South Asia

Choose certainty.
Add value.

Validation Report

VALIDATION OF THE RENEWAL OF CREDITING PERIOD OF AN EXISTING CDM-PROJECT: CAIEIRAS LANDFILL GAS EMISSION REDUCTION

(UNFCCC REGISTRATION REF. NO. 0171)

REPORT NO. 600501161

24 September 2013

TÜV SÜD South Asia Pvt. Ltd.
Environmental Technology
Carbon Management Service
Solitaire, I.T.I. Road, Aundh
Pune- 411007
INDIA

Date of first issue of this report	Revision No. of this report
24-09-2013	3
Project Participant (contractor): Essencis Soluções Ambientais S.A. Rodovia dos Bandeirantes, km 33 Caieiras, ZIP 07803-970 São Paulo, Brasil	**Project Site(s):** Municipality of Caieiras State of São Paulo GPS coordinates (location of the flares): Latitude -23.343232, Longitude -46.76978 **Host Country:** Brazil
Applied Methodology / Version: ACM0001 / Version 13.0.0	**Scope(s):** 13 **Technical Area(s):** 13.1
First PDD Version: PDD completion date: 28-03-2013 Version No.: 05 (renewal of crediting period update)	**Final PDD version:** PDD completion date: 05-09-2013 Version No.: 5.9

VALIDATION OPINION

TÜV SÜD has performed a validation of the request for renewal of the crediting period of the aforementioned existing CDM project activity.

Standard auditing techniques have been used for the validation process.

The validation has been performed following the requirements of the latest version of the CDM VVS.

The review of the project design documentation, subsequent follow-up interviews, and further verification and validation of references have provided TÜV SÜD with sufficient evidence to determine the validity of the original baseline and to confirm that the estimated emission reductions are in line with the applied methodology. In our opinion, the project meets all relevant UNFCCC requirements and hence TÜV SÜD recommends the renewal of the crediting period of this project.

Considering that the project is implemented as designed, the project is likely to achieve the estimated amount of annual emission reductions of 1,213,522 tCO_2e and a total estimated amount of emission reductions of 8,494,654 tCO_2e as specified within the final PDD version for the second crediting period.

The single purpose of this report is its use during the registration process as part of the CDM project cycle. Based on the work described in this report, nothing has come to our attention that causes us to believe that any project component or issue has not been covered by the validation process.

Pune, 24/09/2013

Shivraj Sharma
Member,
Certification Body "Environment and Energy"
TÜV SÜD South Asia

Abbreviations

ACM	Approved Consolidated Methodology
BM	Build Margin
CAR	Corrective Action Request
CB	Certification Body
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction
CETESB	Companhia de Tecnologia de Saneamento Ambiental (Environmental Agency of the State of Sao Paulo)
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CL/CR	Clarification Request
CO_2e	Carbon dioxide equivalent
CTR	Caieiras landfill site *(from the Portuguese: Centro de Tratamento de Resíduos Caieiras)*
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
EF	Emission Factor
EIA / EA	Environmental Impact Assessment / Environmental Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	GreenHouse Gas(es)
GSP	Global Stakeholder Consultation / Process
IPCC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
KP	Kyoto Protocol
LFG	Landfill Gas
LPG	Liquefied Petroleum Gas
MP	Monitoring Plan
MSW	Municipal Solid Waste
NGO	Non Governmental Organisation
OM	Operating Margin
PDD	Project Design Document

PP	Project Participant
PS	Project Standard
SWDS	Solid Waste Disposal Site
TÜV SÜD	TÜV SÜD South Asia Pvt Ltd
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Clean Development Mechanism Validation And Verification Standard

Table of Contents Page

1 INTRODUCTION

1.1 Objective

The objective of the validation of the renewal of crediting period process of an existing project is to determine whether the project participants have updated the PDD in the sections related to the baseline, estimated emission reductions and monitoring plan using the most recent version of the baseline and monitoring methodology applicable for the project activity.

The ultimate decision on the acceptance to renew the crediting period of a proposed project activity rests with the CDM-EB.

1.2 Scope

The scope of any assessment is defined by the underlying legislation, regulation and guidance given by relevant entities or authorities. In the case of CDM project activities, the scope is set by:

- The Kyoto Protocol, in particular § 12 and modalities and procedures for the CDM
- Decision 2/CMP1 and Decision 3/CMP.1 (Marrakech Accords)
- Further COP/MOP decisions with reference to the CDM (e.g. decisions 4 – 8/CMP.1)
- Clean Development Mechanism Validation And Verification Standard (VVS) published under http://cdm.unfccc.int
- Decisions and specific guidance outlined by the EB which are published under http://cdm.unfccc.int
- Guidelines for Completing the Project Design Document (CDM-PDD) and the Proposed New Baseline and Monitoring Methodology (CDM-NM)
- Baselines and monitoring methodologies (including GHG inventories)
- Management systems and auditing methods
- Environmental issues relevant to the applicable sectoral scope
- Applicable environmental and social impacts and aspects of CDM project activity
- Sector specific technologies and their applications
- Current technical and operational knowledge of the specific sectoral scope and information on best practice

The validation process is not meant to provide any form of consulting for the project participant (PP). However, stated requests for clarifications, corrective actions, and/or forward actions may provide input for improvement of the project design.

The purpose of a validation related to the renewal of the crediting period of a project is an assessment according to the VVS and includes an assessment of an updated PDD in accordance with the relevant sections of the PS related to the renewal of crediting period and in particular to:

(a) Consistency of the names of the Project Participants;

(b) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period at the time of requesting renewal of crediting period;

(c) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

2 VALIDATION METHODOLOGY

The information provided by the project participants is assessed by applying the means of validation specified in the VVS and where appropriate standard auditing techniques.

Before the assessment begins, a competent team is selected to perform the process. The team is selected to cover the technical area(s), sectoral scope(s), and relevant host country experience for evaluating the CDM project activity. The members of the team carry out a desk review, follow-up actions, resolution of identified issues, and the preparation of the validation report. The prepared validation report and other supporting documents then undergo an internal quality control by the CB "Environment and Energy" before being submitted to the CDM-EB.

In case the validation team identifies issues that require further elaboration, research or expansion in order to determine whether the project activity meets the CDM requirements, and can achieve credible emission reductions findings are raised as specified in the VVS.

To requests the renewal of the crediting period of the project activity, all CARs and CLs must be resolved.

All CARs, CLs and FARs are found in Annex 1 to this validation report including the responses provided by the project participants, the means of validation of the responses and references to any resulting changes in the PDD or supporting annexes.

2.1 Appointment of the Assessment Team

According to the technical scopes and experiences in the sectoral or national business environment, TÜV SÜD has composed a project team in accordance with the appointment rules of the TÜV SÜD certification body "Environment and Energy".

The composition of an assessment team has to be approved by the Certification Body (CB) to assure that the required skills are covered by the team. The CB TÜV SÜD operates the following qualification levels for team members that are assigned by formal appointment rules:

- Assessment Team Leader (ATL);
- Validator (V);
- Validator Trainee (T);
- Technical Expert (TE);
- Country expert (CE);
- Technical reviewer (TR).

