

# Validation Opinion on Post- registration Changes of Registered CDM Project Activity

Caieiras landfill gas emission reduction

GLC Report No: 253.1, rev. 05

# Validation Opinion on Post-Registration Changes of Registered CDM Project Activity

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Summary:	
Context of the performed validation assessment on post-registration changes:	<input type="checkbox"/> Prior to commencement of a verification for the project activity <input checked="" type="checkbox"/> When performing a verification for the project activity - Monitoring period: From 2010-10-01 to 2011-08-31 (incl. both days) - Number of the verification: 5 <sup>th</sup> verification <input type="checkbox"/> Independent assessment (independent from a verification for the project activity)
Category of assessed post-registration changes (process track):	<input checked="" type="checkbox"/> Changes that do not require prior approval by the CDM Executive Board (in accordance with Appendix 1 of the CDM Project Standard (CDM PS) (changes to be approved under the "Issuance" process track) <input type="checkbox"/> Changes that require prior approval by the CDM Executive Board (changes to be approved under the "Prior approval" process track)

Details of the project activity / PoA of which post-registration changes were assessed:	
UNFCCC Ref.	0171
Project title:	Caieiras landfill gas emission reduction
Host country:	Brazil
Sectoral Scope, Technical Area	CDM Sectoral Scope 13 – Waste handling and disposal 13.1 – Waste handling and disposal
Methodology:	ACM0001
Version:	Version 2
Name:	Consolidated methodology for landfill gas project activities
Project Size:	<input checked="" type="checkbox"/> Large Scale <input type="checkbox"/> Small Scale

Project assessed by:	Assessment reviewed by:	Work approved by:
Marco A. Ratton José-Emilio Moreno	Fernando Rangel Villasana	Markus Weber
Date of this revision:	Revision No.	Number of pages
2013-03-18	05	36
Type of assessed post-registration changes:		

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<b>Temporary deviations from the monitoring plan or the monitoring methodology (TDEV)</b>	<input type="checkbox"/> No revised PDD / PDD / PoA-DD + generic CPA-DD is/are submitted enclosed to this Assessment Report. All temporary deviations are of a type specified in Appendix 1 of the CDM PS. <input type="checkbox"/> yes <input type="checkbox"/> no Temporary deviation period: -
<b>Corrections that do not affect project design (CORR)</b>	<input checked="" type="checkbox"/> (one revised PDD / PoA-DD + generic CPA-DD (incl. a version with tracked changes) is/are submitted enclosed to this Assessment Report)  All corrections are of a type specified in Appendix 1 of the CDM PS. <input checked="" type="checkbox"/> yes <input type="checkbox"/> no
<b>Change to the start date of the crediting period (CGCP)</b>	<input type="checkbox"/> (one revised PDD / PoA-DD + generic CPA-DD (incl. a version with tracked changes) is/are submitted enclosed to this Assessment Report)  The change to the start date of the crediting period requires prior approval as specified in the CDM PS. <input type="checkbox"/> yes <input type="checkbox"/> no  Note: Prior approval by the CDM EB is not required in case of (a) bringing forward the start date up to one year earlier or (b) postponing the start date by up to one year (by up to two years for project activities in LDCs). Proposed start date of the crediting period:
<b>Permanent changes from the monitoring plan or the monitoring methodology (CGMPMETH)</b>	<input type="checkbox"/> (one revised PDD / PoA-DD + generic CPA-DD DD (incl. a version with tracked changes) is/are submitted enclosed to this Assessment Report)  All changes are of a type specified in Appendix 1 of the CDM PS <input type="checkbox"/> yes <input type="checkbox"/> no
<b>Changes to the project or programme design (CGPD)</b>	<input type="checkbox"/> (one revised PDD / PoA-DD + generic CPA-DD (incl. a version of that PDD / PoA-DD + generic CPA-DD with tracked changes) + revised investment analysis spreadsheet (if applicable) + revised emission reduction calculation spreadsheet (if applicable) is/are submitted enclosed to this Assessment Report. (a) In the case of a project activity, the changes have an impact on: <input type="checkbox"/> Scale <input type="checkbox"/> Additionality <input type="checkbox"/> Applicability and application of baseline Methodology <input type="checkbox"/> None of the above  (b) In the particular case of a PoA, the changes relate to: <input type="checkbox"/> Expanding geographical coverage <input type="checkbox"/> Including additional host Parties

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History of report revisions:

Rev.	Date	Person	Function	Action
01	2013-03-04	Marco A. Ratton	Assessment Team Leader (ATL)	Initial version
02	2013-03-05	Fernando Rangel Villasana	Reviewer	Review with corrections and comments
03	2013-03-10	Marco A. Ratton	ATL	Corrections were made in order to address comments made by the reviewer
04	2013-03-13	Fernando Rangel Villasana	Reviewer	Review of revisions and closing of comments
05	2013-03-18	Markus Weber	Final approver	Final reviewed and approved

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## Abbreviations

CDM	Clean Development Mechanism
CDM-EB	CDM Executive Board (the board)
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DOE	Designated Operational Entity
ER	Emission Reduction
GHG	Greenhouse gas(es)
GLC	Germanischer Lloyd Certification GmbH
LFG	Landfill gas
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project Design Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change

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## 1 BACKGROUND AND SUMMARY OF THE POST-REGISTRATION CHANGES

Germanischer Lloyd Certification GmbH (GLC) was commissioned by the project participant Essencis Soluções Ambientais S.A. to perform the 5<sup>th</sup> verification for the CDM project activity "Caieiras landfill gas emission reduction" (UNFCCC Project no. 0171) (monitoring period from 2010-10-01 to 2011-08-31). As part of the verification assessment, the GLC's assessment team confirmed the need to address via submission of a "Post-registration change requests"(under the "Issuance" process track the following type of changes):

- Corrections in information made available in the PDD (changes which do not affect the project design)

As established by applicable guidance for post-registration changes of the Clean Development Mechanism Project Standard <sup>/6/</sup>, the needed corrections were addressed in a revised version of the PDD by the project participant Essencis Soluções Ambientais S.A. This Validation Opinion Report includes the assessment and opinion of GLC about such performed corrections in information made available in the PDD for the registered CDM project activity "Caieiras landfill gas emission reduction" as per the latest version of the revised PDD (version 4, dated 2013-01-10). Also in accordance with applicable guidance of the Clean Development Mechanism Project Standard <sup>/6/</sup>, the GLC's assessment and opinion for the post-registration changes are to be submitted to UNFCCC as part of the submission of the CER issuance request in the context of the 5<sup>th</sup> verification for the CDM project activity under the so-called "Issuance" process track).

During the verification assessment for the 5<sup>th</sup> verification for the project activity, the GLC's assessment team was able to confirm (during the performed on-site visit to the project site and also based on interviews with representatives of the project participants) that the considered required corrections as post-registration changes as presented in this Validation Opinion Report indeed represents changes which are to be addressed as per the "Issuance" process track for addressing post-registration changes.

The findings of previous Verification Reports <sup>/10/ /11/ /12/ /13/</sup> for the project activity were also taken into account in the context of the assessment.

This Validation Opinion Report thus presents the complete GLC's assessment and opinion for post-registration changes of the project activity which are being addressed in the context of its 4<sup>th</sup> verification. The assessment was performed by GLC on the basis of applicable UNFCCC criteria, requirements and procedures for the assessment of post-registration changes for a registered CDM project activity. The assessment was performed also based on the recommendations and guidance of the latest version of the Validation and Verification Standard (VVS) <sup>/5/</sup>.

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## 2 ASSESSMENT TEAM

A competent assessment team with relevant knowledge and experience in the specific scopes and sectors was appointed by GLC. The appointment of the team takes into account the required scope, technical area and project activity knowledge requirements for assessing the post-registration changes.

