the methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/12/} and by taking into account the following requirements also defined by ACM0001 (version 19.0) ^{/5/}:

- The gaseous stream the methodological tool shall be applied to is the stream of collected LFG which is sent to each engine generator set j of the CPA’s electricity generation infrastructure and to the infrastructure to promote supply of upgraded LFG to consumer(s) (through natural gas distribution network) respectively;
- CH_4 is the greenhouse gas for which the mass flow is determined;
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 or 17 in the methodological tool); and
- The mass flows should be calculated at least on an hourly basis for each hour h in year y ;
- The mass flow calculated for hour h is 0 if the equipment/device is not working in hour h ($Op_{j,h}$ = not working). Accumulated hourly values are summed to a yearly unit basis.

The mass flow should be calculated on an at least hourly basis in year y .

As confirmed by the Applus+ Certification’s validation team applicable guidance of the methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/12/} is correctly applied in the updated CPA-DD ^{/2/} for the ex-post determination of $F_{CH4,sent_flare,y}$, $F_{CH4,EL,y}$ and $F_{CH4,NG,y}$ as assessed below:

Assessment of the use of applicable guidance of the methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” for determining $F_{CH4,sent_flare,y}$, $F_{CH4,EL,y}$ and $F_{CH4,NG,y}$:

As confirmed by the Applus+ Certification’s validation team, applicable guidance of the methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/12/} is correctly applied for the ex-post determination of $F_{CH4,sent_flare,y}$, $F_{CH4,EL,y}$ and $F_{CH4,NG,y}$ as follows:

Use of Option A, B, C or D:

The following potential measurement options of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/12/} are correctly and reasonably considered for the determination of $F_{CH_4, sent_flare, y}$, $F_{CH_4, EL, y}$ and $F_{CH_4, NG, y}$ for each one of the LFG destruction/utilization processes of CPA-1 Santa Rosa¹⁷.

Considered methodological approaches for the determination of $F_{CH_4, sent_flare, y}$, $F_{CH_4, EL, y}$ and $F_{CH_4, NG, y}$ as per the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” ^{/12/}:

Option	Flow of gaseous stream	Volumetric fraction
A	Volume flow – dry basis	Dry or wet basis
B	Volume flow – wet basis	Dry basis
C	Volume flow – wet basis	Wet basis
D	Mass flow – dry basis	Dry or wet basis

As correctly outlined in the updated CPA-DD ^{/2/}, depending on project conditions and installed instruments/equipment along its 2nd 7-year crediting period, Option A, B, C or D will be selected *ex-post*. The decision of the CME and CPA implementer to select the calculation option on *ex-post* basis (as reflected in the updated CPA-DD ^{/2/}) is deemed reasonable and acceptable (by taking into account that the selection of Option A, B, C or D clearly depends on project’s operational aspects/conditions and specifications of monitoring equipment actually installed and under operating along its 2nd 7-year crediting period).

Thus, along its 2nd 7-year crediting period, depending on project’s operational aspects/conditions and specifications of operative monitoring equipment, either Option A, B, C or D will be applied *ex-post* as assessed below:

Option A

$$F_{CH_4, t, j} = V_{t, db, j} * v_{CH_4, t, db, j} * \rho_{CH_4, t, j}$$

Where:

$F_{CH_4, t, j}$ Mass flow of greenhouse gas i ($i = CH_4$) in the gaseous stream (LFG) in time interval t for process j (in kg gas/h)

$V_{t, db, j}$ Volumetric flow of LFG stream in time interval t on a dry basis for process j . $V_{t, db, j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being *ex-post* determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $V_{t, db, j}$ are included in Appendix 8.

$v_{CH_4, t, db, j}$ Volumetric fraction of methane in the gaseous stream (LFG) in time interval t on a dry basis for process j (in m³ gas /m³ dry gas). $v_{CH_4, t, db, j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being *ex-post* determined/monitored

¹⁷ As confirmed by the Applus+ Certification’s validation team, the following related disclaimer is appropriately added in Section B.4.1 of the updated CPA-DD ^{/2/}:

“It is relevant to note that in the particular case of CPA-1 Santa Rosa (under its original design configuration), at the same time instant, the flow of LFG being combusted in the CPA’s flares, the flow of LFG used as gaseous fuel for electricity generation in the CPA’s electricity generation infrastructure and the flow of LFG being sent to the CPA’s infrastructure for the supply of upgraded LFG to consumer(s) may have different compositions (e.g. content/fraction of CH₄) due to design and operational aspects of CPA-1 Santa Rosa. Due to that, mass flow will be determined independently for each one of such LFG destruction/utilization processes on each time instant t.”

along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $v_{CH_4,t,db}$ are included in Appendix 8.

$\rho_{CH_4,t,j}$ Density of methane in the gaseous stream in time interval t for process j (kg gas /m³ gas j). $\rho_{CH_4,t}$ will be determined as follows:

$$\rho_{CH_4,t,j} = P_{t,j} * MM_{CH_4} / R_u * T_{t,j}$$

Where:

$P_{t,j}$ Absolute pressure of the gaseous stream (LFG) in time interval t for process j (in Pa). $P_{t,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further assessment details for the ex-post determination/monitoring of $P_{t,j}$ are included in Appendix 8.

$T_{t,j}$ Temperature of the gaseous stream (LFG) in time interval t for process j (in K). $T_{t,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further assessment details for the ex-post determination/monitoring of $T_{t,j}$ are included in Appendix 8.

MM_{CH_4} Molecular mass of greenhouse gas methane (in kg/kmol). For the considered GHG (CH₄), MM_{CH_4} is correctly indicated in the updated CPA-DD ^{/2/} as being ex-ante determined as 16.04 kg/kmol. Further related assessment details are included in Appendix 7.

R_u Universal ideal gases constant (in Pa.m³/kmol.K). R_u is ex-ante determined as 8,314 Pa.m³/kmol.K. Further related assessment details are included in Appendix 7.

Option B

$F_{CH_4,t,j}$ is to be determined by using the equations listed above under Option A, however, by converting the measured volumetric flow from wet basis to dry basis as follows:

$$V_{t,db,j} = V_{t,wb,j} / (1 + v_{H_2O,t,db,j})$$

Where:

$V_{t,db,j}$ Volumetric flow of the gaseous stream (LFG) in time interval t on a dry basis for process j (in m³ dry gas/h).

$V_{t,wb,j}$ Volumetric flow of the gaseous stream (LFG) in time interval t on a wet basis for process j (in m³ wet gas/h). $V_{t,wb,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $V_{t,wb,j}$ are included in Appendix 8.

$v_{H_2O,t,db,j}$ Volumetric fraction of H₂O in the gaseous stream (LFG) in time interval t on a dry basis for process j (in m³ H₂O/m³ dry gas). The volumetric fraction of H₂O in time interval t on a dry basis for process j ($v_{H_2O,t,db,j}$) is estimated as follows:

$$v_{H_2O,t,db,j} = (m_{H_2O,t,db,j} * MM_{t,db,j}) / (MM_{H_2O})$$

Where:

$V_{H_2O,t,db,j}$	Volumetric fraction of H_2O in the gaseous stream in time interval t on a dry basis for process j (in $m^3 H_2O/m^3$ dry gas)
$m_{H_2O,t,db,j}$	Absolute humidity in the gaseous stream in time interval t on a dry basis for process j (in kg H_2O/kg dry gas)
$MM_{t,db,j}$	Molecular mass of the gaseous stream in time interval t on a dry basis for process j (kg dry gas/kmol dry gas)
MM_{H_2O}	Molecular mass of H_2O (in kg $H_2O/kmol H_2O$). MM_{H_2O} is correctly indicated in the updated CPA-DD ^{/2/} as being ex-ante determined as 18.0152 kg/kmol. Further related assessment details are included in Appendix 7.

As also appropriately outlined in the updated CPA-DD ^{/2/}, in case Option B is selected, the absolute humidity of the gaseous stream ($m_{H_2O,t,db}$) will be determined using Option 2 of the methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/12/} for the “Determination of the absolute humidity of the gaseous stream” as follows:

Option 2: Simplified calculation without measurement of the moisture content

While this calculation option provides a simple and conservative approach to determine the absolute humidity (by assuming the gaseous stream is dry or saturated depending on which is the conservative situation), if it is conservative to assume that the gaseous stream is dry, then $m_{H_2O,t,db}$ is appropriately assumed to equal 0. If it is conservative to assume that the gaseous stream is saturated, then $m_{H_2O,t,db}$ is appropriately assumed to equal the saturation absolute humidity ($m_{H_2O,t,db,sat}$) and calculated as follows:

$$m_{H_2O,t,db,sat} = (p_{H_2O,t,db,Sat} * MM_{H_2O}) / (P_{t,j} - p_{H_2O,t,Sat}) * MM_{t,db}$$

Where:

$m_{H_2O,t,db,sat}$	Saturation absolute humidity in time interval t on a dry basis (in kg H_2O/kg dry gas). $m_{H_2O,t,db,sat}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2 nd 7-year crediting period of CPA-1 Santa Rosa as per “Option 2: Simplified calculation without measurement of the moisture content”.
$p_{H_2O,t,Sat}$	Saturation pressure of H_2O at temperature T_t in time interval t (in Pa). $p_{H_2O,t,Sat}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2 nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $p_{H_2O,t,Sat}$ are included in Appendix 8.
$T_{t,j}$	Temperature of the gaseous stream in time interval t for process j (in K). $T_{t,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2 nd 7-year

crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $T_{t,j}$ are included in Appendix 8.

$P_{t,j}$ Absolute pressure of the gaseous stream in time interval t for process j (in Pa). $P_{t,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $P_{t,j}$ are included in Appendix 8.

MM_{H_2O} Molecular mass of H_2O (in kg H_2O /kmol H_2O). MM_{H_2O} is correctly indicated in the updated CPA-DD ^{/2/} as being ex-ante determined as 18.0152 kg/kmol. Further related assessment details are included in Appendix 7.