It is required that the sectoral scope(s) and the technical area(s) (TA) linked to the methodology and project has to be covered by the assessment team.

A technical review is conducted to perform a check on quality and completeness.

Assessment Team:

Name	Qualification	Coverage of scope	Coverage of technical area	Coverage of financial aspect	Host country experience	Conducted On-site visit
Robert Mitterwallner	**ATL**	☑	☑	N/A	-	-
Johann Thaler	V	☑	☑	N/A	☑	☑

Technical Reviewer:

Name	Qualification	Coverage of scope	Coverage of technical area	Coverage of financial aspect
Eric Tolcach	**TR**	☑	☑	N/A

Appointment certificates are attached to this report in Annex 3.

2.2 Review of Documents

The first version of the updated PDD and additional background documents, related to the project design and baseline have been reviewed to verify the correctness, credibility, and interpretation of the presented information and their compliance to the applicable requirements for requesting the renewal of crediting period. Furthermore, a cross-check between information provided and information from other sources has been done as an initial step of the validation process. A complete list of all documents and evidence material reviewed is attached as Annex 2 to this report.

2.3 Follow-up Interviews

TÜV SÜD performed interviews, telephone conferences, and physical site inspections during 06/05/2013 to 07/05/2013 with project stakeholders to confirm relevant information and to resolve issues identified in the first document review. A list of all persons interviewed in this process is presented in Annex 2 to this report.

2.4 Cross-check

During the validation process the team has made reference to available information related to similar projects or technologies as this CDM project activity. Project documentation has also been reviewed against the approved methodology applied to confirm the appropriateness of formulae and correctness of calculations.

2.5 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to resolve the requests for corrective actions, clarifications, and any other outstanding issues which need to be clarified for TÜV SÜD`s conclusion on the project design. The CARs and CLs raised by TÜV SÜD are resolved during communication between the client and TÜV SÜD. To guarantee the transparency of the validation process, the concerns raised and responses that have been given are documented in more detail in Annex 1 to this report.

2.6 Internal Quality Control

Internal quality control within the team is assured by means of a technical review process that takes place after the on-site assessment and after closure of findings. The internal quality control in the validation process is given by the final decision (Validation Opinion) made by the CB “Environment and Energy”.

3 REPORTING REQUIREMENTS

The assessment work and the main results are described below in accordance with the Clean Development Mechanism Validation and Verification Standard (VVS). The reference documents indicated in this section and Annex 1 are stated in Annex 2 of this report.

3.1 Project design document

The PDD is compliant with relevant form and guidance as provided by UNFCCC. The most recent version of the PDD form was used.

3.2 Description of project activity

The information presented in the PDD on the technical design has been assessed for accuracy and completeness using standard auditing techniques including:

(a) Document review including

- A review of data and information;
- Cross checks between information provided in the PDD and information from sources other than those used, the DOE´s sectoral or local expertise. If necessary, independent background investigations were performed.

(b) Follow-up actions including:

- Interviews with relevant stakeholders in the host country, personnel with knowledge of the project design and implementation;
- Cross checks between information provided by interviewed personnel (i.e. by checking sources or other interviews) to ensure that no relevant information has been omitted.

(c) Reference to available information relating to projects or technologies similar to the proposed project activity under validation;

The names of the project participants included in the request for renewal of crediting period are consistent with the names stated already at UNFCCC website (http://cdm.unfccc.int/Projects/DB/DNV-CUK1134509951.62/view).

In opinion of TÜV SÜD the project description, as included in the PDD, is accurate and complete; and it provides a correct understanding of the proposed project activity.

3.3 Validity of the selected baseline and monitoring methodology

The project at hands was originally registered based on version 02 of the approved CDM methodology ACM0001. The CDM-PDD of the 2nd crediting period applies version 13.0.0 of the consolidated methodology ACM0001. This is appropriate as version 13.0.0 is the most recent version at the time of submission of the revised PDD for the renewal of the crediting period as per the “CDM Project Standard” v. 04.0, §230.

3.3.1 Applicability of the selected baseline and monitoring methodology to the project activity

The project applies the approved consolidated baseline and monitoring methodology ACM0001 (version 13.0.0), “Flaring or use of landfill gas” in combination with several tools like:

- “Combined tool to identify the baseline scenario and demonstrate additionality” (version 05.0.0)

- ”Emissions from solid waste disposal sites” (version 06.0.1),
- “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (version 01),
- “Project emissions from flaring” (version 02.0.0),
- “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 02.0.0),
- ”Tool to calculate the emission factor for an electricity system” (version 3.0.0) and
- “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” (version 02).

Compliance with each applicability condition as listed in the chosen baseline and monitoring methodology and relevant tools has been demonstrated.

The validation team assessed by checking the UNFCCC webpage that the baseline and monitoring methodology selected by the project participant is the valid version of that approved by the Board.

Applicability criterion No. 1 from ACM0001 (version 13.0.0)
Install a new LFG capture system in a new or existing SWDS; or 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) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and (ii) 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.
Information from PDD:
The project design encompasses the installation of an active (forced) LFG capture system in an existing SWDS partially replacing a previously existent passive LFG combustion system (using conventional passive LFG venting/combustion drains). The project was implemented in year 2007. In this sense, condition (b – i) of the quoted applicability criteria is met. It is important to note that, at the time the project design was conceived (during time period encompassing years 2004 and 2005 as declared in the latest version of the PDD valid for the 1st 7-year crediting period) and later in 2007 (when the project activity was implemented), there were no pre-project active/forced LFG capture system that has been in operation in the last calendar year prior to the start of the project activity (in year 2007).
Assessment:
The assessment team compared the actual text of the applicable version of the methodology with the information stated in the PDD. The DOE by assessing the technical project description issued by the 3rd party Arquipelago Engenharia Ambiental (IRL 4c) confirms that prior to the implementation of the project activity the captured LFG was vented (with a minor share flared in combustion drains) and not used for electricity or heat generation. IRL 4c explains this situation prior to the implementation (baseline scenario) of the project activity and shows the original landfill design and photos of the landfill prior to the implementation of the project activity. It was further confirmed by a declaration issued and signed by Essencis Soluções Ambientais S.A. (IRL 9i) that no systematic and continuous monitoring of the landfill gas took place prior to the implementation of the project activity. Furthermore, presented documents like the aforementioned IRL 4c as well as samples of invoices for flares and blowers (IRL 4a) and design of the landfill after project implementation including the LFG unit (IRL 4d) obviously evidence that there was an investment into an existing LFG capture system to increase the recovery rate and to systematically flare the captured LFG.