Table 2-1: Assessment team members, summary of qualification and knowledge

	Name	Function <sup>1)</sup>	Sectoral scope specific knowledge	Technical area specific knowledge	Local knowledge	Type of involvement						
						Desk review	On-site visit / interviews	Reporting	Supervision of work	Technical review	Expert input	Approval
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Marco A. Ratton	ATL/ LE	X	X	X	X	X	X	X		X	
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Fernando Rangel Villasana	R								X		
<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Markus Weber	FR/ FA	X	X						X		X

1) ATL: Assessment Team Leader; TE: Technical Expert; LE: Local Expert; R: Reviewer; FR: Final Reviewer; FA: Final Approval

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## 3 DESCRIPTION OF THE POST-REGISTRATION CHANGES

This section provides an overview of the following post-registration changes addressed in the revised version of the PDD (version 4) <sup>/1/</sup> which was made available and assessed by the GLC's assessment team:

- Corrections in information made available in the PDD (changes which do not affect the project design)

Section 4 includes details about the GLC's assessment of the post-registration changes, including assessment of compliance with specific applicable CDM requirements. Section 5 presents the summarized validation opinion (validation statement) for the performed assessment.

### 3.1 Overview of the permanent changes to the design of the project activity

Not applicable. There are no occurred or planned post-registration permanent changes to the project design encompassed by the revised version of the PDD (version 4) <sup>/1/</sup>.

### 3.2 Overview of the permanent changes from the registered monitoring plan and/or monitoring methodology

Not applicable. There is no occurred permanent change from the registered monitoring plan and/or monitoring methodology encompassed by the revised version of the PDD (version 4) <sup>/1/</sup>.

### 3.3 Overview of performed corrections in the PDD (that do not affect the project design)

In the context of the submission of a revised version of the PDD (version 4 dated 2013-01-10) <sup>/1/</sup>, the project participant Essencis Soluções Ambientais S.A. has corrected previously existent minor errors and mistakes of the initial registered version of the PDD <sup>/2/</sup> as follows:

**Corrections and improvements in information in the previous PDD which do not affect the project design (due existent minor errors, inconsistencies and not updated information) (including revision of the ex-ante estimation of emission reduction along the 1<sup>st</sup> 7-year renewable crediting period):** Previously existent not correct/updated information in the earlier registered version of the PDD (version 3) <sup>/2/</sup> which are related to quantitative information about historical, current and forecasted disposal of municipal solid waste (MSW) at the CTR Caieiras landfill is addressed via corrections in the PDD. While the correctness of the amount of disposed MSW in the CTR Caieiras landfill has a direct impact over the correctness of estimated emission reductions to be achieved by the project activity, correct quantitative MSW disposal information is thus added in the revised version of the PDD (version 4) <sup>/1/</sup>. Recalculated ex-ante estimations of emission reductions are also included in the revised in the PDD (by taking into account the updated and higher figures for MSW disposal for the period from 2007 onwards and historical information for year 2006).

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Furthermore, minor text corrections and improvements are also made in the revised version of the PDD (version 4) <sup>/1/</sup>. The term "*as per information available at the time of the project design initial conceptualization*" was added in selected sentences in different sections in the PDD in order to address the existent temporal difference between facts, data and events which were valid/applicable at the time of the project conceptualization (period encompassing years 2004 and 2005) and facts, data and events valid/applicable at the time of the issuance of the revised version of the PDD (2013-01-10, which is more than seven years afterwards). This revised version of the PDD <sup>/1/</sup> also incorporates corrections of previously existent minor typo errors/mistakes and text descriptions are adjusted as per the date of the revised version of the PDD <sup>/1/</sup>.

Such minor corrections include the following:

- Inclusion of project's geographical location coordinates in decimal GPS format;
- Correct description of the name of one of the project participants was added;
- Updated contact information for the project participants were added;
- Clarification about the current ownership of the CTR Caieiras landfill was added;
- Clarification about the current situation in Brazil and region where the project activity is located regarding regulatory requirements for LFG management in landfills.
- Clarification about the version of the applied ACM0001 baseline and monitoring methodology (version 2) was added.
- Clarification about the occurred temporarily pilot tests/evaluations with a portable electricity generation station (fuelled by LFG collected at the CTR Caieiras landfill as part of the project activity) during the period from April 2009 to June 2009 (including related explanations/justifications for not regard such initiative as a permanent change to the design of the project activity).
- Information about the revision of the PDD (version 4, dated 2013-01-10) in the context of the request of approval of post-registration changes which this Validation Opinion Report refers to.
- Corrected name of the landfill was added: CTR Caieiras landfill.
- Figure notation was corrected in several sections of the PDD: use of "," for thousands (instead of ".").
- Other minor corrections

No corrections/changes to project information or parameters fixed at validation (as described in the registered PDD) were made.

All corrections and text improvements are not directly related to the project design and thus do not represent permanent changes to the project design. Section 4 includes assessment of the rationale and appropriateness of addressing occurred increase in MSW disposal at the CTR Caieiras landfill as "Corrections" (in information which do not affect the project design) instead of addressing that as "Permanent changes to the project design".

The project participant Essencis Soluções Ambientais S.A. submitted to the GLC's assessment team a revised version of the PDD (version 4 dated 2013-01-10) <sup>/1/</sup> with the above-summarized corrections appropriately implemented. Section 4.5 includes a table that outlines in details all changes made in each applicable section of the earlier version of the registered PDD (version 3) <sup>/2/</sup> and in the earlier validated version spreadsheet with calculated *ex-ante* estimations of emission reductions. The table also includes the GLC's overall assessment opinion about the made text editing's. Corrected information as per the revised version of the PDD (version 4) <sup>/1/</sup> reflects the actual project information.

As confirmed by the GLC's assessment team, the above-summarized corrections do not require prior approval of the CDM-EB. As outlined in Appendix 1 of the Clean Development Mechanism Project

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Standard <sup>/6/</sup>, any corrections to project information of a registered CDM project activity that do not affect the design of the project activity do not require prior approval by the CDM-EB.

As assessed by the GLC's verification team, the performed revision of *ex-ante* estimation of emission reductions appropriately address the following disclaimer which is added in Section A.4.3 of the revised version of the PDD (version 4) <sup>/1/</sup>:

*"Significant increase in the amount of MSW actually disposed in the CTR Caieiras landfill from the period from March 2007 onwards:*

*As per the ex-ante estimation of emission reductions in the previously registered version of the PDD (version 3), the project would collect and flare LFG which would be generated from the decomposition of an average historical MSW disposal rate stream of 4,000 tons of waste per day. This MSW disposal rate stream estimation was actually not confirmed during the monitoring period due to the following reasons:*

- *From March 2007 onwards, other public landfills (which at the time were also used for disposal MSW from the city of São Paulo) faced operational problems:*
  - *The Bandeirantes landfill (public owned landfill) was closed on March 2007. As a result of that, all MSW stream which were used to be disposed in this landfill started to be disposed to the CTR Caieiras landfill, thus increasing the average MSW disposal rate at the CTR Caieiras landfill to about 7,500 ton of MSW per day.*
  - *Later in August 2007, other owned public landfill serving the city of São Paulo (São João Landfill) suffered with an unfortunate and unexpected severe accident (slide of disposed waste accident). As a consequence of this severe accident, MSW disposal at the São João landfill was interrupted and significant part of the MSW stream that used to be disposed in this landfill thus started to be also disposed in the CTR Caieiras landfill, thus increasing its total MSW disposal rate to about 10,000 ton of MSW per day.*

*While the permanent interruption of MSW disposal activities at both Bandeirantes and São João landfills was a decision of the environmental authority for the São Paulo State (which is named CETESB), the decision of sending an incremental amount of MSW to be disposed in the CTR Caieiras landfill was a decision from the administrative authorities of the municipality of São Paulo.*

*The occurred heavy increment in the amount of MSW actually disposed in the CTR landfill obviously resulted in a significant increase in the amount of LFG being generated at the CTR landfill and collected & destroyed by the CDM project activity "Caieiras landfill gas emission reduction" from the end of year 2007 onwards. With more LFG being collected and destroyed, baseline emissions and emission reductions achieved by the project activity also increased accordingly.*

*It is important to note that in the absence of the CDM project activity (baseline scenario), the occurred significant increment of MSW disposal rate at CTR landfill would happen anyway. Thus, baseline emissions are not artificially inflated due to the occurred increment in the amount of MSW disposed at the CTR landfill."*

As a result of such revision of ex-ante estimations of emission reductions in the PDD, the average annual emission reduction value along the 7-year renewable crediting period has increased significant