$MM_{t,db,j}$ Molecular mass of the gaseous stream in a time interval t on a dry basis for process j (in kg dry gas/kmol dry gas) $MM_{t,db}$ is estimated using the following equation:

$$MM_{t,db,j} = \sum_i (v_{i,t,db,j} * MM_k)$$

Where:

$v_{k,t,db,j}$ Volumetric fraction of gas k in the gaseous stream in time interval t on a dry basis for process j (m^3 gas k/m^3 dry gas)

MM_k Molecular mass of gas k (kg/kmol). For Nitrogen (N_2), MM_{N_2} is correctly ex-ante determined as 28.1 kg/kmol. Further related details are included in Appendix 7.

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). For the particular case of CPA-1 Santa Rosa, only Nitrogen is considered. This is under conformance with applicable

In accordance with the simplification given in the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" ^{/12/} it is appropriately indicated in the updated CPA-DD ^{/2/} that only the volumetric fraction of CH_4 ($v_{CH_4,t,db,j}$) will be monitored and the difference to 100% will be considered as pure nitrogen.

Option C

$$F_{CH_4,t,j} = V_{t,wb,n,j} * v_{CH_4,t,wb,j} * \rho_{CH_4,n}$$

Where:

$F_{CH_4,t,j}$ Mass flow of greenhouse gas methane in the gaseous stream in time interval t for process j (in kg gas/h)

$V_{t,wb,n,j}$ Volumetric flow of the gaseous stream (LFG) in time interval t on a wet basis at normal conditions for process j (in m^3 wet gas/h).

$v_{CH_4,t,wb,j}$ Volumetric fraction of methane in the gaseous stream (LFG) in time interval t on a wet basis for process j (in m^3 gas / m^3 wet gas). $v_{CH_4,t,wb,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $v_{CH_4,t,wb,j}$ are included in Appendix 8.

$\rho_{CH_4,n}$ Density of methane in the gaseous stream at normal conditions (in kg gas / m^3 wet gas i). Parameter $\rho_{CH_4,n,j}$ will be determined as follows:

$$\rho_{CH_4,n,j} = P_n * MM_{CH_4} / R_u * T_n$$

Where:

P_n Absolute pressure at normal conditions (in Pa). P_n is correctly indicated in the updated CPA-DD ^{/2/} as being ex-ante determined as 101,325 Pa. Further related assessment details are included in Appendix 7.

T_n Temperature at normal conditions (in K). T_n is correctly indicated in the updated CPA-DD ^{/2/} as being ex-ante determined as 273.15 K. Further related assessment details are included in Appendix 7.

MM_{CH_4} Molecular mass of greenhouse gas methane (in kg/kmol). For the considered GHG (CH_4), MM_{CH_4} is correctly indicated in the updated CPA-DD ^{/2/} as being ex-ante determined as 16.04 kg/kmol. Further related assessment details are included in Appendix 7.

R_u Universal ideal gases constant (in $Pa.m^3/kmol.K$). R_u is ex-ante determined as 8,314 $Pa.m^3/kmol.K$. Further related assessment details are included in Appendix 7.

As also appropriately outlined in the updated CPA-DD ^{/2/}, the following equation should be used to convert the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure:

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

Where:

$V_{t,wb,n,j}$ Volumetric flow of the considered gaseous stream (LFG) in a time interval t on a wet basis at normal conditions for process j (in m^3 wet gas/h)

$V_{t,wb,j}$ 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, LFG delivery pipeline to each one of the flares and LFG delivery pipeline to the infrastructure for supply of upgraded LFG to consumer(s)) (in m^3 wet gas/h). $V_{t,wb,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $V_{t,wb,j}$ are included in Appendix 8.

$P_{t,j}$ Pressure of the gaseous stream in time interval t for process j (in Pa). $P_{t,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further assessment details for the ex-post determination/monitoring of $P_{t,j}$ are included in Appendix 8.

- $T_{t,j}$ Temperature of the gaseous stream in time interval t for process j (in K). $T_{t,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further assessment details for the ex-post determination/monitoring of $T_{t,j}$ are included in Appendix 8.
- P_n Absolute pressure at normal conditions (in Pa). P_n is correctly indicated in the updated CPA-DD ^{/2/} as being ex-ante determined as 101,325 Pa. Further related assessment details are included in Appendix 7.
- T_n Temperature at normal conditions (in K). T_n is correctly indicated in the updated CPA-DD ^{/2/} as being ex-ante determined as 273.15 K. Further related assessment details are included in Appendix 7.

Option D

The mass flow of methane for time interval t and for process j ($F_{CH_4,t,j}$) is to be determined using equations 7 and 8 as outlined in the updated CPA-DD ^{/2/}. The volumetric flow of the LFG in time interval t on a dry basis for process j (where j is the LFG delivery pipeline to each item of electricity generation, LFG delivery pipeline to each one of the flares and LFG delivery pipeline to the infrastructure for supply of upgraded LFG to consumer(s)). ($V_{t,db,j}$) is determined by converting the mass flow of the gaseous stream to a volumetric flow as follows:

$$V_{t,db,j} = M_{t,db,j} / \rho_{t,db,j}$$

Where:

$V_{t,db,j}$ Volumetric flow of LFG stream in time interval t on a dry basis for j (where j is the LFG delivery pipeline to each item of electricity generation, LFG delivery pipeline to each one of the flares and LFG delivery pipeline to the infrastructure for supply of upgraded LFG to consumer(s)) (in m³ dry gas/h). $V_{t,db,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $V_{t,db,j}$ are included in Appendix 8.

$M_{t,db,j}$ 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, LFG delivery pipeline to each one of the flares and LFG delivery pipeline to the infrastructure for supply of upgraded LFG to consumer(s)) (in kg/h). $M_{t,db,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $M_{t,db,j}$ are included in Appendix 8.

$\rho_{t,db,j}$ Density of gaseous stream (LFG) in time interval t on a dry basis for process j (in kg dry gas/m³ dry gas). $\rho_{t,db,j}$ shall be determined as follows:

$$\rho_{t,db,j} = P_{t,j} * MM_{t,db,j} / R_u * T_{t,j}$$

Where:

$MM_{t,db,j}$ Molecular mass of the gaseous stream (LFG) in a time interval t on a dry basis for process j (in kg dry gas/kmol dry gas)

$P_{t,j}$	Pressure of the gaseous stream in time interval t for process j (in Pa). $P_{t,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2 nd 7-year crediting period of CPA-1 Santa Rosa. Further assessment details for the ex-post determination/monitoring of $P_{t,j}$ are included in Appendix 8.
$T_{t,j}$	Temperature of the gaseous stream in time interval t for process j (in K). $T_{t,j}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored along the 2 nd 7-year crediting period of CPA-1 Santa Rosa. Further assessment details for the ex-post determination/monitoring of $T_{t,j}$ are included in Appendix 8.

Assessment of the determination of $PE_{\text{flare},y}$ (in the context of the determination of $F_{\text{CH}_4,\text{flared},y}$):

As correctly outlined in the updated CPA-DD ^{/2/}, $PE_{\text{flare},y}$ is to be ex-post determined using one of the selected methodological approaches as per latest version of the methodological tool “Project emissions from flaring” (version 03.0) ^{/10/}. Project emissions from flaring the residual gas ($PE_{\text{flare},y}$) are determined based the flare efficiency ($\eta_{\text{flare},m}$) and the mass flow of methane to the flare ($F_{\text{CH}_4,\text{RG},m}$). As correctly described in the updated CPA-DD ^{/2/}, the 3-step approach for determining project emissions from flaring through continuous monitoring of following parameters will be used as per the applicable guidance of the methodological tool “Project emissions from flaring” (version 03.0) ^{/10/}. The ex-post application of this methodological tool is to encompass the following steps:

STEP 1: Determination of the methane mass flow of the residual gas:

This first step requires that applicable guidance of the methodological “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/12/} is applied to determine the mass flow of methane in the residual gaseous stream in minute m ($F_{\text{CH}_4,m}$). Furthermore, $F_{\text{CH}_4,m}$ shall be used to determine the mass of methane in kilograms directed to the flare in minute m ($F_{\text{CH}_4,\text{RG},m}$).

As appropriately outlined in the updated CPA-DD ^{/2/}, the following requirements are correctly considered:

- The gaseous stream tool shall be applied to the residual gas;
- The flow of the gaseous stream shall be measured continuously;
- CH_4 is the greenhouse gas i for which the mass flow should be determined;
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 and 17 in the tool); and
- The time interval t for which mass flow should be calculated is every minute m .

STEP 2: Determination of the flare efficiency:

Option A: Application of default value:

The flare efficiency for each minute m ($\eta_{\text{flare},m}$) is 90% when the following two operational conditions/requirements are simultaneously met (in order to demonstrate that the flare is operating as per the recommendations and requirements set by the equipment manufacturer for the minute m in question):

- (1) The temperature of the exhaust gases of the flare (monitoring parameter $T_{\text{EG},m}$) and the flow rate of LFG to the flare (monitoring parameter $F_{\text{RG},m}$) is within the manufacturer’s specification/requirements for the flare (monitoring parameter $\text{SPEC}_{\text{flare}}$) in minute m ;
- (2) Flame is detected in the flare in minute m (monitoring parameter Flame_m).

If for the minute m , conditions (1) and/or (2) are not met, $\eta_{\text{flare},m}$ is set as 0% for the minute in question.

Option B: Measured flare efficiency:

The flare efficiency in the minute m is determined as a value which is calculated based on performed related measurements ($\eta_{\text{flare},m} = \eta_{\text{flare,calc},m}$) when the following conditions are simultaneously met (in order to demonstrate that the flare is operating):

- (1) The temperature of the exhaust gas of the flare (monitoring parameter $T_{\text{EG},m}$) and the flow rate of LFG to the flare (monitoring parameter $F_{\text{RG},m}$) is within the manufacturer's specification for the flare ($\text{SPEC}_{\text{flare}}$) in minute m ;
- (2) Flame is detected in the flare in minute m (monitoring parameter Flame_m).

Otherwise $\eta_{\text{flare},m}$ is set as 0% for the minute in question. Furthermore, as also established by the methodological tool "Project emissions from flaring" (version 03.0), for enclosed flares that are defined as low height flares, the flare efficiency shall be adjusted, as a conservative approach, by subtracting 10 percentile points. For example, the default value applied shall be 80%, rather than 90%.