Validation opinion: The documentation content is correctly quoted and interpreted in the PDD. The applicability criterion is met by the project activity.
Applicability criterion No. 2 from ACM0001 (version 13.0.0) Flare the LFG and/or use the captured LFG in any (combination) of the following ways: (i) Generating electricity; (ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace;1 and/or (iii) Supplying the LFG to consumers through a natural gas distribution network.
Information from PDD: The project design encompasses collection and destruction by flaring of all LFG which is collected as part of the operation of the project activity. The project design does not encompass any utilization of collected LFG. By flaring all collected LFG as part of its operations, the project activity meets condition (c) of the applied methodology.
Assessment: The assessment team compared the actual text of the applicable version of the methodology with the information stated in the PDD. The DOE by assessing the technical project description issued by the 3rd party Arquipelago Engenharia Ambiental (IRL 4c), environmental licenses (IRL 8a), manufacturer's flare specifications (IRL 4b) and the visual inspection of the project's equipment during the DOE's on-site visit (IRL 4e) confirms that the LFG is only flared and there is no other use of the LFG like for electricity or heat generation or supply of LFG to consumers through a natural gas distribution network.
Validation opinion: The documentation content is correctly quoted and interpreted in the PDD. The applicability criterion is met by the project activity.
Applicability criterion No. 3 from ACM0001 (version 13.0.0) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.
Information from PDD: By taking into consideration the nature of the project activity and aspects related to recycling of organic fraction of MSW in the region of landfill and in the rest of Brazil, the implementation and operation of the project activity per se are not expected to promote any quantitative change in waste disposal activities undertaken at the CTR Caieiras landfill. Furthermore, no quantitative or qualitative changes in terms of waste management practices are expected to occur in any other existent or potential waste disposal or waste treatment facility (located or to be located in the region of the project site) as a direct outcome or consequence of the operation of the project activity during the 2nd 7-year crediting period. Thus, the mere previously occurred implementation of the project and its continuous operation during the 2nd 7-year crediting period are not expected to promote or trigger any reduction (or prevention) of the amount of organic type of MSW (or any other type of solid waste) that would eventually be recycled or utilized in the region (e.g. no prevention by the project activity of the implementation or and non-promotion of any reduction of activity in an existent or hypothetical waste composting facility that would promote utilization/recycling of waste in the region (for example)). As demonstrated in construction, design and operational requirements valid for the CTR Caieiras

landfill (as defined by Essencis Soluções Ambientais S.A. and confirmed in the environmental permits for the construction and operation of this landfill), the CTR Caieiras is not expected to include any activity or initiative promoting recycling or utilization of organic fraction of waste to be disposed in this landfill (such as implementation of a large scale waste sorting or waste composting facility for example).

Without any organic waste recycling activity being under operation within the limits of the CTR Caieiras landfill, it is thus clearly not expected that the implementation of the project activity could eventually reduce organic waste recycling activities in the CTR Caieiras landfill.

The design, construction and operational aspects for the CTR Caieiras landfill were defined in accordance with the commercial agreements that the project participant Essencis Soluções Ambientais S.A. currently holds and is expected to hold in the position of operator and owner of the CTR Caieiras landfill and regional waste management company (service provider) providing MSW disposal services for municipalities located within the Metropolitan Region of São Paulo.

Furthermore, it is also crucial to take into account that currently there is not even any existent or planned large scale MSW sorting, recycling or utilization facility for organic fraction of MSW (e.g. a large scale waste composting plant) with comparable size/capacity and located in the region of influence of the CTR Caieiras landfill. As a matter of fact, recycling and utilization of organic fraction of MSW is not a common practice in the whole country of Brazil.

In this sense, the implementation and operation of the project activity thus does not represent any perverse incentive or driver for the promotion of any supposed quantitative or qualitative reduction or prevention of waste recycling related activities or initiatives for any type of organic fraction of solid waste or solid residues that would occur in the absence of the project activity at the CTR Caieiras landfill or in the region of influence of this landfill.

The same is actually also applicable for recycling of inert waste material.

Furthermore, regardless of the non-existence of any MSW recycling or utilization facility with comparable capacity that could eventually somehow compete with the CTR Caieiras landfill for organic fraction of MSW waste, aspects and actions related to promotion of recycling or utilization of organic fraction of solid waste are to be seen as fully dependent on public service policies in the case of Brazil (including policies, laws, regulations and programmes) and are to be defined/triggered by competent governmental authorities (under a regional and national level) and/or to be eventually implemented/operated by practitioners of waste recycling.

In Brazil, the administrations of municipalities are the entities responsible for all MSW management services. Waste management companies such Essencis Soluções Ambiental S.A. normally acts as service providers, providing MSW collection and disposal services as per directives and contractual requirements set by the municipalities from where generated MSW are to be managed.

In this sense, in the position of a MSW management company operating a LFG collection and destruction initiative in the landfill it operates, Essencis Soluções Ambientais S.A. is not under a position to trigger, establish or promote any promotion of reduction or prevention of organic waste recycling in the region where it operates.

Finally, the implementation and operation of the project activity has never represented any incentive or driver for involved municipalities, any other public entity or any other relevant recycling practitioner for the promotion of changes in the policies and practices related to recycling of inert or organic solid waste in the region (or even outside the region) of influence of the CTR Caieiras landfill. No change in this sense is expected to occur during the 2nd 7-year crediting period either. As outlined in Section B.6.1 [of the PDD], so far, there is still no legal restriction or requirement for LFG gas collection and its destruction or utilization using high temperature enclosed flares or any other device/equipment in Brazil. Moreover, there is still no legal restriction neither requirement for venting and/or combustion of LFG in conventional passive LFG destruction systems either (where combustion of small and not defined share of generated LFG through use of conventional LFG vent-

ing/combustion drains is identified as the baseline scenario for the project activity). Actually, there is no applicable regulation that deals with LFG management in Brazil at all. Thus, the implementation of more appropriate and environmentally safe management of LFG at the CTR Caieiras landfill (as a direct outcome of the implementation and operation of the project activity) *per se* does not represent any driver or incentive to dispose incremental amount of MSW in the CTR Caieiras landfill (when compared to the situation that would occur in the absence of the project).

In this sense, under no circumstance the project activity *per se* potentially promote any displacement of volumes of organic waste stream from eventual treatments/utilization in an existent or hypothetical MSW recycling/utilization facilities (e.g. a MSW composting plant for example) to be disposed at the CTR Caieiras landfill because of the implementation and continuous operation of the project activity.

Therefore condition (d) of the applied methodology is satisfied.

Assessment:

The assessment team compared the actual text of the applicable version of the methodology with the information stated in the PDD.

The DOE by assessing the documents Brazilian Greenhouse Gases (GHG) Emissions Inventory (IRL 7e), Municipal Solid Waste Management Diagnostic (IRL 7d), National Basic Sanitation Research (IRL 7b and 7c) confirms that only an insignificantly[1] small part of organic waste is recycled in Brazil. The document Annual Solid Waste Inventory in São Paulo State (IRL 7a) further evidences that inside Essencis Caieiras landfill influence area, 100% of the municipal solid waste are disposed in landfill/open dumps and no organic waste recycling occurs. A self-declaration issued and signed by Essencis Soluções Ambientais S.A. (IRL 9i) and submitted to the DOE further confirms that recycling of organic waste has never been and will never be carried out in Essencis Caieiras landfill site. Hence, it can be concluded that the project activity does not result in a reduction of the amount of organic waste that would be recycled in the absence of the project activity.