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(from 368 710 tCO<sub>2</sub>e per year<sup>1</sup> to 764 646 tCO<sub>2</sub>e per year). As per the revised version of the PDD (version 4) <sup>/1/</sup>, *ex-ante* estimates of emission reduction to be achieved by the project activity are correctly calculated as follows:

Table 3-1: Summary of ex-ante estimations of emission reductions to be achieved by the project activity along the selected 7-year renewable crediting period as per the revised version of the PDD (version 4) <sup>/1/</sup>

Year	Ex-ante estimations of emission reductions to be achieved by the project activity along the 7-year renewable crediting period
2006 (from 2006-03-31 to 2006-12-31)	79 926
2007	251 988
2008	516 038
2009	671 818
2010	903 827
2011	1 161 016
2012	1 382 469
2013 (from 2013-01-01 to 2013-03-30)	385 441
Period from 2006-03-31 to 2013-03-30 (accumulated value)	5 352 523
Annual average value	764 646

<sup>1</sup> While the earlier available value for *ex-ante* estimated average annual emission reductions to be achieved by the project activity which is indicated at the project's webpage at UNFCCC's CDM website is 770 932 tCO<sub>2</sub>e/year, the GLC's assessment team has confirmed that as per the earlier version of the emission reduction calculation spreadsheet (used for the development of the earlier version of the registered PDD (version 3)), such annual average value was actually 368 710 tCO<sub>2</sub>e/year:

Year	2006	2007	2008	2009	2010	2011	2012	2013
Ex-ante estimation of ER (tCO <sub>2</sub> e)	81 167	192 653	301 088	353 323	396 472	497 166	590 119	168 981
Accumulated value (tCO <sub>2</sub> e)	2 580 970							
Annual average (tCO <sub>2</sub> e/year)	368 710							

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It is GLC opinion that the initiative of Essencis Soluções Ambientais S.A. to revise *ex-ante* estimates of emission reductions in the PDD (as well as all related calculations in the spreadsheet file with *ex-ante* estimations of emission reductions which is enclosed to the PDD) is deemed reasonable and correct.

As further assessed in Section 4, the GLC's assessment team confirms that all performed corrections in the PDD as are appropriately performed. Such performed corrections do not affect the project design and do not compromise the compliance of the monitoring plan with the applied methodology ACM0001 (version 2) <sup>/20/</sup> either. Appropriate statements were added in the revised version of the PDD (version 4, dated 2013-01-10) <sup>/1/</sup> highlighting that the performed corrections (i) do not adversely affect the applicability of the baseline and monitoring methodology ACM0001 (version 2); (ii) do not adversely affect the earlier demonstrated additionality for the project activity; (iii) do not compromise the compliance of the monitoring plan with the applied methodologies. It is also highlighted in the revised version of the PDD, that (iv) the level of accuracy and completeness in overall monitoring of the project activity is not compromised either by the performed corrections either.

## 3.4 Overview of temporary deviations from the registered monitoring plan and/or monitoring methodology

Not applicable. There are no temporary deviations from the registered monitoring plan and/or monitoring methodology occurred within the 5<sup>th</sup> monitoring period. Thus, the revised version of the PDD (version 4) <sup>/1/</sup> does not address any type of temporary deviations.

## 3.5 Summary of the change to the start date of the crediting period

Not applicable. No change to the start date of the crediting period is being requested.

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## 4 ASSESSMENT OF THE POST-REGISTRATION CHANGES

This section includes further description and assessment of the post-registration changes (as per the latest version of the revised PDD (version 4 dated 2013-01-10) <sup>1/1</sup>) vis-à-vis currently applicable CDM rules requirements for addressing post-registration changes for a registered CDM project activity.

As per applicable CDM rules and requirements for assessing post-registration changes, the assessment of the following aspects should be included:

- The reasons and rationale for the changes
- The timing of the changes (including assessment whether the changes were known prior to the registration of the project as a CDM project activity),
- The impact of the changes in terms of the overall operation of the project activity
- The impact of the changes in terms of specific requirements for CDM project activities (if/how the changes adversely impact scale, additionality, application of selected methodology(ies) for the project activity).

As assessed in Section 3, the performed post-permanent changes encompass corrections/editing's in the PDD under category "Corrections" in information which do not affect the project design which are related to quantitative information about MSW disposed in the CTR Caieiras landfill (including related corrections in ex-ante estimations of emission reductions along the 7-year renewable crediting period) + minor corrections and text improvements.

Clarification box - Assessment of rationale and appropriateness of addressing occurred increase in MSW disposal at the CTR Caieiras landfill as "Corrections" (in information which do not affect the project design)

*Non addressing of occurred and forecasted relative increment in the amount of MSW disposed and to be disposed in the CTR Caieiras landfill as permanent change to the project design of the project activity:*

It is important to note that the occurred and forecasted relative increment in the amount of MSW disposed and to be disposed in the CTR Caieiras landfill was addressed in the PDD as "Corrections" in project information (that do not affect the project design) by merely correcting available quantitative information related to MSW disposal at the CTR Caieiras landfill in the PDD as well as correcting/updating *ex-ante* estimations of emission reductions also in the PDD. It is crucial to note that such occurred (and forecasted) relative increment in MSW disposal activity is not regarded as fitting the post-registration change category "Changes to the project design from a registered project activity". The changes are reasonably assumed as fitting the post-registration change category "Corrections" (in information that do not affect the project design)".

*Differentiated definitions and approaches for addressing and assessing "Corrections" (in information which do not affect the project design) and "Permanent changes to the project design" as per the CDM Project Standard and CDM Validation and Verification Standard (VVS):*

The latest version of the CDM Project Standard <sup>16/</sup> clearly indicates the following regarding "Corrections" (in project information that do not affect the project design):

*"209. If project participants make any corrections to project information or parameters fixed at validation as described in the registered PDD, project participants shall document these corrections in a revised PDD.*

*210. In such cases project participants shall either:*

*(a) Inform the DOE contracted to perform a verification regarding the corrections; or*

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*(b) Request any DOE at any time prior to the commencement of verification to assess the corrections. (...)*

## *Appendix 1: Changes that do not require prior approval by the board*

### *I. Corrections*

*1. Any corrections to project information <sup>1)</sup> of a registered CDM project activity that do not affect the design of the project activity do not require prior approval by the Board.*

*<sup>1)</sup> Such corrections may include typographical errors, location, names and numbers of components, etc. "*

The following is included in VVS <sup>15)</sup> regarding Corrections (to project information that do not affect the project design):

#### *"9.5.2. Corrections*

##### *9.5.2.1. Verification requirement*

*257. The DOE shall verify that any corrections to project information or parameters fixed at validation, as described in the registered PDD, made by project participants in a revised PDD comply with the requirements of the Project standard.*

##### *9.5.2.2. Means of verification*

*258. If the DOE identifies that the project participants have made corrections to project information or parameters determined at validation, the DOE shall determine whether:*

*(a) The corrected information is an accurate reflection of actual project information; and/or*

*(b) The corrected parameters are in accordance with the applied methodology and/or selected monitoring plan.*

##### *9.5.2.3. Reporting requirements*

*259. The DOE shall describe how the corrected information accurately reflects the actual project information and/or how the corrected parameters reflect the application of the applied methodology and/or monitoring plan."*

As clearly indicated in VVS, evaluation and assessment on (i) when the changes occurred, (ii) reasons for those changes taking place, (iii) whether the changes would have been known prior to registration of the project activity, and (iv) how the changes would impact the overall operation/ability of the project activity to deliver emission reductions as stated in the PDD are not applicable or required for the category of changes denominated "Corrections" (item 9.5.2 of VVS). Also as per VVS, the assessment and reporting requirements/guidance presented in its paragraph 279 (a) (b) (c) are only applicable for the change category "Changes to the project design of a registered project activity" (item 9.9.5 of VVS).

Regardless of that, for the particular case of the change which is addressed as corrections in the information in the revised PDD (which do not affect the project design), this Validation Opinion Report also includes assessment details on (i) when all the related changes occurred, (ii) reasons for changes taking place, (iii) whether the changes would have been known prior to registration of the project activity and (iv) and how the changes would impact the overall operation/ability of the project activity to deliver emission reductions as stated in the PDD.