Option B. 2: Measurement of flare efficiency in each minute

As correctly outlined in the updated CPA-DD ^{/2/}, for each installed flare, the flare efficiency in the minute m is a measured value ($\eta_{\text{flare},m} = \eta_{\text{flare,calc},m}$) when the following conditions are met (to demonstrate that the flare is operating):

- (1) The temperature of the flare ($T_{\text{EG},m}$) and the flow rate of the residual gas to the flare ($F_{\text{RG},m}$) is within the manufacturer's specification for the flare ($\text{SPEC}_{\text{flare}}$) in minute m ;
- (2) The flame is detected in minute m (Flame_m); and

Otherwise $\eta_{\text{flare},m}$ is 0%.

The flare efficiency ($\eta_{\text{flare,calc},m}$) is determined based on monitoring the methane content in the exhaust gas, the residual gas, and the air used in the combustion process during the minute m in year y . In case this Option is adopted, the flare efficiency for minute m will be calculate by following the provisions of the methodological tool "Project emissions from flaring" (version 03.0) ^{/12/} as follows:

$$\eta_{\text{flare,calc},m} = 1 - \frac{F_{\text{CH}_4, \text{EG}, m}}{F_{\text{CH}_4, \text{RG}, m}}$$

Where:

$\eta_{\text{flare,calc},m}$	Flare efficiency in the minute m
$F_{\text{CH}_4, \text{EG}, m}$	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the minute m (in kg)
$F_{\text{CH}_4, \text{RG}, m}$	Mass flow of methane in the residual gas on a dry basis at reference conditions in the minute m (in kg)

Step 2.1: Determine the methane mass flow in the exhaust gas on a dry basis

The Applus+ Certification's validation team confirmed that as correctly outlined in the updated CPA-DD ^{/2/} and by following the provisions of the methodological tool "Project emissions from flaring" (version 03.0) ^{/12/}, the mass flow of methane in the exhaust gas is determined based on the

volumetric flow of the exhaust gas and the measured concentration of methane in the exhaust gas, as follows:

$$F_{CH_4,EG,m} = V_{EG,m} \times fc_{CH_4,EG,m} \times 10^{-6}$$

Where:

$V_{EG,m}$ Volumetric flow of the exhaust gas of the flare on a dry basis at reference conditions in minute m (m^3)

$fc_{CH_4,EG,m}$ Concentration of methane in the exhaust gas of the flare on a dry basis at reference conditions in minute m (in mg/m^3)

Step 2.2: Determine the volumetric flow of the exhaust gas ($V_{EG,m}$)

The Applus+ Certification's validation team confirmed that as correctly outlined in the updated CPA-DD ^{/2/} and by following the provisions of the methodological tool "Project emissions from flaring" (version 03.0) ^{/12/}, the average volume flow of the exhaust gas in minute m is determined based on a stoichiometric calculation of the combustion process that depends on the chemical composition of the residual gas, where the amount of air supplied to combust it and the composition of the exhaust gas. It is calculated as follows:

$$V_{EG,m} = Q_{EG,m} \times M_{RG,m}$$

Where:

$Q_{EG,m}$ Volume of the exhaust gas on a dry basis at reference conditions per kilogram of residual gas on a dry basis at reference conditions in minute m (in m^3 exhaust gas/kg residual gas)

$M_{RG,m}$ Mass flow of the residual gas on a dry basis at reference conditions in the minute m (in kg)

Step 2.3: Determine the mass flow of the residual gas ($M_{RG,m}$)

The Applus+ Certification's validation team confirmed that as correctly outlined in the updated CPA-DD ^{/2/} and by following the provisions of the methodological tool "Project emissions from flaring" (version 03.0) ^{/12/}, it is assumed that monitoring the mass flow of the residual gas in minute m directly may be selected (see monitored parameter $M_{RG,m}$) or, according to the procedure given in this step, calculate $M_{RG,m}$ based on the volumetric flow and the density of the residual gas.

The density of the residual gas is determined based on the volumetric fraction of all components in the gas as follows:

$$M_{RG,m} = \rho_{RG,ref,m} \times V_{RG,m}$$

Where:

$\rho_{RG,ref,m}$ Density of the residual gas at reference conditions in minute m (in kg/m^3)

$V_{RG,m}$ Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m (in m^3)

and

$$\rho_{RG,ref,m} = \frac{P_{ref}}{\frac{R_u}{MM_{RG,m}} \times T_{ref}}$$

Where:

- P_{ref} Atmospheric pressure at reference conditions (in Pa)
- R_u (universal ideal gas constant (in Pa.m³/kmol.K)
- $MM_{RG,m}$ Molecular mass of the residual gas in minute m (kg/kmol)
- T_{ref} Temperature at reference conditions (K)

By correctly following the provisions of the methodological tool “Project emissions from flaring” (version 03.0) ^{/12/}, it is assumed that the equation below may be used to calculate $MM_{RG,m}$. It is also assumed that when applying this equation, either a) the option of use the measured volumetric fraction of each component i of the residual gas, or b) as a simplification, measure the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N₂) may be used. The same equation applies, irrespective of which option is selected.

$$MM_{RG,m} = \sum_i (v_{i,RG,m} \times MM_i)$$

Where:

- MM_i molecular mass of residual gas in minute m (in kg/kmol)
- $v_{i,RG,m}$ Volumetric fraction of component i in the residual gas on a dry basis at reference conditions in the hour h
- i Components of the residual gas. If Option (a) is selected to measure the volumetric fraction, then $i = CH_4, CO, CO_2, O_2, H_2, H_2S, NH_3, N_2$ or if Option (b) is selected then $i = CH_4$ and N_2 .

Step 2.4: Determine the volume of the exhaust gas on a dry basis at reference conditions per kilogram of residual gas ($Q_{EG,m}$)

The Applus+ Certification’s validation team confirmed that as correctly outlined in the updated CPA-DD ^{/2/} and by following the provisions of the methodological tool “Project emissions from flaring” (version 03.0) ^{/12/}, $Q_{EG,m}$ shall be determined as follows:

$$Q_{EG,m} = Q_{CO_2,EG,m} + Q_{O_2,EG,m} + Q_{N_2,EG,m}$$

- $Q_{CO_2,EG,m}$ Volume of the exhaust gas on a dry basis per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)
- $Q_{CO_2,EG,m}$ Quantity of CO₂ volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)
- $Q_{N_2,EG,m}$ Quantity of N₂ volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)

$Q_{O_2,EG,m}$ Quantity of O₂ volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)

With

$$Q_{O_2,EG,m} = n_{O_2,EG,m} \times VM_{ref}$$

Where:

$n_{O_2,EG,m}$ Quantity of O₂ (moles) in the exhaust gas per kg of residual gas flared on a dry basis at reference conditions in minute m (kmol/kg residual gas)

VM_{ref} Volume of one mole of any ideal gas at reference temperature and pressure (m³/kmol)

$$Q_{N_2,EG,m} = VM_{ref} \times \left\{ \frac{MF_{N,RG,m}}{2 \times AM_N} + \left(\frac{1 - v_{O_2,air}}{v_{O_2,air}} \right) \times [F_{O_2,RG,m} + n_{O_2,EG,m}] \right\}$$

Where:

$MF_{N,RG,m}$ Mass fraction of nitrogen in the residual gas in the minute m

AM_N Atomic mass of nitrogen (kg/kmol)

$v_{O_2,air}$ Volumetric fraction of O₂ in air

$F_{O_2,RG,m}$ Stoichiometric quantity of moles of O₂ required for a complete oxidation of one kg residual gas in minute m (kmol/kg residual gas)

$$Q_{CO_2,EG,m} = \frac{MF_{C,RG,m}}{AM_C} \times VM_{ref}$$

Where:

$MF_{C,RG,m}$ Mass fraction of carbon in the residual gas in the minute m

AM_C Atomic mass of carbon (kg/kmol)

VM_{ref} Volume of one mole of any ideal gas at reference temperature and pressure (m³/kmol)

$$n_{O_2,EG,m} = \frac{v_{O_2,EG,m}}{(1 - (v_{O_2,EG,m} / v_{O_2,air}))} \times \left[\frac{MF_{C,RG,m}}{AM_C} + \frac{MF_{N,RG,m}}{2 \times AM_N} + \left(\frac{1 - v_{O_2,air}}{v_{O_2,air}} \right) \times F_{O_2,RG,m} \right]$$

Where:

$v_{O_2,EG,m}$ Volumetric fraction of O₂ in the exhaust gas on a dry basis at reference conditions in the minute m

$MF_{C,RG,m}$ Mass fraction of carbon in the residual gas in the minute m

$MF_{N,RG,m}$ Mass fraction of nitrogen in the residual gas in the minute m

AM_N Atomic mass of nitrogen (kg/kmol)

$$F_{O_2 < RG, m} = \frac{MF_{C, RG, m}}{AM_C} + \frac{MF_{H, RG, m}}{4AM_H} - \frac{MF_{O, RG, m}}{2AM_O}$$

Where:

$MF_{O, RG, m}$ Mass fraction of oxygen in the residual gas in the minute m

AM_O Atomic mass of oxygen (kg/kmol)

$MF_{H, RG, m}$ Mass fraction of hydrogen in the residual gas in the minute m

AM_H Atomic mass of hydrogen (kg/kmol)

The Applus+ Certification's validation team confirmed that as correctly outlined in the updated CPA-DD ^{/2/} and by following the provisions of the methodological tool "Project emissions from flaring" (version 03.0) ^{/12/}, the mass fractions of carbon, hydrogen, oxygen and nitrogen in the residual gas is determined using the volumetric fraction of component i in the residual gas and applying the equation below. In applying this equation, it is correctly assumed that CME and/or CPA implementer may choose to either a) use the measured volumetric fraction of each component i of the residual gas, or (b) as a simplification, measure the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N₂). The same equation applies, irrespective of which option is selected.

$$MF_{j, RG, m} = \frac{\sum_i v_{i, RG, m} \times AM_j \times NA_{j, i}}{MM_{RG, m}}$$

Where:

$MF_{j, RG, m}$ Mass fraction of element j in the residual gas in the minute m

$v_{i, RG, m}$ Volumetric fraction of component i in the residual gas on a dry basis in the minute m

AM_j Atomic mass of element j (kg/kmol)

$NA_{j, i}$ Number of atoms of element j in component i

$MM_{RG, m}$ Molecular mass of the residual gas in minute m (kg/kmol)

j Elements C, O, H and N

i Component of residual gas. If Option (a) is selected to measure the volumetric fraction, then i = CH₄, CO, CO₂, O₂, H₂, H₂S, NH₃, N₂ or if Option (b) is selected then i = CH₄ and N₂

The Applus+ Certification's validation team confirmed that as correctly outlined in the updated CPA-DD ^{/2/} and by following the provisions of the methodological tool "Project emissions from flaring" (version 03.0) ^{/12/}, the determination of every-minute values for the calculated parameter $\eta_{flare, m}$ should correctly takes into account whether the manufacturer's specifications for the correct operation of the flare equipment are met. Both approaches are confirmed to be under conformance with the methodological tool "Project emissions from flaring" (version 03.0) ^{/12/}. As also established by the methodological tool "Project emissions from flaring" (version 03.0), for enclosed flares that are defined as low height flares, it is also considered that determined every-minute the flare efficiency values shall be adjusted, as a conservative approach, by subtracting 10 percentile points.