Validation opinion:

The documentation content is correctly quoted and interpreted in the PDD.

The applicability criterion is met by the project activity.

Applicability criterion No. 4 from ACM0001 (version 13.0.0)

The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is:
(a) Release of LFG from the SWDS; and
(b) 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) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or
(ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary.

Information from PDD:

The most plausible baseline scenario remains being the release of LFG from the SWDS into the atmosphere (with minor share of generated LFG being partially destroyed in conventional LFG passive

[1] The Municipal Solid Waste Management Diagnostic (IRL 7d) mentions the total solid waste headed for composting and incineration as 0.11% and 0.03% respectively. The National Basic Sanitation Research 2008 (IRL 7c) indicates that about 2% are destined for composting, incineration or other methods and about 98% of the waste is disposed in landfills/open dumps. The same is confirmed by the Brazilian Greenhouse Gases (GHG) Emissions Inventory (IRL 7e).

venting/combustion drains). No use of LFG collected by project activity is currently expected to be promoted for electricity generation, heat in boilers, etc. Therefore, the application of the procedure to identify the baseline scenario falls into (a).
Assessment: The assessment team compared the actual text of the applicable version of the methodology with the information stated in the PDD. Section B.4. of the PDD demonstrates that the most plausible baseline scenario is the release of LFG from the SWDS. The DOE by assessing the technical project description issued by the 3rd party Arquipelago Engenharia Ambiental (IRL 4c) confirms that prior to the implementation of the project activity the captured LFG was vented (with a minor share flared[2] in combustion drains) and not used for electricity or heat generation. IRL 4c explains this situation prior to the implementation (baseline scenario) of the project activity and shows the original landfill design and photos of the landfill prior to the implementation of the project activity. It was further confirmed by a declaration issued and signed by Essencis Soluções Ambientais S.A. (IRL 9i) that no systematic and continuous monitoring of the landfill gas took place prior to the implementation of the project activity.
Validation opinion: The documentation content is correctly quoted and interpreted in the PDD. The applicability criterion is met by the project activity.
Applicability criterion No. 5 from ACM0001 (version 13.0.0) The methodology is not applicable 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;
Information from PDD: The only GHG emission reductions claimed are due to destruction of methane through combustion in high temperature enclosed flares and there is no combination with other approved methodologies.
Assessment: The assessment team compared the actual text of the applicable version of the methodology with the information stated in the PDD. It is confirmed by the sectoral knowledge of the assessment team, that the applied methodology ACM0001 is not used in combination with other approved methodologies. The same is confirmed through the information given in the PDD.
Validation opinion: The applicability criterion is met by the project activity.
Applicability criterion No. 6 from ACM0001 (version 13.0.0) The methodology is not applicable if the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.
Information from PDD: After the implementation of the project activity in year 2007, the landfill operator has continued with MSW disposal activities at the CTR Caieiras landfill as per its normal and previously

[2] No systematic and continuous flaring took place in the baseline scenario.

planned/defined operation conditions and practices (as per the practice prior to the implementation of the project activity). MSW disposal practices and management at the CTR Caieiras landfill is not expected to change during the 2nd 7-year crediting period.

Assessment:

The assessment team compared the actual text of the applicable version of the methodology with the information stated in the PDD.

The DOE by assessing the technical project description, issued by the 3rd party Arquipelago Engenharia Ambiental (IRL 4c) and current design of the landfill (IRL 4d) confirms that the management of the SWDS in the project activity has not been or will not be deliberately changed during the crediting period in order to increase methane generation (like e.g. through addition of liquids, pre-treating waste, changing the shape of the landfill) compared to the situation prior to the implementation of the project activity. The same has been confirmed through a self-declaration issued and signed by Essencis Soluções Ambientais S.A. (IRL 9i).

Validation opinion:

The documentation content is correctly quoted and interpreted in the PDD.

The applicability criterion is met by the project activity.

Applicability criterion No. 7 from tool "Emissions from solid waste disposal sites" (Version 06.0.1)

The tool can be used to determine emissions for the following types of applications:
• Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. ACM0001). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an *ex-ante* estimation of emissions in the CDM-PDD. The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS).
• Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. An example of this application of the tool is AM0025, in which MSW is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both *ex-ante* and *ex-post* estimation of emissions.
In the case that (a) different types of residual waste are disposed or prevented from disposal or that (b) both MSW and residual waste(s) are prevented from disposal, then the tool should be applied separately to each residual waste and to the MSW.

Information from PDD:

The project mitigates methane emissions from a landfill. The applicability of the methodological tool is thus met. Application A in the methodological tool is selected and applied.

Assessment:

The assessment team compared the actual text of the applicable version of the tool with the information stated in the PDD.

The DOE by assessing the technical project description, issued by the 3rd party Arquipelago Engenharia Ambiental (IRL 4c), manufacturer's specifications of the flares (IRL 4b) and visual inspection during the DOE's on-site visit confirms that methane emissions are mitigated by capturing and flaring at Essencis Caieiras SWDS. Hence, Application A of the tool "Emissions from solid waste disposal sites" is the relevant one for the project activity.

Validation opinion:

The documentation content is correctly quoted and interpreted in the PDD.

The applicability criterion is met by the project activity.

Applicability criterion No. 8 from tool "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"(version 01)

The tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption:

Scenario A: **Electricity consumption from the grid.** The electricity is purchased from the grid only. Either no captive power plant is installed at the site of electricity consumption or, if any on-site captive power plant exits, it is not operating or it can physically not provide electricity to the source of electricity consumption.

Scenario B: **Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s).** One or more fossil fuel fired captive power plants are installed at the site of the electricity consumption source and supply the source with electricity. The captive power plant(s) is/are not connected to the electricity grid.

Scenario C:**Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s).** One or more fossil fuel fired captive power plants operate at the site of the electricity consumption source. The captive power plant(s) can provide electricity to the electricity consumption source. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumption source can be provided with electricity from the captive power plant(s) and the grid.

This tool is **not** applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO_2 emissions.

Information from PDD:

The project activity has all electricity demand being entirely met by imports of grid electricity. Scenario A of the tool is thus applicable. The use of any backup off-grid captive electricity generator (fuelled by fossil fuel (i.e. diesel) or any other fuel type) for meeting the project's electricity demand during normal or abnormal/emergency situations is not expected. Thus, scenarios B and C of the tool are not applicable.

Assessment:

The assessment team compared the actual text of the applicable version of the tool with the information stated in the PDD.

The DOE by assessing a sample of grid electricity consumption invoices (IRL 9e) and instruments list (mentioning the electricity meter measuring the grid electricity import) (IRL 10) confirms that electricity is purchased and consumed from the grid. Besides, the DOE during the on-site visit could not find and identify any electricity generator at the project site.