*Rationale for addressing related quantitative increment in MSW disposal as "Corrections (that do not affect the project design)" and not as "Permanent changes to the project design of a registered project activity":*

As part of its verification assessment, GLC is of the opinion that in the case of any CDM project activity encompassing LFG collection and destruction/utilization (including the "Caieiras landfill gas emission reduction") where no disposal of MSW is expected to be prevented/avoided and/or no waste management practice (disposal, compacting, leachate management) is expected to be modified as a result of the

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implementation and operation of such LFG collection and destruction/utilization infrastructure, any occurred or forecasted change in the amount of MSW disposed in the landfill where the project is implemented (which is demonstrated that would also occur in the absence of the project activity - baseline scenario) should not be regarded as a permanent post-registration change to the project design (at least in cases where only limited quantitative information about project's equipment/infrastructure is made available in the PDD).

For sake of mere comparison, it is interesting to note that even in the latest revised version of the methodological tool "Emissions from solid waste disposal sites" (version 06.0.1) (which is a methodological tool used for LFG collection and destruction project activities applying the latest version of the ACM0001 baseline and monitoring methodology (version 13)), different methodological and monitoring approaches are included for its "*Application A - The CDM project activity mitigates methane emissions from a specific existing SWDS*" and for its "*Application B - The CDM project activity avoids or involves the disposal of waste at a SWDS*". Differently than in the earlier versions of this methodological tool, in case of "Application A" (which is the particular case of project activities encompassing collection and destruction/utilization of LFG), no quantitative or qualitative monitoring for waste disposal is required. This methodological improvement in such methodological tool is regarded by the GLC's verification team as a clear indication that waste disposal related activities and aspects (such as the occurred relative increment in MSW disposal at the CTR Caieiras landfill) should not be regarded as a change in the design of the project activities not encompassing MSW management (such as a typical LFG collection and destruction/utilization project activity) as long as it is demonstrated that such increment in MSW disposal is completely independent from the project activity (and would thus also occur in its absence (baseline scenario)).

Anyhow, while *ex-ante* estimations of emission reductions in the PDD are (under a certain limit) proportional to both the amount of MSW historically disposed in the landfill and forecasted amount of MSW to be disposed in the future, in the particular case of the project activity Caieiras landfill gas emission reduction, the occurred and projected relative quantitative increment in terms of MSW disposal at the CTR Caieiras landfill has indeed affected the correctness of the earlier calculated *ex-ante* estimations of emission reductions to be achieved by the project activity.

This is even highlighted in the Monitoring Reports for the previous 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> verification for the project activity, which were performed under the VVM regulatory framework. Moreover, the earlier indicated quantitative information about MSW disposal in the CTR Caieiras landfill in the registered PDD obviously also became incorrect (or not any longer updated) as a result of the occurred/project increment in MSW disposal at this MSW disposal site.

Due to that, in order to merely correct related information made available in the registered PDD (as established by applicable guidance/rules under the VVS regulatory framework), the *ex-ante* estimations of emission reduction were revised in both the PDD and the related emission reduction calculation spreadsheet (which is enclosed to the revised PDD). Furthermore, correct and updated quantitative information about MSW disposal were also added in the revised version of the PDD. These corrections enhance and ensure the overall correctness and accurateness of the PDD. While the currently valid project configuration/design information (as described in the registered PDD) is not influenced by the occurred/forecasted relative increment in the MSW disposal (as the registered PDD does not explicitly specify quantitative information about the number of flares or other equipment/infrastructure that could be eventually influenced/changed or adversely affected by the occurred increase in amount of collected LFG, which is per se a direct outcome of the increase in MSW disposal on site), correcting all quantitative references to MSW disposal as well as correcting the *ex-ante* estimations of emission reductions to be achieved by the project activity in the registered PDD is thus assumed as deemed sufficient corrections (that do not affect the project design) to be performed in the PDD.

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## 4.1 Assessment of the timeline and reasons for the permanent changes

### 4.1.1 Assessment of the timeline for the changes

The following is indicated in the Monitoring Report <sup>/24/</sup> for the 5<sup>th</sup> verification of the project activity regarding the occurred increment in MSW disposed in the CTR Caieiras landfill:

*"The total technical MSW disposal capacity for the CTR landfill is about 60 000 000 ton of MSW. By the end of the considered monitoring period, an accumulated quantity about 6 000 000 ton of MSW was disposed in the project site. Within the monitoring period, MSW has disposed with an average rate of about 1,000,000 ton of MSW per year. The CTR landfill is currently not expected to close prior to year 2030."*

The disclaimer quoted in Section 3.3 was also added in both the Monitoring Report for the 5<sup>th</sup> verification of the project activity and revised version of the PDD (version 4) <sup>/1/</sup> in order to highlight the occurred increment in MSW disposed in the CTR Caieiras landfill.

As part of its assessment, the following documents were made available and assessed by the GLC's assessment team in order to confirm the appropriateness and correctness of above-quoted information which was added in the revised version of the PDD (version 4) and Monitoring Report for the 5<sup>th</sup> verification:

- Online available information from third party confirming the closure of the Bandeirantes landfill in March 2007 <sup>/22/</sup>.
- Online available information from third party confirming the unfortunate and unexpected severe accident event (slide of disposed waste accident) at the São João landfill in August 2007 which cause suspension of MSW disposal at this landfill <sup>/23/</sup>

Thus, the timeline for the occurred increase in the amount of MSW disposed in the CTR Caieiras landfill (which triggered corrections in information (which do not affect the project design) in the PDD is reasonably defined as March 2007 and August 2007.

### 4.1.2 Assessment of reasons and rationale for the changes

The reasons for the occurred permanent increment in the amount of MSW disposed at the CTR Caieiras landfill are demonstrated to be completely independent by any decision, course of action or influence from the project participants for the CDM project activity Caieiras landfill gas emission reduction.

Through assessment of information (news) from third party which are made available online <sup>/22/ /23/</sup>, the GLC's assessment team was able to confirm that the permanent interruptions of MSW disposal at the Bandeirantes and São João landfills and the decision to regularly dispose in the CTR Caieiras landfill the quantity of MSW that would otherwise be disposed in these landfills are all course of actions and decisions taken by the Environmental authority for São Paulo State and Administration of the Municipality of São Paulo respectively (which are the public entities who are in charge of environmental affairs and waste management public service). The initiative of the project participant Essencis Soluções Ambientais S.A. of correcting related information in the PDD (quantitative information about MSW disposal at the site and *ex-ante* estimations of emission reductions) was taken for sake of ensuring the

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required correctness in information available in the PDD (as argued by the interviewed representatives of this project participant).

It is also reasonable to assume that rationale and reasons for the other corrections in the PDD, as listed in Section 3.3 (minor typo errors/mistakes and text improvement needs) are to enhance and ensure the overall completeness and transparency of the project description in the PDD. As stated by the project participant Essencis Soluções Ambientais S.A., while a new version of the PDD was compiled, this was taken as an opportunity to also address minor typo errors/mistakes and text improvements identified. It is the opinion of the GLC's assessment team that this is deemed reasonable and acceptable.

## 4.2 Assessment whether the need changes (corrections) were known prior to the registration of the project as a CDM project activity

While the PDD which was sent as part of the registration package is dated 2005-09-12, the Validation Report <sup>14/</sup> for the project activity is dated 2005-12-12. The registration date for the project activity is indicated to be 2006-03-09. By taking into account that, as assessed in Section 4.1, all events related to the occurred and forecasted relative increase in MSW disposal at the CTR Caieiras are dated year 2007, it is thus deemed demonstrated that the need of changes in the PDD (in order to address the occurred increment in the amount of MSW disposed at the CTR Caieiras landfill) were not known prior to the registration of the project as a CDM project activity.

It is also reasonable to assume that the need of making the other corrections in the PDD, as listed in Section 3.3 (minor typo errors/mistakes and text improvement needs), were not known prior to the registration of the project as a CDM project activity either.

## 4.3 Assessment whether the changes will impact the overall operation of the project activity and its ability to achieve GHG emission reductions as stated in the PDD

In general terms, besides of the potential quantitative increment in emission reductions to be achieved by the project activity due to the occurred quantitative increment in MSW disposal in the CTR Caieiras landfill<sup>2</sup>, the corrections in the PDD do not impact the overall operation / ability of the project activity to deliver emission reductions.