STEP 3: Calculation of project emissions from flaring

The Applus+ Certification's validation team confirmed that as correctly outlined in the updated CPA-DD ^{/2/} and under conformance with applicable guidance of the methodological tool "Project emissions from flaring" (version 03.0) ^{/12/}, project emissions from flaring ($PE_{\text{flare},y}$) are calculated as the sum of emissions for each minute m in year y as follows:

$$PE_{\text{flare},y} = GWP_{\text{CH}_4} * \sum_{m=1}^{525600} F_{\text{CH}_4,\text{RG},m} * (1 - \eta_{\text{flare},m}) * 10$$

Where:

$PE_{\text{flare},y}$	Project emissions from flaring of the residual gas in year y (in tCO _{2e})
GWP_{CH_4}	Global warming potential of methane valid for the commitment period (in tCO _{2e} /tCH ₄). GWP_{CH_4} is correctly ex-ante determined as 25 tCO _{2e} /tCH ₄ .
$F_{\text{CH}_4,\text{RG},m}$	Mass flow of methane in the residual gas in the minute m (in kg)
$\eta_{\text{flare},m}$	Flare efficiency in minute m

In summary, as assessed by the Applus+ Certification's validation team, the application of the 3-step approach is correctly outlined in the updated CPA-DD ^{/2/} and under conformance with applicable guidance and requirements established in the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.

Assessment of the ex-ante determination of $F_{\text{CH}_4,\text{PJ},y}$:

As established by ACM0001 (version 19.0) ^{/5/}, the *ex-ante* estimation of emission reductions for the whole 2nd 7-year crediting period of CPA-1 Santa Rosa (under its original design configuration) are correctly calculated and correctly reported in the updated CPA-DD ^{/2/} based on the application of the multi-phased first order decay (FOD) model as per applicable guidance of the methodological tool "Emissions from solid waste disposal sites" (version 08.0) ^{/14/} and under conformance with applicable guidance and requirements established in the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}. In accordance to ACM0001 (version 19.0) ^{/5/}, in the particular context of the *ex-ante* estimations of emission reductions to be achieved by CPA-1 Santa Rosa, the amount of methane in the LFG which is flared and/or utilized in CPA-1 Santa Rosa (as gaseous fuel for electricity generation and/or supplied to consumer(s)) in year y ($F_{\text{CH}_4,\text{PJ},y}$) is determined (in tCO_{2e}) as follows:

$$F_{\text{CH}_4,\text{PJ},y} = \eta_{\text{PJ}} * BE_{\text{CH}_4,\text{SWDS},y} / GWP_{\text{CH}_4}$$

Where:

$BE_{\text{CH}_4,\text{SWDS},y}$	Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year y (in tCO _{2e} /yr). $BE_{\text{CH}_4,\text{SWDS},y}$ was determined by correctly applying guidance of the methodological tool "Emissions from solid waste disposal sites" (version 08.0) ^{/14/} where "Application A - "The CDM project activity mitigates methane emissions from a specific existing SWDS" of such methodological tool is selected. The calculation of values for $BE_{\text{CH}_4,\text{SWDS},y}$ correctly takes into account the different types of waste j with respectively different decay rates k_j and different fractions of degradable organic carbon (DOC _{j}). By correctly applying the multi-phased FOD model, in the context of the <i>ex-ante</i> estimation of emission reduction, baseline
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emissions of methane are calculated based on the actual and projected waste streams $W_{i,x}$ disposed in each year x . The Applus+ Certification's validation team confirmed that values for applicable ex-ante determined parameters and values for occurred and project MSW disposal streams are correctly applied and under conformance with its sources.

In the particular context of the ex-ante estimation of emission reductions to be achieved by CPA-1 Santa Rosa (under its original design configuration) within its 2nd 7-year crediting period, annual values for $BE_{CH_4,SWDS,y}$ are correctly estimated as follows:

Year	$BE_{CH_4,SWDS,y} = \varphi (1-f) * GWP_{CH_4} * (1-OX) * 16/12 * F * DOC_f * MCF * \sum w_{i,x} * DOC_i * e^{-kj(y-x)} * (1-e^{-kj})$
Unit	(tCO ₂ e)
2019	518,665
2020	2,243,148
2021	2,326,070
2022	2,402,289
2023	2,473,364
2024	2,540,397
2025	2,604,176
2026	2,022,689
Total	17,130,797

As appropriately outlined in the updated CPA-DD ^{/2/}, values for year 2019 and 2026 are correctly determined as applicable for the share of such years encompassing the periods from 05/10/2019 to 31/12/2019 and from 01/01/2026 to 04/10/2026 respectively.

η_{PJ} Efficiency of the LFG capture system under CPA-1 Santa Rosa. η_{PJ} is appropriately ex-ante determined as 0.50 (50%) which corresponds to default value as per ACM0001 (version 19.0). Further related assessment details are included in Appendix 7.

Assessment of the determination of $F_{CH_4,BL,y}$:

As required by ACM0001 (version 19.0) ^{/5/} and under conformance with the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA of which CPA-1 Santa Rosa is part of), the amount of methane assumed as being captured and destroyed in the baseline scenario ($F_{CH_4,BL,y}$) (absence of CPA-1 Santa Rosa) due to eventually applicable regulatory and/or contractual requirements, and/or to address eventually existent applicable safety and other concerns (which are collectively referred to as "requirement" under this step) is correctly determined by following the applicable approach of ACM0001 (version 19.0) ^{/5/} through selection of one of the four cases of such applied CDM baseline and monitoring methodology as outlined in the table below:

Cases for the determination of $F_{CH_4, BL, y}$ as per ACM0001 (version 19.0):

Situation at the start of the project activity	Requirement to destroy methane?	Existing LFG capture and destruction system?
Case 1	No	No
Case 2	Yes	No
Case 3	No	Yes
Case 4	Yes	Yes

Source: ACM0001 (version 19.0) ^{/5/}

Assessment of the existence of regulatory or contractual and non-regulatory or non-contractual requirements to destroy methane (as per the applicable definition of "requirement" of ACM0001 (version 19.0)):

Existence of contractual requirements related to LFG management for the particular case of CPA-1 Santa Rosa:

As confirmed by the Applus+ Certification's validation team, from the time the CTR Santa Rosa landfill was built until nowadays there has been no legal municipal, state or national legally binding requirement or regulation that would establish any management requirement for LFG at such particular landfill site. The following disclaimer is thus confirmed to be appropriately added in the updated CPA-DD ^{/2/}:

"Requirement to destroy methane: NO".

By taking this assumption into account, Case 2 and Case 4 (*Requirement to destroy methane? = Yes*) from the cases above-summarized are thus automatically regarded as not applicable cases for the determination of $F_{CH_4, BL, y}$. This is deemed reasonable and correct.

Thus, in the context of the assessment of the valid cases, the remaining possibly valid alternatives (cases) (after the confirmation of existence of non-regulatory and non-contractual requirements to destroy methane due to safety and odor concerns) are thus appropriately identified in the updated CPA-DD ^{/2/} as being Case 1 and Case 3 (*Requirement to destroy methane? = No*).

Assessment of existence of "LFG capture and destruction system" at the CTR Santa Rosa landfill (as per the applicable definition of "existing LFG capture and destruction" of ACM0001 (version 19.0) ^{/5/}):

The Applus+ Certification's validation team confirmed that, as appropriately outlined in Section A.3 of the updated CPA-DD ^{/2/}, in line with the non-existence of requirements to destroy methane at the CTR Santa Rosa landfill, this landfill site was under regular operation with no LFG being combusted in pre-project conventional passive LFG venting/combustion drains prior to the implementation of CPA-1 Santa Rosa. The Applus+ Certification's validation team thus confirms that, that no LFG capture system was existent at the CTR Santa Rosa landfill prior to the implementation of CPA-1 Santa Rosa. Therefore, Case 1 is correctly regarded as applicable, with Case 3 being also correctly regarded as not applicable.

In summary, as appropriately outlined in the updated CPA-DD ^{/2/}, the only option/case applicable for the CTR Santa Rosa landfill (in the absence of CPA-1 Santa Rosa) is selected as Case 1.

Application of methodological guidance valid for Case 1:

As per applicable guidance of ACM0001 (version 19.0) ^{/5/}, $F_{CH_4, BL, y}$ is correctly directly determined as follows:

$$F_{CH_4,BL,y} = 0$$

The determination of $F_{CH_4,BL,y}$ is also confirmed by the Applus+ Certification's validation team as also being under conformance with applicable guidance and requirements established in the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.

Assessment of the determination of baseline emissions associated with electricity generation ($BE_{EC,y}$):

As correctly outlined in the updated CPA-DD ^{/2/}, baseline emissions associated with electricity generation in year y ($BE_{EC,y}$) for CPA-1 Santa Rosa (under its original design configuration) is calculated as follows:

By correctly following the applicable guidance of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}, valid for Scenario A (Electricity consumption from the grid) with Option A.2 (Electricity from the grid) being appropriately selected as a generic approach; baseline emissions associated with electricity generation in year y ($BE_{EC,y}$) are determined as follows:

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

Where:

$EC_{BL,grid,y}$ Amount of electricity generated by the CPA in year y . $EC_{BL,grid,y}$ will be monitored ex-post as per the provisions of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}. Further related assessment details for this parameter determined ex-post are presented in Appendix 8.