Validation opinion:

The documentation content is correctly quoted and interpreted in the PDD.

The applicability criterion is met by the project activity.

Applicability criterion No. 9 from tool "Project emissions from flaring"

The tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity.
Information from PDD: The use of high temperature enclosed flares is documented in the PDD. Operational specifications/requirements of the installed flares as provided by flare manufacturers are available.
Assessment: The assessment team compared the actual text of the applicable version of the tool with the information stated in the PDD. The DOE by assessing the manufacturer's flare specifications (IRL 4b) and the visual inspection of the project's equipment (amongst others flares) during the DOE's on-site visit (IRL 4e) confirms that the project activity uses enclosed flares and the same is documented in the CDM-PDD.
Validation opinion: The documentation content is correctly quoted and interpreted in the PDD. The applicability criterion is met by the project activity.
Applicability criterion No. 10 from tool "Project emissions from flaring" This tool is applicable to the flaring of flammable greenhouse gases where: • Methane is the component with the highest concentration in the flammable residual gas; and • The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas). The tool is not applicable to the use of auxiliary fuels and therefore the residual gas must have sufficient flammable gas present to sustain combustion. For the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare.
Information from PDD: As part of the project activity, all LFG (whose component with the highest concentration is methane) is combusted in high temperature enclosed flares. LFG is a flammable gas generated from the anaerobic decomposition of organic waste material disposed in the CTR Caieiras landfill. LFG is thus a gas from a biogenic source. Methane is the component with the highest concentration in LFG. No auxiliary fuel is required to make the flammability of LFG sufficiently enough to be combusted in the project flares[3].

[3] In accordance with the design of the four currently installed high temperature enclosed flares, Liquefied Petroleum Gas (LPG) has been used during short time periods for igniting the flares. For starting the flares, LPG is directed to the fuel injectors of the flare and once the flame is sufficiently stable, LFG is directed to the flares and supply of LPG to the injectors is thus interrupted. The use of LPG by the project activity is also outlined in the latest version of the registered PDD valid for the 1st 7-year crediting period (PDD version 4, dated 10/01/2013). By taking into account the type/purpose of use of LPG by the project activity, it is deemed correct to assume that LPG does not represent any auxiliary fuel (which would be required to make the flammability of LFG sufficiently enough to be combusted in the project flares). It is important to note that during the short time LPG is being combusted during the flare ignition process, no measurements of LFG directed to flares are performed with the flare meeting the operational requirements (as set by equipment manufacturer (e.g. min. flow, min. temperature of exhaust gas of the flare, etc.)). Thus,

Operational specifications/requirements of the installed flares as provided by flare manufacturers are available.
Assessment: The assessment team compared the actual text of the applicable version of the tool with the information stated in the PDD. The DOE by assessing a LFG analysis report, issued by White Martins (IRL 9d) confirms that methane is the component with the highest concentration in the flammable residual LFG at Essencis Caieiras landfill site and that the source of the residual gas is landfill gas. Furthermore, the manufacturer's flare specifications have been evidenced through IRL 4b.
Validation opinion: The documentation content is correctly quoted and interpreted in the PDD. The applicability criterion is met by the project activity.
Applicability criterion No. 11 from tool "Combined tool to identify the baseline scenario and demonstrate additionality" This tool is only applicable to methodologies for which the potential alternative scenarios to the proposed project activity available to project participants cannot be implemented in parallel to the proposed project activity. For example, in the following situations a methodology could refer to this tool: -For an energy efficiency CDM project where the identified potential alternative scenarios are: (a) retrofit of an existing equipment, or (b) replacement of the existing equipment by new equipment, or (c) the continued use of the existing equipment without any retrofits; -For a CDM project activity related to the destruction of a greenhouse gas in one site where the identified potential alternative scenarios are: (a) installation of a thermal destruction unit, or (b) installation of a catalytic destruction system, or (c) no abatement of the greenhouse gas. In these cases, the project proponents could not implement the three alternatives in parallel but they could only implement one of them. However, the tool is, for example, not applicable in the following situation: the CDM project activity is the installation of a Greenfield facility that provides a product to a market (i.e. electricity, cement, etc.) where the output could be provided by other existing facilities or new facilities that could be implemented in parallel with the CDM project activity.
Information from PDD: The 'Combined tool to identify the baseline scenario and demonstrate additionality' is applied for the demonstration of the continuation of the baseline scenario. The project activity encompasses the destruction of a greenhouse gas in one site where one of the identified potential alternative scenarios is no abatement of the greenhouse gas.
Assessment: The assessment team compared the actual text of the applicable version of the tool with the information stated in the PDD. The DOE by validating the PDD confirms that this methodological tool is applied as per the methodology for the demonstration of the continuation of the baseline scenario. The DOE through its sectoral expertise further confirms that the project activity encompasses the destruction of a green-

whenever the minor quantity of LPG is being combusted in the flare, no emission reductions due to methane combustion are claimed. It is important to note that as outlined in Section B.6.1 of the PDD, all consumption of LPG by the project activity to ignite the flares are to be accounted as project emissions.

house gas in one site where one of the identified potential alternative scenarios is no abatement of the greenhouse gas.

Validation opinion:

The applicability criterion is met by the project activity.

Applicability criterion No. 12 "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"

This tool provides procedures to determine the mass flow of greenhouse gas *i* (CO2, CH4, N2O, SF6 or a PFC) in the gaseous stream in time interval *t.* The mass flow of a particular greenhouse gas is calculated based on measurements of: (a) the total volume flow or mass flow of the gas stream, (b) the volumetric fraction of the gas in the gas stream and (c) the gas composition and water content.
Typical applications of this tool are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions. Methodologies where CO2 is the particular and only gas of interest should continue to adopt material balances as the means of flow determination and may not adopt this tool as material balances are the cost effective way of monitoring flow of CO2.

Information from PDD:

The tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" is applied for determining the mass flow of CH_4.

Assessment:

The assessment team compared the actual text of the applicable version of the tool with the information stated in the PDD.

The DOE due to its sectoral expertise confirms that the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" is applicable to the methodology (ACM0001) applied to the project activity, since in ACM0001 the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions.

Validation opinion:

The applicability criterion is met by the project activity.

Applicability criterion No. 13 "Tool to calculate the emission factor for an electricity system"

This tool is also referred to in the "Tool to calculate project emissions from electricity consumption" for the purpose of calculating project and leakage emissions in case where a project activity consumes electricity from the grid or results in increase of consumption of electricity from the grid outside the project boundary.

Information from PDD:

Project emissions due to the consumption of grid electricity by the project activity are determined by applying applicable guidance of "Tool to calculate project emissions from electricity consumption" (to which ACM0001 version 13 refers). The "Tool to calculate the emission factor for an electric system" is referred to in the "Tool to calculate project emissions from electricity consumption" for the purpose of calculating project emissions in case where a project activity consumes electricity from the grid.