The project design is still encompassing collection of LFG at the CTR Caieiras landfill and its destruction (in enclosed high temperature flares) with the possibility of promoting alternative utilization of collected LFG as gaseous fuel for electricity generation or as fuel in industrial boilers located outside the project site (without claiming associated GHG emission reductions of such alternative utilization of LFG as CERs in the context of the project activity). Thus, the occurred increment in the amount of MSW

<sup>2</sup> As acknowledged by the GLC's assessment team, more MSW being disposed in the CTR Caieiras landfill will potentially increase the generation of LFG in the landfill. With more LFG being generated, more LFG can be potentially collected and destroyed by the project activity, thus increasing GHG emission reductions accordingly.

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disposed in the CTR Caieiras landfill does not represent any change in terms of the technological concept of the project activity<sup>3</sup>.

The corrections does not affect the applicability of ACM0001 (version 2) <sup>/20/</sup> either. None of the applicability requirements for this methodology are adversely affected by the increase of disposal of MSW in the CTR Caieiras landfill.

## 4.4 Assessment whether the changes impact the project activity in terms of additionality, scale, applicability of the applied CDM baseline and monitoring methodology and compliance of the monitoring plan with applied methodologies

By taking into account the correctness of selected category of post-registration changes encompassed by this Validation Opinion Report ("Corrections" in information which do affect the project design), that fact would be sufficiently enough condition to acknowledge that such changes do not impact the project activity in terms of additionality, scale, applicability of the applied CDM baseline and monitoring methodology. As highlighted in the clarification box made available in Section 4, as per VVS related assessment is not even required in the case of post-registration changes under category "Corrections" (in information which do affect the project design). Anyway, for the sake of completeness and transparency, related assessment is included in this section.

The table below summarizes if/how the post-registration changes under category "Corrections" raise potential concerns with specific CDM requirements:

<sup>3</sup> As confirmed by the GLC's assessment team, the earlier registered version of the PDD (version 3) do not include any detailed specification for the project's equipment/infrastructure (such as quantity and size of flares, quantity of LFG collection wells, etc.). Thus, as argued by the project participant Essencis Soluções Ambientais S.A., there is no need to revise the project description in the PDD in this particular aspect. However, for sake of completeness and transparency, a summary of the installation of the high temperature enclosed flares along the project's operational lifetime was included in the revised version of the PDD.

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Table 4-1: Assessment of potential concerns of the post-registration changes with specific CDM requirements

CDM requirement of which related potential impact caused by the changes in the project design should be assessed	Do the changes raise potential concerns with the CDM requirement? <sup>4</sup>	
	Yes	No
Additionality of the project activity (see assessment details in Section 4.8.1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Scale of CDM project activity (see assessment details in Section 4.8.2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Applicability and application of approved baseline methodology (see assessment details in Section 4.8.3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Compliance of the monitoring plan with the applied monitoring methodologies (or level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan) (see assessment details in Section 4.8.4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

## 4.4.1 Impact of the changes in the context of the additionality of the project activity

At the time when the project activity “Caieiras landfill gas emission reduction” was validated, the project’s additionality was assessed and demonstrated by applying the guidance of the the document “Annex 1 – Tool for the demonstration and assessment of additionality” (EB-16 meeting of the CDM-EB). The requirements valid at that time (year 2005) for assessment and demonstration of additionality were correctly followed as indicated in the Validation Report <sup>/4/</sup> for the project activity.

As indicated in Section B.3 of the revised version of the PDD (version 4.2) <sup>/1/</sup>, the additionality for the project is not undermined or adversely affected by the performed corrections in information which do not affect the project design (incl. the corrections related to the occurred increase in MSW disposal at the CTR Caieiras landfill). Thus, the demonstration of additionality for the project activity is not revised in this context. Similarly to other sections of the revised version of the PDD, some minor text corrections and improvements in the Section B.3 of the PDD are implemented for sake of correctness and completeness.

The following disclaimer was opportunely added as a footnote in Section B.3 of the revised version of the PDD (version 4) <sup>/1/</sup>:

<sup>4</sup> Raising potential concerns means that the changes have an impact on the CDM requirement in question. It does not necessarily mean that the CDM requirement is not anylonger met.

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*"In case fractions of all collected LFG end-up being exported to an external industrial facility (to be used as gaseous fuel in industrial boilers) or end-up being utilized as gaseous fuel for electricity generation in quantities differently than specified in this PDD (as a result of higher installed capacity for such combustion sources and/or increased availability of collected LFG inter alia due to the occurred increment in the MSW disposal at the CTR Caieiras landfill), this will be addressed as post-registration permanent changes to the project design of the project activity. In such case, the potential adverse impact over additionality of the project will have to be addressed as per applicable CDM rules."*

It is the opinion of the GLC's assessment team, that as suggested in the above-quoted disclaimer, if a share or quantity of collected LFG (which is higher than the one considered at the time of the project's design conceptualization) ends up being utilized with a commercial purpose in the future (being sold as gaseous fuel for an external industrial facility or being utilized as gaseous fuel for electricity generation), the impact of such incremental economic benefit of the project may be eventually considered in terms of adverse impact over the additionality of the project activity. Thus, if a share or quantity of collected LFG (which is higher than the one considered at the time of the project's design conceptualization) ends up being utilized with a commercial purpose in the future, this will be addressed by the project participants and assessed by a DOE in the context of a new request of approval of post-registration changes.

As a conclusion, by taking into account all applicable guidance for assessing impact of the changes in terms of additionality of the project activity, it is the opinion of the GLC's assessment team that the project's additionality is sufficiently demonstrated and not adversely affected or undermined by the performed corrections in information which do not affect the project design.

## 4.4.2 Assessment of the impact of the changes in terms of scale of the project activity

By taking into account of the nature of the performed corrections (in information that do not affect the project design) in the PDD, the GLC's assessment team confirms that the performed corrections do not adversely affect the scale of the project activity. The large scale baseline and monitoring methodology ACM0001 (version 2) does not include any restriction or cap for the amount of MSW to be disposed in the landfill where the project activity is implemented. Thus, there is no requirement (threshold or capacity) in terms of scale and size for the landfill or for the project activity which could adversely affect the classification of the project as a large scale CDM project activity applying the baseline and monitoring methodology ACM0001 (version 2).

## 4.4.3 Assessment of the impact of the changes in terms of applicability of the applied baseline and monitoring CDM methodology(es)

The large scale baseline and monitoring methodology ACM0001 (version 2) does not include in its applicability conditions any restriction or capacity for the amount of MSW to be disposed in the landfill where the project activity is implemented. All applicability conditions of ACM0001 (version 2) are still being met.

## 4.4.4 Assessment of the impact of the changes in terms of compliance of the monitoring plan with applied monitoring methodology and/or level of accuracy of the monitoring when compared with requirements as per the registered monitoring plan

By taking into account the nature of the performed corrections (in information that does not affect the project design) in the PDD, the GLC's assessment team confirms that the performed corrections do not

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adversely affect the compliance with the registered monitoring plan or with applied monitoring methodology. The level of accuracy of the monitoring is not adversely affected by the made corrections either.

## 4.5 Assessment of performed text editing's in the PDD for addressing the changes

The revised version of the PDD (version 4 dated 2013-01-10) <sup>/1/</sup> was made available by Essencis Soluções Ambientais S.A. to the GLC's assessment team (in both clean version and version with all changes being tracked) and it sufficiently describes the nature and extent of the occurred post-registration changes (correction in information which does not affect the project design).

The revised version of the PDD (version 4) <sup>/1/</sup> also includes general text improvements/corrections. Performed corrections and text improvements, which are not directly related to and do not affect the project design, are thus also implemented in the revised version of the PDD <sup>/1/</sup>. This is deemed reasonable and acceptable.

The following tables outline in detail all changes in texts made in each affected section of the original PDD. Changes and editing's were also made in the spreadsheet with *ex-ante* estimations of emission reductions. All changes are summarized in the table below.