In the particular context of the ex-ante estimation of emission reductions to be achieved by CPA-1 Santa Rosa (under its original design configuration) within its 2nd 7-year crediting period, by correctly taking into account the gradual/phased implementation of the CPA's electricity generation infrastructure (under its original design configuration), annual values for $EC_{BL,grid,y}$ are estimated as follows:

Year	$EC_{BL,grid,y}$ (MWh)
2019	32,750
2020	135,840
2021	169,800
2022	169,800
2023	203,760
2024	203,760
2025	203,760
2026	154,634
Total	1,274,104

As appropriately outlined in the updated CPA-DD ^{/2/}, values for year 2019 and 2026 are correctly determined as applicable for the share of such years encompassing the periods from 05/10/2019 to 31/12/2019 and from 01/01/2026 to 04/10/2026 respectively.

As confirmed by the Applus+ Certification's validation team, for the determination of the above-summarized annual values for electricity generation, equipment availability of 8,000 hour/year is reasonably assumed.

$TDL_{grid,y}$ Average technical transmission and distribution losses for providing electricity to the grid and/or for grid sourced electricity consumed by CPA-1 Santa Rosa in year y . The applicable value for $TDL_{grid,y}$ for the determination of baseline emissions associated with generation of electricity by the project activity will be determined ex-post determined/monitored as per the provisions of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/} with the parameter being termed as $TDL_{grid,export}$. In the particular context of the ex-ante estimation of emission reductions to be achieved by CPA-1 Santa Rosa within its 2nd 7-year crediting period, the value for $TDL_{grid,export}$ is correctly assumed as being 3%. This value represents the applicable default value for determination of baseline emissions as per Option A of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}.

$EF_{EL,grid,BL,y}$ CO₂ emission factor for grid-sourced electricity in year y (in tCO₂/MWh). $EF_{EL,grid,BL,y}$ is ex-ante determined as follows:

- Option A.2: $EF_{EL,grid,y}$ is to be directly determined as 0.25 tCO₂/MWh (applicable conservative default value of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}) Further related assessment details are included in Appendix 7.

The determination of $BE_{EC,y}$ is also confirmed by the Applus+ Certification's validation team as also being under conformance with applicable guidance and requirements established in the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.

Assessment of the determination of project emissions:

In the particular case of CPA-1 Santa Rosa, $PE_{EC,y}$ is correctly determined as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y}$$

Where:

$PE_{EC,y}$ Project emissions due to the consumption of electricity by CPA-1 Santa Rosa. Assessment details for the determination of $PE_{EC,y}$ is included below.

$PE_{FC,y}$ Project emissions due to the consumption of fossil fuel by CPA-1 Santa Rosa. Assessment details for the determination of $PE_{FC,y}$ is included below.

Assessment of the determination of project emissions due to the consumption of electricity by the CPA-1 Santa Rosa ($PE_{EC,y}$):

In the particular case of CPA-1 Santa Rosa, $PE_{EC,y}$ is determined as follows:

$$PE_{EC,y} = PE_{EC,grid,y}$$

Where:

$PE_{EC,grid,y}$ Project emissions from consumption of grid electricity due to CPA-1 Santa Rosa in year y .

By correctly following applicable guidance of the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/}, valid for Scenario C (Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s)) with Case C.III (Electricity from both the grid and captive power plant(s)) being selected as a generic approach; project emissions due to grid electricity consumption by CPA-1 Santa Rosa ($PE_{EC,grid,y}$) are correctly determined as follows:

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

Where:

$EC_{PJ,grid,y}$ Quantity of grid sourced electricity consumed by CPA-1 Santa Rosa in year y . As correctly indicated in the updated CPA-DD ^{/2/}, $EC_{PJ,grid,y}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored as per the provisions of the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/} along the 2nd 7-year crediting period of CPA-1 Santa Rosa. Further related assessment details for monitoring of $v_{CH4,t,wb}$ are included in Appendix 8. In the particular context of the ex-ante estimation of emission reductions to be achieved by CPA-1 Santa Rosa within the 2nd 7-year crediting period, $EC_{PJ,grid,y}$ is estimated on 541 MWh per year. This value is reasonably estimated by the CPA implementer by taken into account the original design conceptualization for CPA-1 Santa Rosa.

$TDL_{grid,y}$ Average technical transmission and distribution losses for providing electricity to the grid and/or for grid sourced electricity consumed by CPA-1 Santa Rosa in year y . $TDL_{grid,y}$ is correctly indicated in the updated CPA-DD ^{/2/} as being ex-post determined/monitored as per the provisions of the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/} along the 2nd 7-year crediting period of CPA-1 Santa Rosa with the parameter being termed as $TDL_{grid,export..}$. In the particular context of the ex-ante estimation of emission reductions to be achieved by CPA-1 Santa Rosa within the 2nd 7-year crediting period, the value for $TDL_{grid,y}$ is assumed as being 20%. This value represents the applicable default value for determination of project emissions as per Option A of the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/}.

$EF_{EL,grid,y}$ CO₂ emission factor for grid-sourced electricity in year y (in tCO₂/MWh). $EF_{EL,grid,y}$ is determined ex-ante by following applicable guidance of the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/} as per Options A.2 as follows:

- Option A.2: $EF_{EL,grid,y}$ is to be directly determined as 1.3 tCO₂/MWh (applicable conservative default value of the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/}). Further related assessment details are included in Appendix 7.

The determination of $PE_{EC,y}$ is also confirmed by the Applus+ Certification's validation team as also being under conformance with applicable guidance and requirements established in the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.

Assessment of the determination of project emissions due to the consumption of fossil fuel by the CPA-1 Santa Rosa ($PE_{FC,y}$):

While since its start of operations, CPA-1 Santa Rosa has consumed Liquefied Petroleum Gas (LPG) for igniting the currently installed high temperature enclosed flares, related project emissions from consumption of fossil fuels due to the CPA (for purpose other than electricity generation) ($PE_{FC,y}$) shall be calculated by following applicable guidelines of the methodological tool "Tool to calculate project or leakage CO₂ emissions from fossil fuel" (version 03.0) as required by ACM0001 (version 19.0). As correctly outlined in the updated CPA-DD ^{/2/}, in the particular case of CPA-1 Santa Rosa, LPG represents the fossil fuel consumed as part of the operation of the CPA (used for igniting the flares).

Thus,

$$PE_{FC,y} = PE_{LPG,y}$$

Where:

$PE_{LPG,y}$ Project emissions due to the consumption of Liquefied Petroleum Gas by the CPA in year y (in tCO₂/year)

In order to determine $PE_{LPG,y}$, applicable guidance of the methodological tool "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 03.0) will be applied ex-post as follows:

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

Where:

$FC_{LPG,y}$ Quantity of LPG consumed (in ton LPG or m³ LPG). $FC_{LPG,y}$ will be monitored ex-post based on measurements as per monitoring details which are assessed in Appendix 8.

$COEF_{LPG,y}$ CO₂ emission coefficient for LPG (in tCO₂/ton LPG or in tCO₂/m³ LPG)). $COEF_{LPG,y}$ is determined by following applicable guidance of Option B of the methodological tool "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 03.0) as follows:

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

Where:

$NCV_{LPG,y}$ Net calorific value of the fuel LPG (in GJ/ton LPG or in GJ/m³ LPG). $NCV_{LPG,y}$ will be monitored ex-post as per monitoring details which are assessed in Appendix 8.

$EF_{CO2,LPG,y}$ CO₂ emission factor of fuel LPG (in tCO₂/GJ LPG). $EF_{CO2,LPG,y}$ will be monitored ex-post as per monitoring details which are assessed in Appendix 8.

In the particular context of ex-ante estimates of emission reductions to be achieved by CPA-1 Santa Rosa within its 2nd 7-year crediting period, consumption of LFG is estimated on 0 kg or 0 m³ per year (null consumption). $FC_{LPG,y}$ is thus estimated to be 0 ton or 0 m³ of LPG per year. This assumption is appropriately made in the updated CPA-DD ^{/2/} by reasonably taking into account the very low

reported and verified LPG consumption figures as part of the latest periodic verifications for CPA-1 Santa Rosa within the currently expired 1st crediting period and by also taking into account operational aspects of the currently installed LFG flaring infrastructure for CPA-1 Santa Rosa. The annual consumption of LPG by the project activity is thus reasonably regarded as negligible in the particular context of ex-ante estimates of emission reductions to be achieved by CPA-1 Santa Rosa within its 2nd 7-year crediting period.

Assessment of the determination of leakage emissions:

In accordance with ACM0001 (version 19.0) ^{/5/}, leakage emissions are not considered for the determination of emission reductions to be achieved by CPA-1 Santa Rosa.

As part of its assessment, the Applus+ Certification's validation team confirms that, as highlighted in the updated CPA-DD ^{/2/}, it was not identified project emission or leakage which would contribute to more than 1% of the emission reductions to be achieved by CPA-1 Santa Rosa other than the ones covered by the selected CDM baseline and monitoring methodology (ACM0001 (version 19.0)) ^{/5/}.

Summary of ex-ante estimation of emission reductions to be achieved by CPA-1 Santa Rosa (under its original design configuration) during its 2nd 7-year crediting period:

The ex-ante estimation of emission reductions to be achieved by CPA-1 Santa Rosa (as calculated in the emission reductions calculation spreadsheet ^{/4/} and summarized in the updated CPA-DD ^{/2/}) was assessed by the Applus+ Certification's validation team.

The performed assessment included checking of input parameters and formulas contained in the spreadsheet cells for estimating baseline and project emissions along the 2nd 7-year crediting period of CPA-1 Santa Rosa (under its original design configuration). The Applus+ Certification's validation team was also able to confirm that all assumptions and data used for estimating GHG emission reductions to be achieved by CPA-1 Santa Rosa (under its original design configuration) within its 2nd 7-year crediting period are appropriately listed in the updated CPA-DD ^{/2/}. Furthermore, formulas, parameters and values are complete, accurate and transparent.