The CO_2 emission factor for the electricity grid which sources electricity to the project activity is determined as the combined margin CO_2 emission factor.

Assessment:

The assessment team compared the text of the applicable version of the tool with the information stated in the PDD.

The DOE by assessing several samples of grid electricity consumption invoices (IRL 9e) and instruments list (including the grid electricity meter) (IRL 10) confirms that the 'Tool to calculate the emission factor for an electricity system' is applicable to the project activity for the purpose of calculating project emissions. The 2012 $EF_{grid,BM,y}$ and $EF_{grid,OM,y}$ data were validated by the DOE through the data published by the Brazilian DNA (Ministry of Science and Technology) at http://www.mct.gov.br/index.php/content/view/338047.html#ancora (IRL 9k).
Validation opinion: The documentation content is correctly quoted and interpreted in the PDD. The applicability criterion is met by the project activity.
Applicability criterion No. 14 "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" This tool provides procedure to determine and calculate project and/or leakage CO_2 emissions from the combustion of fossil fuels. It is used in cases where CO_2 emissions from fossil fuel combustion (for use other than for electricity generation) are calculated based on the quantity of fuel combusted and its properties.
Information from PDD: This tool is applied for the determination of project emissions due to the consumption of fossil fuel by the project activity (with fossil fuel being used for purposes other than for electricity generation). In the particular case of the project activity Liquefied Petroleum Gas (LPG) has been used to ignite the flares.
Assessment: The assessment team compared the text of the applicable version of the tool with the information stated in the PDD. The DOE by assessing a letter issued by the LPG supplier referring to the supply history of LPG to Caieiras landfill site (IRL 9l) confirms that the 'Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion' is applicable to the project activity for the purpose of calculating project emissions due to the consumption of LPG used at Caieiras landfill site to ignite the flares.
Validation opinion: The documentation content is correctly quoted and interpreted in the PDD. The applicability criterion is met by the project activity.

TÜV SÜD confirms that the chosen baseline and monitoring methodology is applicable to the project activity.

3.3.2 Validity of Baseline

The baseline scenario identified at the validation of the project activity was the business-as-usual management practice at CTR Caieiras landfill, i.e. the LFG produced at the site is collected passively and being freely emitted into the atmosphere with a minor share of generated LFG being destroyed in conventional passive LFG venting/combustion drains in order to address safety and odor requirements. There is no systematic flaring of the landfill gas or any other use of the LFG. According to the methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of crediting period" (Version 03.0.1) the following procedure was applied to assess the validity of the baseline:

Step 1: Assess the validity of the current baseline for the next crediting period
Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

There is no regional or national legal requirement to capture and destroy LFG in Brazilian landfills. This was the situation prior to the implementation of the project activity and this situation prevails currently. However, in the particular case of CTR Caieiras landfill, as per the design and licensing requirements applicable for this landfill, since the time of its construction and start of operations it has been required that a non-defined and small share of LFG shall be destroyed by combustion in order to address odor and safety concerns. Combustion of minor portion of generated LFG in conventional passive LFG venting/combustion drains was indeed the practice (during the period from year 2002 to January 2007[4]) prior to the implementation of the project activity.

The following relevant mandatory national law/policy and decree came into effect after the submission of the project activity for validation:

- National Solid Waste Policy (from the Portuguese "Politica Nacional de Residuos Solidos"), established by Federal Law N° 12,305, published on 02/08/2010[5] and decree N° 7,404/10, published on 23/12/2010[6].

TÜV SÜD by assessing the aforementioned policy/law/decree confirms that the current baseline complies with those mandatory national, regional and/or sectoral requirements and that there is no law/requirement to capture and destroy LFG in Brazilian landfills. This is further confirmed by the local and sectoral expertise of the assessment team.

Step 1.2: Assess the impact of circumstances

Since the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment - the LFG produced at the site is collected passively and being freely emitted into the atmosphere (with minor share of generated LFG being destroyed in conventional passive LFG venting/combustion drains in order to address safety and odor requirements) and there is no systematic flaring of the gas or any other use of the LFG - an assessment of the changes in the market characteristics shall be applied. Based on the sectoral expertise of the assessment team, TÜV SÜD confirms that in such kind of projects no potential marketable (by) product exists and thus no financial benefit other than CERs can be generated. It is confirmed that the conditions used to determine the baseline emissions in the previous crediting period are still valid. The assessment of 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 is not applicable for the given project activity.

---

[4] The project activity started to operate in February 2007 as outlined in the monitoring report of the 1st monitoring period (IRL 1e).

[5] The law N° 12,305 is applicable, according to §1 of Article 1 to companies or individuals, from public or private domain, responsible for waste generation and waste management. The law establishes legal grounds for waste management, including final destination, i.e. landfills. By establishing directives for management of solid waste, the law aims to be a legal framework for promoting overall improvement of waste management practices in Brazil. The "*Política Nacional de Resíduos Sólidos*" does not even refer to LFG, LFG flaring nor other types of LFG destruction or utilization technologies. Therefore it is demonstrated that LFG destruction or utilization is not mandatory in Brazil.

[6] The decree 7,404/10 regulates the National Solid Waste Policy established by Federal Law No. 12,305 however does not establish any requirement, obligation or recommendation related to LFG management at landfills in Brazil.

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

Since the identified baseline scenario is the continuation of the current practice without any investment, i.e. the LFG produced at the site is collected passively and being freely emitted into the atmosphere (with minor share of generated LFG being destroyed in conventional passive LFG venting/combustion drains in order to address safety and odor requirements) and there is no systematic flaring of the gas or energy generation or any other use of the LFG, thus this step is not applicable to the project activity.

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

Some conditions, data and parameters which were determined at the start of the 1st crediting period and were thus not monitored during the 1st 7-year renewable crediting period (as per applicable requirements of ACM0001 (version 2)) will not any longer be valid/applicable during the 2nd 7-year crediting period. Since the latest applied version of ACM0001 (version 13.0.0) and related methodological tools refer to other ex-ante determined parameters, other default values and even other assumptions and approaches, consequently data and parameters that are determined at the start of the 2nd crediting period are different to those in the 1st crediting period.

Data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period have been assessed in the revised PDD. IPCC default values, collection efficiency value and the Global warming potential value applied were added[7] and updated respectively for the second crediting period as follows:

- GWP_{CH4} = 25 tCO_2e/tCH_4, the former Global warming potential of CH_4, valid until 31/12/2012, was 21 tCO_2e/tCH_4, validated by the DOE through http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14 [accessed on 01/06/2013].
-Parameters were added/updated due to the necessary use of the tool "Emissions from solid waste disposal sites" like OX_{top_layer} (0.1), Default value for the model correction factor to account for model uncertainties (0.75), OX based on IPCC 2006 (0.1), F based on IPCC 2006 (0.5), $DOC_{f,default}$ based on IPCC 2006 (0.5), $MCF_{default}$ based on IPCC 2006 (1.0), DOCj based on IPCC 2006 (wood and wood products 43, pulp, paper and cardboard (other than sludge) 40, food, food waste, beverages and tobacco (other than sludge) 15, textiles 24, garden, yard and park waste 20, glass plastic, metal, other inert waste 0), kj[8] based on IPCC 2006 (pulp, paper and cardboard (other than sludge), textiles 0.06, wood, wood products and straw 0.03, other (non-food) organic putrescible garden and park waste 0.10, food, food waste, sewage sludge, beverages and tobacco 0.185), weight fraction of the different waste types (IPCC 2006 default values); The correctness of the aforementioned IPCC

[7] The replacement of version 2 by version 13.0.0 of the applied methodology ACM0001 resulted in addition of several parameters.