Table 4-2: Assessment of modifications and editing's and modifications made in the PDD (as outlined in the revised version of the PDD (version 4 dated 2013-01-10) <sup>/1/</sup>

PDD Section	Description of the performed modification / editing's	Validation opinion of the GLC's assessment team about the performed modification/editing's
Cover / front pages	Version number was updated. Reference to "version 4" was added. A summary of the editing's/revisions encompassed by version 4 of the PDD was added.	OK. Editing's/modifications in cover / front pages are deemed correct and acceptable.
A.1	No changes were made.	-
A.2	Texts were corrected (typo mistakes) and improved by inter alia taking into account the temporal difference between the issuance date for the PDD (version 3) (which is prior to the actual implementation of the project activity) and the more recent issuance date for PDD (version 4) (which is dated more than 6 years after the implementation and start of operation of the project activity). The term " <i>as per information available at the time of the project design initial conceptualization</i> " was added in several sentences along the PDD as text improvement in order to address such	OK. Editing's/modifications in Section A.1 are deemed correct and acceptable. The performed text corrections and improvements enhance the overall transparency and completeness of the project design description and they are in accordance with applicable CDM rules.

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	temporal difference between facts, data and events at the time of the project conceptualization and at the issuance date of the revised version of the PDD (version 4). A disclaimer justifying and explaining the reasons for the addition of such term was added as a footnote in Section A.2. Furthermore general text improvements and information complements were added: complementary information about the historical installed project's LFG flaring capacity along its operation were added. Translation into English of the title of a publication was added as a footnote. Clarification about the role of the company "SUEZ Ambiental" in the context of the implementation of the project activity until year 2006 was added as a footnote.	
A.3	The description of the name for the project participant "ELECTRIC POWER DEVELOPMENT CO. LTD." was corrected.	OK. The description of the name of the project participant "ELECTRIC POWER DEVELOPMENT CO. LTD." is in accordance with the latest version of the completed Modalities of Communication form (MoC) for the project activity.
A.4	No changes were made	-
A.4.1	No changes were made	-
A.4.1.1	No changes were made	-
A.4.1.2	No changes were made	-
A.4.1.3	No changes were made	-
A.4.1.4	General minor text corrections/improvements were made. Project's geographical coordinates (in decimal format) were added. Furthermore general text improvements and information complements were added.	OK. Editing's/modifications performed in Section A.4.1.4 are deemed correct and acceptable. The inclusion of project's geographical coordinates (in decimal format) is deemed correct (as verified by the GLC's assessment team).
A.4.2	Reference to UNFCCC Sector Scope 13 was added.	OK. Editing's/modifications performed in Section A.4.2 are deemed correct and acceptable.
A.4.3	General minor text corrections/improvements were made. Clarification about the use of integrated cover (with impermeable material, such as PVC or similar) on the waste calls at the CTR Caieiras landfill was added as complementary information. A informative box	OK. Editing's/modifications in Section A.4.3 are deemed correct and acceptable.

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	highlighting the occurred significant increase in the amount of MSW actually disposed in the CTR Caieiras landfill from the period from March 2007 onwards was added.	
A.4.4	<p>General minor text corrections/improvements were made. Clarification about situation regarding regional and national regulatory requirements for LFG management valid in January 2013 was added as complementary information.</p> <p>A clarification about the more recently published "Brazilian Regulation of the National Policy on Waste Management", (which was published in December 2010) was added as complementary information.</p>	OK. The performed editing's/modifications in Section A.4.4 are deemed correct and acceptable.
A.4.4.1	<p>The summarized values for <i>ex-ante</i> estimation of emission reductions over the 7-year renewable crediting period were updated by taking into account the following:</p> <ul style="list-style-type: none"> <li>• Increase in the amount of MSW disposed in the CTR Caieiras landfill from year 2007 onwards.</li> <li>• The final approved dates for the start and end of the 7-year renewable crediting period.</li> </ul> <p>It is crucial to note that, in accordance with applicable rules, no other assumption or parameter was changed in the revised calculation of the <i>ex-ante</i> estimation of emission reduction as per the earlier made assumptions at the time of the project design initial conceptualization (compilation of the initial version of the PDD). An explanative disclaimer was also added.</p>	OK. Editing's/modifications in Section A.4.4.1 are deemed correct and acceptable. The GLC's assessment team has assessed the spreadsheet with calculated <i>ex-ante</i> estimations of emission reductions to be achieved by the project activity. All related calculation revisions are deemed correct and acceptable (and in accordance with the added explanative disclaimer).
A.4.5	No changes were made	-
B.1	References to the applied version of ACM0001 methodology was added: version 2.	OK. Editing's/modifications in Section B.1 are deemed correct and acceptable.
B.1.1	References to the applied version of ACM0001 methodology was added: version 2. General text minor improvements/corrections were made.	OK. Editing's/modifications performed in Section B.1.1 are deemed correct and acceptable.

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B.2	<p>References to the applied version of ACM0001 methodology was added: version 2. General text minor improvements/corrections were made.</p> <p>A disclaimer was added as a footnote highlighting that the determination of emission reductions achieved by the project activity also takes into account project emissions due to the consumption of grid electricity and fossil fuel Liquefied Petroleum Gas (LPG) by the project activity.</p> <p>A disclaimer was added as a footnote highlighting that "ER<sub>y</sub>" is equivalent to baseline emissions (and not emission reductions).</p> <p>A clarification disclaimer was added highlighting that in January 2013, no use of any share of collected LFG as fuel by a local industry has yet occurred.</p> <p>A clarification was added as a footnote about the Salvador da Bahia landfill.</p> <p>A disclaimer was added highlighting that performed corrections (in information which do not affect project design) do not adversely affect the earlier demonstrated compliance with applicability requirements of ACM0001 (version 2). It is also highlighted that the scale of the project activity is not adversely affected by performed corrections either.</p>	OK. Editing's/modifications in Section B.2 are deemed correct and acceptable.
B.3	<p>General text corrections/improvements were made. A clarification about the Brazilian Regulation of the National Policy on Waste Management (which was published in December 2010) was added as a footnote as complementary information.</p> <p>A disclaimer was added highlighting that the performed corrections (in information which do not affect project design) do not adversely affect the earlier demonstrated additionality for the project activity.</p> <p>A disclaimer was added as a footnote highlighting that in case fractions of all collected LFG end-up being exported to an external industrial facility or end-up being utilized as gaseous fuel for electricity</p>	OK. Editing's/modifications performed in Section B.3 are deemed correct and acceptable.

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	generation in quantities differently than specified in this PDD this will be addressed as post-registration permanent changes to the project design of the project activity. The disclaimer also emphasizes that in such case, the potential adverse impact over additionality of the project will have to be addressed as per applicable CDM rules.	
B.4	Minor text improvements and corrections were made. Details about the occurred pilot tests/evaluation of a portable electricity generation facility fuelled by collected LFG at CTR Caieiras Landfill (using LFG collected by the project activity) during the period from April 2009 to June 2009 were added as an informative box for sake of completeness and transparency.	OK. Editing's/modifications in Section B.4 are deemed correct and acceptable.
B.5	Details about the completion of baseline studies were updated with a disclaimer about revision of the PDD in January 2013 in order to address the post-registration changes which are assessed in this Validation Opinion Report.	OK. Editing's/modifications performed in Section B.5 are deemed correct and acceptable.
C.1	No changes were made.	-
C.1.1	No changes were made.	-
C.1.2	No changes were made	-
C.2.1.1	Date format was changed for sake of consistency and uniformity.	OK. Editing's/modifications in Section C.2.1.1 are deemed correct and acceptable.
C.2.1.2	No changes were made	-
C.2.2	No changes were made	-
C.2.2.1	No changes were made	-
C.2.2.2	No changes were made	-
D.1	References to the applied version of ACM0001 methodology was added: version 2.	OK. Editing's/modifications in Section D.1 are deemed correct and acceptable.
D.2.	A disclaimer was added highlighting that in case electricity generation using collected LFG as fuel occurs, associated GHG emission reductions will not be claimed by the project activity. The disclaimer also highlights that GHG emissions associated with the consumption of grid electricity and LPG by the project activity are accounted as project emissions in the context of the determination	OK. Editing's/modifications in Section D.2 are deemed correct and acceptable.