While total accumulated baseline emissions generated from waste disposal at the SWDS ($BE_{CH_4,y}$) and baseline emissions for electricity generation ($BE_{EC,y}$) for CPA-1 Santa Rosa (under its original design configuration) are correctly and reasonably ex-ante estimated to represent 7,708,859 tCO₂e and 328,081 tCO₂ over the whole 2nd 7-year crediting period, total baseline emissions for CPA-1 Santa Rosa are thus correctly and reasonably estimated to be (on annual average) 1,148,134 tCO₂e per year along its 2nd 7-year crediting period.

By correctly taking into account estimated annual amount of grid-sourced electricity to be consumed by CPA-1 Santa Rosa (under its original design configuration) within its 2nd 7-year crediting period, the ex-ante estimated project emissions (PE_y) are determined as 843 tCO₂ per year.

As confirmed by the Applus+ Certification's validation team, emission reductions (ER_y) to be achieved by CPA-1 Santa Rosa (under its original design configuration) are correctly ex-ante estimated as the difference of ex-ante estimation of baseline emissions and ex-ante estimation of project emissions. ER_y are correctly estimated to be (on the average) 1,147,291 tCO₂e per year over the 2nd 7-year crediting period of CPA-1 Santa Rosa.

Detailed calculation of ex-ante estimation of both baseline and project emissions, as provided in the emission reduction calculation spreadsheet ^{/4/} (which is enclosed to the updated CPA-DD ^{/2/}) are deemed correct and can be reproduced using data and parameter values provided in the updated CPA-DD ^{/2/} and supporting files submitted to the Applus+ Certification's validation team.

The selection and determination of all used factors and parameters are deemed reasonable and acceptable (as further assessed in Appendix 7 and 8). In summary, the GHG calculations are confirmed as being complete and transparent.

The Applus+ Certification's validation team however highlights that forecasted/estimated emission reductions for CPA-1 Santa Rosa (under its original design configuration) along its 2nd 7-year crediting period are deemed accurate and correct within reasonable limits. Based on assessment of similar project-based initiatives registered as CDM project activities (also involving LFG collection and destruction/utilization), the Applus+ Certification's validation team highlights that methane generation and collection efficiency of LFG in landfills (as typically forecasted through the application of the First Order Decay (FOD) model in the context of the selected methodology and the methodological tool "Emissions from solid waste disposal sites" (version 08.0) ^{/14/}) has an inherent high uncertainty level (of almost 50% in some cases) and hence the amount of emission reductions, which will be determined on the basis of *ex-post* monitoring, might significantly vary from the forecasted amount. Furthermore, in the particular case of CPA-1 Santa Rosa, the activity level of devices/infrastructure promoting utilization of LFG and supply of upgraded LFG to consumer(s) (through natural gas distribution network) may vary depending on typical operational factors and aspects.

Summary of ex-ante determination of emission reductions:

As correctly reported in the updated CPA-DD ^{/2/}, ex-ante annual estimates of emission reduction to be achieved by CPA-1 Santa Rosa along its 2nd 7-year crediting period starting on 05/10/2019 and ending on 04/10/2026 are summarized as follows:

Year	Emission reductions (tCO ₂ e)
2019	241,629
2020	1,043,552
2021	1,089,612
2022	1,123,910
2023	1,164,639
2024	1,194,803
2025	1,223,504
2026	949,389
Total	8,031,037
Annual average	1,147,291

As appropriately outlined in the updated CPA-DD ^{/2/}, values for year 2019 and 2026 are correctly determined as applicable for the share of such years encompassing the periods from 05/10/2019 to 31/12/2019 and from 01/01/2026 to 04/10/2026 respectively.

In summary, the Applus+ Certification's validation team confirmed that calculations for *ex-ante* estimates of emission reductions to be achieved by CPA-1 Santa Rosa (under its original design configuration) along its 2nd 7-year crediting period, as reported in the updated CPA-DD ^{/2/}, are deemed complete, transparent and also under conformance with applicable guidance and requirements established in the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.

Appendix 7: Assessment of ex-ante selected (fixed) parameters

As outlined in Section B.4.2 of the updated CPA-DD ^{/2/}, the following *ex-ante* determined parameters are correctly defined and used for the *ex-ante* estimation of emission reduction to be achieved by CPA-1 Santa Rosa within its 2nd 7-year crediting period and/or for the determination of baseline and/or project emissions for CPA-1 Santa Rosa along such new crediting period. The selection and definition of applicable values for the following *ex-ante* determined parameters are verified to be under conformance with details and guidelines included in the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA which CPA-1 Santa Rosa is part of) as well as under conformance with ACM0001 (version 19.0) ^{/5/} + the following applicable methodological tools:

- Emissions from solid waste disposal sites (version 08.0) ^{/14/}
- Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0) ^{/11/}
- Project emissions from flaring (version 03.0) ^{/10/}
- Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) ^{/12/}
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 03) ^{/20/}

Assessment details for parameters determined *ex-ante*¹⁸

Parameter / data	Unit	Value applied	Source of used data/ Applus+ assessment opinion
Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline (OX _{top_layer})	-	0.1	Default value as per ACM0001 (version 19.0) ^{/5/} is correctly selected and indicated in the updated CPA-DD ^{/2/} . Selected value is under conformance with applicable guidance defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} . In summary, the parameter and its selected value are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Global Warming Potential of CH ₄ (GWP _{CH4})	tCO ₂ e/tCH ₄	25	Value 25 (as per IPCC's: Global Warming Potential for Given Time Horizon) is correctly selected. This is in accordance with the "Standard for application of the global warming potential to clean development mechanism project activities and programmes of activities for the second commitment period of the Kyoto Protocol" ^{/19/} . Selected value also represents the value to be applied for this particular parameter as defined by the PoA-DD for the Caixa's PoA ^{/49/} .

¹⁸ The table includes all *ex-ante* determined parameters which are presented in Section B.4.2 of the updated CPA-DD. In accordance with applicable CDM guidance for completing the CDM-CPA-DD form, data that are calculated with equations provided in the applied CDM baseline and monitoring methodology and default values specified in the applied methodology and applicable methodological tools are not included in the table and in Section B.4.2 of the updated CPA-DD. This is deemed correct.

			In summary, the parameter and its selected value are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Efficiency of the LFG capture system under CPA-1 Santa Rosa (η_{PJ})	-	0.50	As confirmed by the Applus+ Certification's validation team, selected value reasonably corresponds to Default value as per ACM0001 (version 19.0) ^{/5/} . In summary, the parameter and its selected value are correctly reported and are determined appropriately determined (under consistency with the selected CDM baseline and monitoring methodology) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y (f_y)	-	0	As confirmed by the Applus+ Certification's validation team, 0 value is selected under conformance with ACM0001 (version 19). Selected value also represents the value to be applied for these particular parameters as defined by the PoA-DD for the Caixa's PoA ^{/49/} . In summary, the parameter and its selected value are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Universal ideal gases constant (R_u)	Pa.m ³ /kmol. K	8,314	As confirmed by the Applus+ Certification's validation team, default values as per the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) ^{/12/} are correctly applied in the updated CPA-DD ^{/2/} . Selected values also represent the values to be applied for these particular parameters as defined by the PoA-DD for the Caixa's PoA ^{/49/} . In summary, the parameters and their selected values are correctly reported and are determined under consistency
Molecular mass of gas k (MM_k)	kg/kmol	28.01 (N ₂)	
Molecular mass of greenhouse gas i (MM_i)	kg/kmol	16.04 (CH ₄)	
Total pressure at normal conditions (P_n)	Pa	101,325	
Temperature at normal conditions (T_n)	K	273.15	
Molecular mass of water (MM_{H_2O})	kg/kmol	18.0152	

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			with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
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CO ₂ emission factor for grid-sourced electricity (EF _{EL,grid,BL})	tCO ₂ /MWh	0.25	<p>Value for the ex-ante determined parameter EF_{EL,grid,BL} is correctly selected as the applicable default value applicable for the determination of baseline emissions as per the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/}.</p> <p>As confirmed by the Applus+ Certification’s validation team, the electricity grid to which CPA-1 Santa Rosa is connected to (Brazil’s National Electricity Grid) has hydro power plants constituting more than 50% of total grid generation in average of the five most recent years as per official data from Brazil’s Ministry of Mines and Energy / Empresa de Pesquisas Energéticas ^{/51/}.</p> <p>Furthermore, in the particular context of the ex-ante determination of EF_{EL,grid,BL} to be used for calculation of baseline emissions related to electricity generation BE_{EC,y} (where EC_{BL,k,y} in the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/} is equivalent to the net amount of electricity generated by CPA-1 Santa Rosa using LFG in year y), electricity consumption of the baseline sources is correctly regarded as greater than the electricity consumption of the project and leakage sources.</p> <p>In summary, the parameter and its selected value is correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa’s PoA ^{/49/}.</p>
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CO ₂ emission factor for grid-sourced electricity (EF _{EL,grid,PJ})	tCO ₂ /MWh	1.3	Value for the ex-ante determined parameter EF _{EL,grid,PJ} is correctly selected as the applicable default value for determination of project emissions as per the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) ^{/11/} . In summary, the parameter and its selected value is correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa’s PoA ^{/49/} .
Default value for model correction factor to account for model uncertainties ($\phi_{default}$) (as appropriately outlined in the updated CPA-DD ^{/2/} , $\phi_{default}$ is equivalent to ϕ_y)	-	0.75	Values are correctly selected according to the methodological tool “Emissions from solid waste disposal sites” (version 08.0) ^{/14/} (default value for Application A) (based on the climate conditions valid for the location of CPA-1 Santa Rosa and/or technical design aspects of the CTR Santa Rosa landfill). Selected value is under conformance with applicable guidance defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa’s PoA ^{/49/} .
Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) (OX)	-	0.1	In summary, the parameters and their selected values are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa’s PoA ^{/49/} .
Fraction of methane in the SWDS gas (volume fraction) (F)	-	0.5	
Fraction of degradable organic carbon (DOC) in MSW that decomposes in the considered SWDS. (DOC _{f,default})	Weight fraction	0.5	
Methane correction factor (MCF _{default})	-	1.0	Assessment details are presented below under “Additional assessment details for the ex-ante determined parameter MCF _{default} , DOC _j , k _j and w _j ”
Fraction of degradable organic carbon (by weight) in the waste type j (weight fraction) (DOC _j)	-	Assessment details are presented below under “Additional assessment details for the ex-ante determined parameter MCF _{default} , DOC _j , k _j and w _j ”	
Decay rate for the waste type j (k _j)	1/yr		
Weight fraction of the waste type (W _j)	-		