[8] The following decay rate values are based on wet (MAP>1,000 mm) boreal/temperate (MAT<=20°C) climate. Assuming wet boreal/temperate climate is deemed to be appropriate as it was verified by the DOE through http://www.tempoagora.com.br/previsaodotempo.html/brasil/Caieiras-SP/ [accessed on 27/04/2013]. Even though other data sources validated by the DOE like http://www.ciiagro.sp.gov.br/ciiagroonline [accessed on 15/07/2013] and http://www.cpa.unicamp.br/outras-informacoes/clima-dos-municipios-paulistas.html [accessed on 15/07/2013] indicate average temperature values of >=20°C in the State of Sao Paulo where the project activity is located, the DOE accepts the PP decision to use the k values for temperatures of <=20°C, since the applied k values results in a more conservative ex-ante ER calculation.

values indicated in the PDD has been validated through the tool "Emissions from solid waste disposal sites" and 2006 IPCC guidelines.
-LFG collection efficiency of 92.80% has been validated by the DOE through the publication "Measuring landfill gas collection efficiency using surface methane concentrations" (IRL 6d)
-Additional parameters were added due to the necessary use of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" like MM_i (for methane 16.04 kg/kmol), MM_k (for nitrogen 28.01 kg/kmol), MM_{H20} (molecular mass of water, 18.0152 kg/kmol); T_n (273.15 K), P_n (101,325 Pa), R_u (universal ideal gases constant 8.314 Pa.m^3/kmol.K); The correctness of the aforementioned values indicated in the PDD has been validated through the tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream".
-The $EF_{grid,OM,y}$ and $EF_{grid,CM,y}$ grid emissions factor are no longer determined ex-ante, but updated annually by the DNA of Brazil. Thus, both parameters are monitored and have been included in section B.7.1. of the PDD. However, $EF_{grid,BM,y}$ is determined ex-ante which is in accordance with paragraph 68 of the "Tool to calculate the emission factor for an electricity system" which mentions that 'for the 2nd crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE." The 2012 $EF_{grid,BM,y}$ and $EF_{grid,OM,y}$ data were validated through the data published by the Brazilian DNA (Ministry of Science and Technology) at http://www.mct.gov.br/index.php/content/view/338047.html#ancora (IRL 9k).
-Additional parameter was added due to the necessary use of the Tool "Project emissions from flaring", namely $SPEC_{flare}$. The manufacturer's flare specifications (temperature, LFG flow and maintenance schedule) were validated through IRL 4b.
-The default value of 20% applied for the average technical transmission and distribution losses for grid sourced electricity consumed by the project activity has been validated through the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

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

Step 2.1: Update the current baseline

As shown under the sub-steps in step 1, the baseline scenario does not need to be updated. Therefore, only current baseline emissions are updated without reassessing the baseline scenario. Since the approach applied by ACM0001 (version 13.0.0) for the determination of the baseline scenario is different to the one required by ACM0001, version 2, the PPs decided to include in step 2.2. of the PDD the determination of the baseline scenario as per ACM0001 (version 13.0.0). The DOE assessed the determination of the baseline scenario indicated in the PDD and concludes that the baseline scenario has been appropriately determined.
As mentioned in the above step 1.4, parameters that were only determined at the start of the crediting period and not monitored during the crediting period were updated and added, refer to step 1.4 above.

Step 2.2: Update the data and parameters

The relevant parameters have been updated as described in detail in step 1.4 above.

As the project activity applies for Renewal of Crediting Period, therefore assessment of Additionality is not required as per the procedures stated under VVS, project standard and project cycle procedure. The whole assessment and demonstration of additionality for the given registered CDM project activity is included in the latest version of the PDD and validation report valid for the 1st 7-year renewable crediting period.

3.3.3 Algorithm and/or formulae used to determine emission reductions

TÜV SÜD has assessed the calculations of project emissions, baseline emissions, leakage, and emission reductions. Corresponding calculations have been carried out based on calculation spreadsheets (IRL 6b). The parameters and equations presented in the PDD, as well as other applicable documents, have been compared with the information and requirements presented in the methodology and respective tools. An equation comparison has been made to ensure consistency between all the formulae presented in the calculation files and in the PDD, methodology, and tools.

The estimate of the baseline emissions are considered correct as the calculations have been reproduced by the audit team with the attainment of the same results.

The assumptions and data used to determine the emission reductions are listed in the PDD and all the sources have been reviewed. Amongst others the following sources of information were used for crosscheck the information contained in the PDD:

-Publication "Measuring landfill gas collection efficiency using surface methane concentrations" (IRL 6d) supporting the LFG collection efficiency of 92.80%;

- Excel spreadsheet showing the waste volume received in the past and expected to be received until 2030 (IRL 6c);

-Print-screens of monthly consolidated reports of weighing tickets as supporting documentation for the calculation of waste volume received in the past (2002 to 2012) (IRL 6e)

-2012 $EF_{grid,BM,y}$ and $EF_{grid,OM,y}$ data published by the Brazilian DNA (Ministry of Science and Technology) at http://www.mct.gov.br/index.php/content/view/338047.html#ancora (IRL 9k)

-Brazilian Energetic Balance Report (dated 2011) (IRL 7f) supporting the NCV of LPG;

-Monitoring reports (1st crediting period) supporting LPG consumption (IRL 1e);

-Technical specifications of blowers (IRL 4a) for calculating estimated electricity consumption.

Annual average estimated emission reductions in the 2nd crediting period are higher than in the 1st crediting period. This is due to the fact that from 2007 the amount of waste disposed at CTR Caieiras landfill increased significantly which was not expected before. The 2 main reasons for the increase of disposed waste at CTR Caieiras landfill was on the one hand the closure of the landfill Bandeirantes in March 2007 (IRL 9f) and an accident which happened in São João landfill in August 2007 (IRL 9h). The aforementioned two landfills have been receiving waste from the City of Sao Paulo and surrounding cities. Consequently the administrative authorities of the municipality of Sao Paulo decided to send most of the waste previously sent to Bandeirantes and São João landfill to CTR Caieiras landfill. The occurred heavily increment in the amount of municipal solid waste actually disposed in the CTR Caieiras landfill obviously resulted and results in a significant increase in the amount of LFG being generated and collected at this landfill and baseline emissions and emission reductions achieved by the project activity also increase accordingly.[9] The waste volume received in the past (2002 to 2012) has been validated by the DOE through print-screens of monthly

[9] The occurred significant increase in daily MSW disposal at the CTR Caieiras landfill was successfully addressed in a revised version of the PDD valid for the 1st crediting period and it was validated by a Designated Operational Entity (DOE) in the context of a submission of request of approval of post registration changes (as part of the 5th periodic verification for the project activity - monitoring period from 01/10/2010 to 31/08/2011). Information related to such submission (incl. related documents) is available online: PRC 0171-1: https://cdm.unfccc.int/PRCContainer/DB/prcp844165620/view. The revised version of the PDD which addresses such corrections (which does not affect the project design) (PDD version 4, dated 10/01/2013) was effectively approved by the CDM-EB on 27/05/2013.

consolidated reports of weighing tickets (IRL 6e). An excel spreadsheet (IRL 6c) shows the waste volume received in the past in a consolidated way and illustrates the waste volumes which are expected to be received until 2030.