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	of emission reductions. Furthermore, general minor text improvements and corrections were made.	
D.2.1.	No changes were made	-
D.2.1.1.	No changes were made	-
D.2.1.2.	No changes were made	-
D.2.1.3.	No changes were made	-
D.2.1.4.	No changes were made	-
D.2.2.	No changes were made	-
D.2.2.1.	<p>A disclaimer was added as a footnote highlighting that the monitoring parameter <math>LFG_{flare,y}</math> is "Amount of landfill gas flared" actually corresponds to the amount of collected LFG sent to the flares for combustion. The disclaimer emphasizes that, also in accordance with ACM0001 (version 2), for the determination of the amount of LFG actually flared, monitoring records of parameter "Flare combustion/ efficiency" (FE) are also required.</p> <p>A "(2)" note was missing in the comment column for the monitoring parameter "Flare combustion/ efficiency" (FE).</p>	OK. Editing's/modifications performed in Section D.2.2.1 are deemed correct and acceptable.
D.2.2.2.	General minor text improvements and corrections were made.	OK. Editing's/modifications performed in Section D.2.2.2 are deemed correct and acceptable.
D.2.3 / D.2.3.1	No changes were made.	-
D.2.3.2	No changes were made.	-
D.2.4.	No changes were made	-
D.3.	A disclaimer was added highlighting that the performed corrections (in information which do not affect project design) do not compromise the compliance of the monitoring plan with the applied methodologies. The disclaimer also highlights that the level of accuracy and completeness in overall monitoring of the project activity is not compromised by the made corrections either.	OK. Editing's/modifications performed in Section D.3 are deemed correct and acceptable.
D.4.	Correct description of for the project participant "Essencis Soluções Ambientais S.A." was added.	OK. Editing's/modifications performed in Section D.4 are deemed correct and acceptable.
D.5	Details about the completion of the monitoring plan were updated with a disclaimer about	OK. Editing's/modifications performed in Section D.5 are deemed correct and acceptable.

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	revision of the PDD performed in January 2013 in order to address the post-registration changes (corrections) which are assessed in this Validation Opinion Report.	
E.1.	<p>General minor text improvements and corrections were made.</p> <p>Historical and forecasted MSW disposal figures for the CTR Caieiras landfill were updated based on information available in January 2013.</p> <p>A disclaimer was added as a footnote highlighting that no fraction of collected LFG was ever exported/sold to local consumer. The disclaimer also highlights that in January 2013, all LFG historically collected by the project activity has been sent to destruction in high temperature enclosed flares.</p> <p>A disclaimer was added as a footnote highlighting that as per forecasts of Essencis Soluções Ambientais S.A. (dated January 2013), the annual quantity of MSW to be disposed at the CTR Caieiras landfill during each year of the period from year 2013 to 2030 is equal to the amount of MSW disposed in the previous year with an increment of 2.0%. The disclaimer also highlights that in January 2013, the expected closure for the CTR Caieiras landfill was year 2030 (when the landfill is expected to reach its maximum accumulated technical MSW disposal capacity).</p> <p>Revised projections of methane generation and collection during the project lifetime were added (by taking into account the occurred quantitative increase in MSW disposal at the CTR Caieiras landfill). Figure notation was corrected: use of "," for thousands (instead of ".").</p>	OK. Editing's/modifications performed in Section E.1 are deemed correct and acceptable.
E.2.	Minor text corrections were made.	OK. Editing's/modifications performed in Section E.2 are deemed correct and acceptable.
E.3.	No changes were made.	-
E.4.	Minor text corrections and improvements were made. Revised figures for collected and destroyed methane along the project's lifetime	OK. Editing's/modifications performed in Section E.4 are deemed correct and acceptable.

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	were added (by taking into account the occurred quantitative increase in MSW disposal at the CTR Caieiras landfill). Figure notation was corrected: use of "," for thousands (instead of ".").	
E.5.	Minor text improvements/corrections were made. A revised graph showing methane generation and collection along the project's lifetime was added (by taking into account the occurred quantitative increase in MSW disposal at the CTR Caieiras landfill).	OK. Editing's/modifications performed in Section E.5 are deemed correct and acceptable.
E.6	Revised figures for <i>ex-ante</i> estimation of emission reductions over the 7-year renewable crediting period were added (by taking into account the occurred quantitative increase in MSW disposal at the CTR Caieiras landfill).	OK. Editing's/modifications in Section E.6 are deemed correct and acceptable. The GLC's assessment team has assessed the revised spreadsheet with calculated <i>ex-ante</i> estimations of emission reductions to be achieved by the project activity. All related calculation revisions are deemed correct and acceptable.
F.1.	No changes were made.	-
F.2	No changes were made.	-
G.1	No changes were made.	-
G.2	No changes were made.	-
G.3	The name of the project participant "Essencis Soluções Ambientais S.A." was corrected.	OK. Editing's/modifications performed in Section G.3 are deemed correct and acceptable.
Annex 1	Contact information of the project participant as indicated in the latest version of the completed Modalities of Communication (MoC) form for the project activity was added.	OK. Editing's/modifications performed in Annex 1 are deemed correct and acceptable.
Annex 2	Minor text correction/improvement was made.	OK. Editing's/modifications performed in Annex 2 are deemed correct and acceptable.
Annex 3	Historical and forecasted MSW disposal figures for the CTR Caieiras landfill were updated based on information available in January 2013. Figure notation was corrected: use of "," for thousands (instead of ".").	OK. Editing's/modifications performed in Annex 3 are deemed correct and acceptable.
Annex 4	No changes were made.	-
Spreadsheet including the ex-ante estimation of emission reduction for the project activity along the the1 <sup>st</sup> 7-	<i>Ex-ante</i> estimation of emission reductions over the 7-year renewable crediting period was updated by taking into account by taking into account the occurred quantitative increase in MSW disposal at the CTR Caieiras landfill. No other assumption or parameter was changed in the revised calculation of the ex-ante estimation of emission reduction as per	OK. Editing's/modifications in the spreadsheet including the ex-ante estimation of emission reduction for the project activity along the the1 <sup>st</sup> 7-year renewable crediting period are deemed correct and acceptable. The GLC's assessment team has assessed such spreadsheet. All related calculation revisions are deemed correct and acceptable.

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year renewable crediting period	assumption at the time of the project design initial conceptualization (compilation of the initial version of the PDD).	
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## 5 VALIDATION OPINION / VALIDATION STATEMENT

Germanischer Lloyd Certification GmbH (GLC) was commissioned by Essencis Soluções Ambientais S.A. to perform the 5<sup>th</sup> verification of the CDM project activity "Caieiras landfill gas emission reduction" (UNFCCC Project no. 0171) (monitoring period from 2010-10-01 to 2011-08-31). As part of its verification assessment, the GLC's assessment team confirmed the need to address via submission of a Post-registration change requests (under "Issuance" process track) the following type of eligible changes:

- Corrections and improvements in information in the previous PDD which do not affect the project design: correction in quantitative MSW disposal information (including revision of the *ex-ante* estimations of emission reduction along the 1<sup>st</sup> 7-year renewable crediting period) + minor corrections and text improvements.

In the context of the verification assessment for the 5<sup>th</sup> verification of the project activity (monitoring period from monitoring period from 2010-10-01 to 2011-08-31), the above summarized corrections were assessed by the GLC's assessment team as per the currently applicable CDM procedure to address post-registration changes under the "Issuance" process track. A revised version of Project Design Document (PDD) addressing these changes (PDD version 4, dated 2013-01-10) was made available by the project participant Essencis Soluções Ambientais S.A. and assessed by the GLC's assessment team.

As part of its assessment, besides assessing all changes in the PDD, the GLC's assessment team also assessed a revised spreadsheet with calculations of *ex-ante* estimations of emission reductions (which is enclosed to the revised PDD).

It is the GLC opinion that the revised version of the PDD (version 4) reflects in an appropriate and transparent manner the required corrections in information (including corrections of minor errors in the project description in PDD which does not affect the project design) accurately and correctly reflects the actual project information.

All explanations and justifications provided by Essencis Soluções Ambientais S.A. regarding information and assumptions added in the revised version of the PDD (version 4) are deemed reasonable, trustful, and acceptable.