Manufacturer's flare specifications for temperature, flow rate / heat flux and maintenance schedule (SPEC _{flare})	Required temperature of the exhaust gas of the flare (to ensure LFG destruction (combustion) under high CH ₄ destruction efficiency):	°C	500 (min. for Flare 1, Flare 2, Flare 3 and Flare 4)	1,200 (max. for Flare 1, Flare 2, Flare 3 and Flare 4)	Values are correctly indicated under conformance on technical information/specifications details for the flares as provided by equipment manufacturers Hofstetter B.V. (Flare 1 and Flare 2) and Biotechnogas s.l.r. (Flare 3 and Flare 4). In summary, the parameters and their selected values are correctly reported and are determined under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
	Operational LFG flow (for continuous operation):	Nm ³ /h	500 (min. for Flare 1) 1,000 (min for Flare 2, Flare 3 and Flare 4)	2,500 (max. for Flare 1) 5,000 (max. for Flare 2, Flare 3 and Flare 4)	
	Required minimum frequency for inspection and maintenance service (incl. inspection in the conditions of the flare isolation ceramics revetment material):	Days	Every 6 months		
	Required/ recommended minimum frequency for replacement of the flare isolation ceramics revetment material:	-	After 10 years of regular and appropriate operation		

Additional assessment details for the ex-ante determined parameter $MCF_{default}$, DOC_j , k_j and w_j :

Assessment of the suitability of ex-ante determined value for parameter $MCF_{default}$:

By taking into account the current and forecasted MSW disposal and management practice at the CTR Santa Rosa landfill and also by also taking into account the operational requirements established for this particular landfill site), the Applus+ Certification's validation team was able to confirm that MSW has been disposed in the landfill sites with depths greater than 5 meters and appropriate MSW landfilling measures have been systematically undertaken. Such operational aspects are expected to continuing being applied/performed

throughout the whole landfill operational lifetime (i.e. effective mechanical compacting, leveling and covering of disposed MSW). The Applus+ Certification's validation team was thus able to conclude that the selected value for the *ex-ante* determined parameter MCF_{default} (equal to 1.0) is deemed acceptable, reasonable and under conformance with applicable guidance of the methodological tool "Emissions from solid waste disposal sites" (version 08.0) ^{/14/}. In summary, the parameter and its selected values are correctly reported and are determined under consistency with the project site conditions, selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.

Assessment of the suitability of ex-ante determined values for parameters DOC_j , k_j and w_j : As established by the methodological tool "Emissions from solid waste disposal sites" (version 08.0) ^{/14/}, default IPCC 2006 values ^{/9/} were correctly selected for the parameters Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j), Decay rate for the waste type j (k_j) and Weight fraction of the waste type (w_j) by taking into account the available statistics and meteorological data valid for the region where the CTR Santa Rosa landfill is located. The selected values for DOC_j , k_j and w_j for the different fractions of solid waste types are presented in the table below. Furthermore, the values were confirmed by the Applus+ Certification's validation team to be deemed appropriate and correct. Values of mean temperatures and precipitation data for the cities of Seropédica in Brazil were also correctly taken into account for the determination of values of k_j as required by the methodological tool "Emissions from solid waste disposal sites" (version 08.0) ^{/14/}.

Composition of disposed MSW (w_j) and *ex-ante* selected values for the parameter DOC_j and k_j

Waste type j	Fraction of degradable organic carbon (by weight) in the waste type j (DOC_j)	Decay rate for the waste type j (k_j) (in 1/yr)	Weight fraction of the waste type j (w_j)
Wood and wood products	43%	0.035	0.3%
Pulp, paper and cardboard (other than sludge)	40%	0.07	16.1%
Food, food waste, beverages and tobacco (other than sludge)	15%	0.4	53.6%
Textiles	24%	0.07	1.9%
Garden, yard and park waste	20%	0.17	1.3%
Glass, plastic, metal, other inert waste	0%	0	26.8%

In summary, the parameters parameters DOC_j , k_j and w_j and their selected values are correctly reported and are determined under conformance with the project site conditions, selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.

Conclusion about the assessment of the selection of ex-ante determined (fixed) parameters as per the updated version of the CPA-DD:

In summary, the selection and report of the all *ex-ante* determined (fixed) parameters in the updated CPA-DD (version 8.0, dated 10/08/2020) ^{/2/} is deemed reasonable, complete and transparent. The rationale/justification for selected values for all *ex-ante* determined (fixed) parameters is sufficiently provided in the updated CPA-DD ^{/2/}. Supporting evidences for the selected values were made available to the Applus+ Certification's validation team. Referred data sources were also verified by the validation team.

In summary, the description of all ex-ante selected (fixed) parameters and their selected values are reported under consistency with the project site conditions, selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.

Appendix 8: Assessment of parameters monitored ex-post

Details about the parameters to be monitored *ex-post* are correctly indicated in the updated CPA-DD (version 8.0, dated 10/08/2020) ^{/2/} and such details are under conformance with monitoring requirements and guidelines included in the PoA-DD valid for the 2nd 7-year crediting period of the Caixa's PoA ^{/49/} (PoA which CPA-1 Santa Rosa is part) of as well as under conformance with ACM0001 (version 19.0) ^{/5/} + the following applicable methodological tools:

- Emissions from solid waste disposal sites (version 08.0) ^{/14/}
- Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0) ^{/11/}
- Project emissions from flaring (version 03.0) ^{/10/}
- Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) ^{/12/}
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 03) ^{/20/}

The updated CPA-DD ^{/2/} correctly and sufficiently includes in its Sections B.4.1 and B.4.3 details about all parameters to be monitored *ex-post* along the 2nd 7-year crediting period of CPA-1 Santa Rosa for which related assessment from the Applus+ Certification's validation team is included in the table below:

Parameter monitored ex-post	Assessment details
Management of SWDS	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, the design and operational conditions of the CTR Santa Rosa landfill will be annually monitored on the basis of different sources such as:</p> <ul style="list-style-type: none"> - Original design of the landfill vis-a-vis eventual changes; - Technical specifications for the management of the CTR Santa Rosa landfill vis-a-vis eventual related eventual changes; - Applicable local or national regulations <p>As required by ACM0001 (version 19.0) ^{/5/}, the design and operational conditions of the CTR Santa Rosa landfill should be demonstrated not to be modified in order to ensure that no practice to increase methane generation have occurred prior or after the implementation of CPA-1 Santa Rosa. As established by ACM0001 (version 19.0) ^{/5/}, any change in the management of the landfill after the implementation of CPA-1 Santa Rosa will be justified by referring to technical or regulatory specifications.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
<p>Volumetric flow of LFG stream in time interval t on a wet basis for process j ($V_{t,wb,j}$)</p> <p>(where j is the LFG delivery pipeline to the flare(s), and the LFG delivery pipeline to each item/element of the CPA's electricity generation infrastructure and LFG</p>	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, continuous measurements will be recorded/reported at least with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. In case of measurements for the applicable LFG flow parameter are automatically converted and recorded in normalized cubic meters (by considering standard temperature and pressure (STP) conditions), monitoring of $T_{t,j}$ and $P_{t,j}$ may not be required.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under</p>

delivery pipeline for the infrastructure for the supply of upgraded LFG to consumer(s) (through natural gas distribution network))	consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Volumetric flow of LFG stream in time interval t on a dry basis for process j ($V_{t,db,j}$)	As appropriately outlined in the updated CPA-DD ^{/2/} , continuous measurements will be recorded/reported at least with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. In case of measurements for the applicable LFG flow parameter are automatically converted and recorded in normalized cubic meters (by considering standard temperature and pressure (STP) conditions), monitoring of T_t and P_t may not be required. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA.
Volumetric fraction of CH ₄ in the collected LFG in time interval t on a dry basis for process j ($V_{CH4,t,db,j}$)	As appropriately outlined in the updated CPA-DD ^{/2/} , continuous measurements will be recorded/reported with an every-minute frequency. Calibration frequency as per manufacturer specifications. If the applicability condition related to the gaseous stream flow temperature being below 60°C is adopted, these parameters shall be monitored continuously in order to assure that the applicability condition is indeed met). In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Volumetric fraction of CH ₄ in time interval t on a wet basis for process j ($V_{CH4,t,wb,j}$)	As appropriately outlined in the updated CPA-DD ^{/2/} , continuous measurements will be recorded/reported with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. If the applicability condition related to the gaseous stream flow temperature being below 60°C is adopted, these parameters shall be monitored continuously in order to assure that the applicability condition is indeed met). In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Mass flow of the LFG stream in time interval t on dry basis for process j ($M_{t,db,j}$)	As appropriately outlined in the updated CPA-DD ^{/2/} , continuous measurements will be recorded/reported at least with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer

	<p>specifications. In case of measurements for the applicable LFG flow parameter are automatically converted and recorded in normalized cubic meters (by considering standard temperature and pressure (STP) conditions), monitoring of T_t and P_t may not be required.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Temperature of the LFG stream in time interval t for process j ($T_{t,j}$)	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, continuous measurements will be recorded/reported with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications.</p> <p>In case of measurements for the applicable LFG flow parameter are automatically converted and recorded in normalized cubic meters (by considering standard temperature and pressure (STP) conditions), monitoring of $T_{t,j}$ and $P_{t,j}$ may not be required.</p> <p>If the applicability condition related to the gaseous stream flow temperature being below 60°C is adopted, these parameters shall be monitored continuously in order to assure that the applicability condition is indeed met). In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA.</p>
Pressure of the LFG stream in time interval t for process j (P_t)	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, continuous measurements will be recorded/reported with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications. In case of measurements for the applicable LFG flow parameter are automatically converted and recorded in normalized cubic meters (by considering standard temperature and pressure (STP) conditions), monitoring of $T_{t,j}$ and $P_{t,j}$ may not be required. If the applicability condition related to the gaseous stream flow temperature being below 60°C is adopted, these parameters shall be monitored continuously in order to assure that the applicability condition is indeed met).</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>

<p>Amount of electricity generated by the CPA using LFG during the year y ($EG_{PJ,y} = EC_{BL,y}$)</p>	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, continuous measurements will be aggregated manually or automatically. Accumulated measurement records will be recorded and reported with an at least once a month frequency.</p> <p>Measurement records will be cross-checked against available electricity commercialization receipts/invoices issued by the local electricity distribution or commercialization company (if applicable).</p> <p>Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
<p>Quantity of grid electricity consumed by CPA-1 Santa Rosa during the year y ($EC_{PJ,grid,y}$)</p>	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, continuous measurements will be aggregated manually or automatically. Accumulated measurement records will be recorded and reported at least with an at least once a month frequency. Measurement records will be cross-checked against available electricity consumption receipts/invoices issued by the local electricity distribution company. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>

<p>Operation of the equipment j that consumes LFG ($O_{pj,h}$) (where j is the LFG delivery pipeline to each item/element of the CPA's electricity generation infrastructure and LFG delivery pipeline of the infrastructure used for the supply of upgraded LFG to consumer(s) (through natural gas distribution network))</p>	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, for each equipment unit j promoting utilization of LFG (where j is the LFG delivery pipeline to each item/element of the CPA's electricity generation infrastructure and LFG delivery pipeline for the infrastructure used for the supply of upgraded LFG to consumer(s) (through natural gas distribution network)), it will be monitored whether the equipment is operating in hour h by monitoring any one or more of the following three parameters:</p> <p>(a) Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment.</p> <p>(b) Flame. Flame detection system is used to ensure that the equipment is in operation;</p> <p>(c) Products generated. Monitor the generation of steam for the case of boilers and air-heaters and glass for the case of glass melting furnaces. This option is not applicable to brick kilns.</p> <p>$O_{pj,h} = 0$ when:</p> <p>(a) One of more temperature measurements are missing or below the minimum threshold in hour h (instantaneous measurements are made at least every minute);</p> <p>(b) Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute);</p> <p>(c) No products are generated in the hour h.</p> <p>Otherwise, $O_{pj,h} = 1$</p> <p>Such approach is confirmed to be under conformance with applicable requirement of ACM0001 (version 19.0) ^{/5/}.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
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<p>Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period t ($F_{CH_4,EG,t}$)</p>	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, $F_{CH_4,EG,t}$ will be measured in accordance to an appropriate national or international standard e.g. UK's Technical Guidance LFTGN05.</p> <p>The time period t over which the mass flow is measured must be at least one hour.</p> <p>The monitoring frequency is biannual. However, as established by the methodological tool "Project emissions from flaring" (version 03.0), if the monitoring period is shorter than one year, the measurement should be at least twice in a monitoring period and in a maximum timeframe of six months between each measurement. The average flow rate to the flare during the time period t must be greater than the average flow rate observed for the previous six months. Monitoring of this parameter is required in the case of enclosed flares and if the CPA implementer select Option B.1 to determine flare efficiency. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s).</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance defined and monitoring requirements by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
<p>Saturation pressure of H₂O at temperature T_t in time interval t ($p_{H_2O,t,Sat}$)</p>	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, this parameter is solely a function of the LFG stream temperature T_t and can be found ex-post at literature ^{/23/}. In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
<p>Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period t ($F_{CH_4,EG,t}$)</p>	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, related measurements for each operational flare will be performed according to an appropriate national or international standard (such as the UK's Technical Guidance LFTGN05 or a similar standard) where the time period t over which the mass flow is measured must be at least one hour. The requirement that average flow rate to the flare during the time period t must be greater than the average flow rate observed for the previous six months will be considered.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>

Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$)	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, for each installed high temperature enclosed flare, $T_{EG,m}$ will be measured by appropriate temperature measurement equipment with an every-minute frequency. Measurements outside the operational temperature specified by the manufacturer may indicate that the flare is not functioning correctly and may require maintenance. Flare manufacturers must provide suitable monitoring ports for the monitoring of the temperature of the flare. These would normally be expected to be in the middle third of the flare.</p> <p>Where more than one temperature port is fitted to the flare, the flare manufacturer must provide written instructions detailing the conditions under which each location shall be used and the port most suitable for monitoring the operation of the flare according to manufacturer specifications for temperature.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Flame detection of flare in the minute m ($Flame_m$)	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, for each installed high temperature enclosed flare, detection of flame in the flare will be recorded with an every-minute frequency as a minute that the flame was on, otherwise recorded as a minute that the flame was off.</p> <p>Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Maintenance events completed in year y for each operational flare ($Maintenance_y$)	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, for each installed high temperature enclosed flare, the date(s) that related maintenance events are completed in year y will be recorded. Records of maintenance logs must include all aspects of the maintenance including the details of the person(s) undertaking the work, parts replaced, or needing to be replaced, source of replacement parts, serial numbers and calibration certificates.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Average technical transmission and distribution losses for providing electricity to the grid and/or for grid sourced electricity consumed by CPA-1 Santa Rosa in year y ($TDL_{grid,y}$)	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, annual value is to be determined and should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses in the grid should not contain other types of grid losses (e.g. commercial losses/theft).</p> <p>The distribution losses can either be calculated by the CPA implementer or be based on references from utilities, network operators or other</p>

	<p>official documentation (incl. use annual average value based on recent, accurate and reliable data available within the host country).</p> <p>As an alternative, applicable default values under Scenario A as per as per the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0) may be selected.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Status of biogas destruction devices (Status of biogas destruction device)	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, continuous measurements will be performed. Monitoring parameter “Status of biogas destruction device” it is thus correctly regarded as applicable to consider the same monitoring procedure as the one applied for parameter Flame_m in the particular case of high temperature enclosed flares. Monitoring and documenting may be undertaken through continuous monitoring of by recording the operational status of the flare (by means of a flame detector) in order to demonstrate the occurrence of methane destruction in this particular type of installed biogas destruction device. Emission reductions will not accrue for periods in which the underlying destruction device (high temperature enclosed flare) is not operational.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Volumetric fraction of component <i>i</i> in the residual gas on a dry basis in the minute <i>m</i> where <i>i</i> = CH ₄ , CO, CO ₂ , O ₂ , H ₂ , H ₂ S, NH ₄ , N ₂ (V _{i,RG,m})	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, measurements performed for each operational flare by the coordinating/managing entity (CME) for the Caixa's PoA and/or CPA implementer using continuous gas analyser(s) will be recorded/reported with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Mass flow of the residual gas on a dry basis at reference conditions in the minute <i>m</i> (M _{RG,m})	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, measurements performed for each operational flare by the coordinating/managing entity (CME) for the Caixa's PoA and/or CPA implementer using continuous mass flow meter(s) will be recorded/reported with an every-minute frequency. Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with</p>

	applicable guidance and monitoring requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
Volumetric fraction of O ₂ in the exhaust gas on a dry basis at reference conditions in the minute <i>m</i> (V _{O2,EG,m})	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, measurements performed for each operational flare by the coordinating/managing entity (CME) for the Caixa's PoA and/or CPA implementer will be performed using continuous gas analyser(s). Extractive sampling analysers with water and particulates removal devices or in situ analysers for wet basis determination. The point of measurement (sampling point) shall be in the upper section of the flare (80% of total flare height). Sampling shall be conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes)</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Concentration of methane in the exhaust gas of the flare on a dry basis at reference conditions in the minute <i>m</i> (f _{CH4,EG,m})	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, measurements performed for each operational flare by the coordinating/managing entity (CME) for the Caixa's PoA and/or CPA implementer using continuous gas analyser(s). Extractive sampling analyser(s) with water and particulates removal device(s) or in situ analyser(s) for wet basis determination. The point of measurement (sampling point) shall be in the upper section of the flare in order that the sampling is of the gas after consumption has taken place (80% of total flare height). Sampling shall be conducted with appropriate sampling probe(s) adequate to high temperatures level (e.g. inconel probe(s)).</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Quantity of LPG consumed by the CPA in year <i>y</i> (FC _{LPG,y})	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, recording of measurements of LPG consumed by CPA-1 Santa Rosa will be performed by using appropriate mass or volume meter(s) (weight scale or flow meter) with related measurements being monitored with frequency not lower than once a month.</p> <p>Calibration events in related monitoring instrument(s) are also indicated as required to be performed under frequency as per manufacturer specifications.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>
Net calorific value of the fuel LPG in year <i>y</i> (NCV _{LPG,y})	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, value provided by the fuel supplier in invoices, regional or national default values or IPCC default values (at upper limit of uncertainty at 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories ^{/9/}) may be considered (with any future revision of the IPCC Guidelines ^{/9/} being taken into account if applicable).</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with</p>

	applicable guidance and monitoring requirements defined by the PoA-DD for 2 nd 7-year crediting period of the Caixa's PoA ^{/49/} .
CO ₂ emission factor of fuel LPG in year y (EF _{CO2,LPG,y})	<p>As appropriately outlined in the updated CPA-DD ^{/2/}, value provided by the fuel supplier in invoices, regional or national default values or IPCC default values (at upper limit of uncertainty at 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories ^{/9/}) may be considered (with any future revision of the IPCC Guidelines ^{/9/} being taken into account if applicable). Appropriate net calorific value (NCV) for LPG may be used for converting energy basis data into mass basis data. If the LPG supplier does provide related NCV values and CO₂ emission factor for the delivered fuel on the invoice and these two values are based on measurements for this specific fuel, this source will be used for the determination of values for the monitoring parameter NCV_{LPG,y}.</p> <p>In summary, both the parameter description and its monitoring approach are selected/defined and reported in the updated CPA-DD ^{/2/} under consistency with the selected CDM baseline and monitoring methodology and/or applicable methodological tool(s) as well as under consistency with applicable guidance and monitoring requirements defined by the PoA-DD for 2nd 7-year crediting period of the Caixa's PoA ^{/49/}.</p>

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM validation and verification standard for programmes of activities” (CDM-EB93-A08-STAN); • Make editorial improvements.
02.0	29 December 2017	Revision to align with the requirements of the “CDM validation and verification standard for programme of activities” (version 01.0). Change form symbol from CDM-CPA-RCP-FORM to CDM-CPA-RCPV-FORM.
01.0	3 August 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Renewal of crediting period Keywords: component project activity, crediting period, validation report		