The performed corrections in information which does not affect the project design correctly reflects the situation faced by the project activity and also correctly reflects the application of the applicable CDM guidance for addressing post-registration changes / category "Corrections" as per the applicable provisions of the Clean Development Mechanism Project Standard.

As a conclusion it is the opinion of GLC that all assessed corrections in project information comply with the applicable requirements as established in the Clean Development Mechanism Project Standard and that the revised version of the PDD (version 4) addresses such required corrections in a correct, reasonable and transparent manner.

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GLC will thus recommend approval of the revised PDD as per CDM "Issuance track" procedure for addressing post-registration permanent changes in the project design of a registered CDM project activity.

Note: GLC highlights that its assessment and opinion for post-registration changes for the CDM project activity "Caieiras landfill gas emission reduction" did not encompass any re-assessment of the earlier performed validation (e.g. including the application of the baseline and monitoring methodology and assessment and demonstration of additionality). The scope of the assessment performed by GLC is in accordance with applicable assessment requirements as per the latest version of the CDM Validation and Verification Standard. Related earlier complete e initial validation assessment for the project activity vis-à-vis CDM requirements and criteria was performed by the DOE responsible for the CDM validation of the project activity. The outcomes and opinion of the performed validation assessment are detailed in the Validation Report for the CDM project activity "Caieiras landfill gas emission reduction" (dated 2005-12-12 and approved by UNFCCC).

Hamburg, 2013-03-18

**Germanischer Lloyd**  
Certification

Markus Weber

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## 6 REFERENCES

The following table outlines the documentation reviewed and assessed by the GLC's assessment team as part of its assessment for post registration changes for the project activity.

### Documents revised or assessed:

The following table outlines the documentation reviewed during the validation assessment:

Table 6-1 List of assessed and reviewed documents

Reference	Author: Title, version, date of issue
/1/	Essencis Soluções Ambientais S.A.: Project Design Document (PDD) for the CDM project activity "Caieiras landfill gas emission reduction". Version 4. Dated 2013-01-10.
/2/	Essencis Soluções Ambientais S.A.: Project Design Document (PDD) for the CDM project activity "Caieiras landfill gas emission reduction". Version 3. Dated 2005-09-12.
/3/	Essencis Soluções Ambientais S.A.: Revised spreadsheet including <i>ex-ante</i> estimations of emission reductions for the CDM project activity "Caieiras landfill gas emission reduction". Version 4. Dated 2013-01-10
/4/	Det Norske Veritas Certification Ltd.: Validation Report for the "Caieiras landfill gas emission reduction ". Report No. 2005-0458. Revision No. 04. Dated 2005-12-12. Available online: <a href="http://cdm.unfccc.int/filestorage/N/M/7/NM771JHTEVQX03MBC7943RSL8UWMR9/Caieiras%20Validation%20Report_v04_2005-12-12.pdf?t=QmR8bWI0cHI6fDA8ym2SGXIEDt5WIfEU8Rvk">http://cdm.unfccc.int/filestorage/N/M/7/NM771JHTEVQX03MBC7943RSL8UWMR9/Caieiras%20Validation%20Report_v04_2005-12-12.pdf?t=QmR8bWI0cHI6fDA8ym2SGXIEDt5WIfEU8Rvk</a>
/5/	UNFCCC / CDM-EB: Clean Development Mechanism Validation and Verification Standard (VVS). Version 03.0.
/6/	UNFCCC / CDM-EB: Clean Development Mechanism Project Standard. Version 02.1.
/7/	UNFCCC / CDM-EB: Clean Development Mechanism Project Cycle Procedure. Version 03.1.
/8/	Terraza, N.; Willumsen, W.; Guimaraes, H.: Design vs. Actual Performance and the Future for CDM Projects. Sponsor Canadian International Development Agency / World Bank. Dated year 2007.
/9/	Makel Engineering, inc.: Landfill Gas-Fuelled HCCI Demonstration System. Dated September 2007.
/10/	SGS United Kingdom Ltd.: CDM Verification and Certification for the project: Caieiras landfill gas emission reduction. Monitoring period from 2006-06-31 to 2007-10-31. Dated 2008-01-18.

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/11/	GLC: Verification and Certification Report for the CDM project activity Caieiras landfill gas emission reduction. Monitoring period from 2007-11-01 to 2008-06-30. GLC Report No. CDM 081, Rev. 15. Dated 2012-07-10.
/12/	GLC: Verification and Certification Report for the CDM project activity Caieiras landfill gas emission reduction. Monitoring period from 2008-07-01 to 2009-12-31. GLC Report No. CDM 066, Rev. 10. Dated 2012-07-10.
/13/	GLC: Verification and Certification Report for the CDM project activity Caieiras landfill gas emission reduction. Monitoring period from 2010-01-01 to 2009-09-30. GLC Report No. CDM 071, Rev. 12. Dated 2012-07-10.
/14/	Landfill Gas Collection System Efficiencies (2007). Solid Waste Association of North America (SWANA). Report dated 2007.
/15/	California Environmental Protection Agency. Evaluation of Landfill Gas Collection Efficiency. Appendix D. Dated year 2009. Available online: <a href="http://www.arb.ca.gov/regact/2009/landfills09/appd.pdf">http://www.arb.ca.gov/regact/2009/landfills09/appd.pdf</a>
/16/	Essencis Soluções Ambientais S.A.: Monitoring Report for the CDM project activity "Caieiras landfill gas emission reduction". Monitoring period from 2006-03-31 to 2007-10-31. Version 2. Dated December 2007.
/17/	Essencis Soluções Ambientais S.A.: Monitoring Report for the CDM project activity "Caieiras landfill gas emission reduction". Monitoring period from 2007-11-01 to 2008-06-30. Version 5. Dated 2012-06-20.
/18/	Essencis Soluções Ambientais S.A.: Monitoring Report for the CDM project activity "Caieiras landfill gas emission reduction". Monitoring period from 2008-07-01 to 2009-12-31. Version 5. Dated 2012-06-20.
/19/	Essencis Soluções Ambientais S.A.: Monitoring Report for the CDM project activity "Caieiras landfill gas emission reduction". Monitoring period from 2010-01-01 to 2010-09-30. Version 5. Dated 2012-06-20.
/20/	CDM-EB: CDM Baseline and monitoring methodology ACM0001 - Consolidated methodology for landfill gas project activities - version 2.
/21/	Ecodebate: Article titled "Com encerramento do último aterro sanitário em funcionamento São Paulo passará a 'exportar' lixo" (translated into English as: " <i>Upon closure of the last landfill located in São Paulo, the city becomes an exporter of solid waste</i> "). This article confirms the closure of the São João landfill in year 2009. Available online:  <a href="http://www.ecodebate.com.br/2009/10/03/com-encerramento-do-ultimo-aterro-sanitario-em-funcionamento-sao-paulo-passara-a-exportar-lixo/">http://www.ecodebate.com.br/2009/10/03/com-encerramento-do-ultimo-aterro-sanitario-em-funcionamento-sao-paulo-passara-a-exportar-lixo/</a>
/22/	Frangé, P.: Article titled "O Lixo, os aterros e a ausência da Política Municipal de Resíduos Sólidos em São Paulo" (translated into English as " <i>Solid waste, landfills and the lack of a Municipal solid waste policy in São Paulo</i> "). This article confirms the closure of the Bandeirantes landfill in year 2007. Available online: <a href="http://www.paulofrange.com.br/comissoes_lixo.html">http://www.paulofrange.com.br/comissoes_lixo.html</a>

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/23/	<p>Estadão. Article titled "Deslizamento suspende atividades de aterro sanitário em SP" (translated into English as "<i>Slide suspends activities of landfill in São Paulo</i>"). Dated 2007-08-13.</p> <p>Available online: <a href="http://www.estadao.com.br/noticias/cidades,deslizamento-suspende-atividades-de-aterro-sanitario-em-sp,33914,0.htm">http://www.estadao.com.br/noticias/cidades,deslizamento-suspende-atividades-de-aterro-sanitario-em-sp,33914,0.htm</a></p>
/24/	<p>Essencis Soluções Ambientais S.A.: Monitoring Report for the CDM project activity "Caieiras landfill gas emission reduction". Monitoring period from 2010-10-01 to 2011-08-31. Version 2. Dated 2013-01-24.</p>