In conclusion, TÜV SÜD confirms the following statements

(a) All assumptions and data used by the project participants are listed in the PDD, including their references and sources;

(b) All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD;

(c) All values used in the PDD are considered reasonable in the context of the proposed project activity;

(d) The baseline methodology and corresponding tool(s) have been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;

(e) All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD;

(f) Any estimates for monitored data or parameter are reasonable for estimating the emission reductions in the PDD

(g) Different options for equations and parameters are selected appropriately.

(h) The data and parameters fixed ex-ante are conservative and appropriate.

3.4 Validity of Monitoring plan

The project applies the approved monitoring methodology within ACM0001. The original monitoring plan was updated based on requirements of version 13.0.0 of the applied methodology.

The monitoring plan presented in the PDD complies with the requirements of the applicable methodology. The assessment team has verified all parameters in the monitoring plan against the requirements of the methodology and no deviations have been found.

The procedures have been reviewed by the assessment team through document review and/or interviews with the relevant personnel. The information provided and a physical inspection has allowed the assessment team to confirm that the proposed monitoring plan is feasible within the project design. The relevant points of monitoring plan have been discussed with the PP. Specifically; these points include the location of meters, data management, and the quality assurance and quality control procedures to be implemented in the context of the project. Therefore, TÜV SÜD confirms that the PP is able to implement the monitoring plan and the achieved emission reductions can be reported ex-post and verified.

Annex 1
List of Findings

South Asia

Compilation and Resolutions of CARs, CRs and FARs

Corrective Action Requests by the assessment team		
	Comments and Results	Conclusion and IRL
Issue	Some of the information presented in the PDD submitted for the renewal of the 2nd crediting period does not comply with relevant forms, tools and guidance. Furthermore, inconsistencies were found within the PDD and between the reviewed documents. Some issues were identified during the review of the documentation presented by the PP and are presented below. -Documentation which has been used for showing compliance with each applicability criterion is missing in B.2. (see PDD guidelines, section B.2.). -The PDD explains in several sections (like e.g. B.6.1.) that there was an existing LFG capture system, namely that of venting (prior to the implementation of the project activity), thus it shall be clarified why not option (b)(i) of the applicability criteria but (a) as stated in B.2. of the PDD is applicable. -Regarding applicability criterion (d) of the applied methodology information is missing in the PDD whether with the project activity any reduction of the amount of organic waste that would be recycled in the absence of the project activity occurs and the applicability criterion of the tool "Project emissions from flaring", namely that "the tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity" is missing in section B.2. of the PDD. -The wording of the applicability criteria is not in all cases fully consistent with the text provided in the applied methodology/tools. -Technical transmission and distribution losses for grid sourced electricity is not considered in equations (18) and (23) of the PDD (version 5). -k values indicated in section B.6.2. of the PDD are not in line with the tool 'emissions from solid waste disposal sites' and are not consistent with the excel file. -EF data is not the most recent one as published at MCT website (www.mct.gov.br). -Measurement methods/procedures of some parameters mentioned in section B.7.1. are not fully in line with the applied methodology/tools; besides, the 'purpose of data' is not correctly indicated for some of the parameters to be monitored.	CAR is closed. 1h,4a,4c,4d,6b,9k ☑

Corrective Action Requests by the assessment team		
	-The PDD does not sufficiently transparently explain why the option “LFG sold to the industry” is not an option for the baseline scenario. -Information of the amount of total emission reductions is missing in section A.1. of the PDD (see PDD guidelines, section A.1.).	
Requirement	Project standard, §16 Completeness, §17 Consistency, §19 Transparency, PDD guidelines (EB66, Annex 8, version 01.0)	
Corrective Action Request	**Corrective Action Request No.1** The PP is requested to make the necessary changes into the project documentation in order to comply with the aforementioned requirements.	
Response	As a response to the raised CAR, all identified outstanding issues were addressed and resolved. In order to address the raised issues, the PDD and the emission reduction calculation spread sheet were edited/corrected as following: • Information about the estimated amount of emission reductions to be achieved by the project activity during the 2nd 7-year crediting period was added in Section A.1. • Clarification about promotion of transfer of technology related to the previously occurred implementation of the project activity in year 2007 was added in Section A.3. • Demonstration and explanations on how the project activity meets the applicability requirements of ACM0001 (version 13.0.0) and selected applicable methodological tools were improved. The explanations how the project activity meets all applicability criteria for ACM0001 (version 13.0.0.) + applicable methodological tools was revised in Section B.2 of the PDD. The wording of the applicability criteria is now in all cases fully consistent with the text provided in the applied methodology/tools. • Technical transmission and distribution losses for grid sourced electricity are considered in the equations of sections B.6.1. and B.6.3. of the revised version of the PDD. • References to correct version number of the latest version of the methodological tool “Tool to calculate the emission factor for an electricity system” were added. • The whole demonstration of the validity of the earlier derived baseline scenario was improved in Section B.4. The whole determination of the baseline scenario by following	

Corrective Action Requests by the assessment team		
	applicable guidance and stepwise procedure of ACM0001 (version 13.0.0)) was improved. • Corrected "k values" are indicated in section B.6.2. • Measurement methods/procedures for parameters mentioned in section B.7.1. were corrected as per applicable requirements of ACM0001 (version 13.0.0) and related methodological tools. Furthermore, the fields 'purpose of data' for selected monitoring parameters were also correctly completed. • Clarification about the no need for monitoring the parameter f_y was added in Section B.6.1. • Clarification about the meaning of the abbreviation "CTR" in the name of the CTR Caierias landfill was added. • The clarification about the earlier expected potential utilization of LFG collected at the CTR Caieiras landfill was improved and complemented. • Clarification that besides of not encompassing utilization of collected LFG as gaseous fuel in power plant(s), boiler(s), air heater(s), kiln(s) and natural gas distribution network, clarifications that the project activity does not include any utilization of LFG as fuel for glass melting furnace(s) was added in different sections in the PDD. • The application of the stepwise approach of ACM0001 (version 13.0.0) for the determination of baseline emissions was improved. • Descriptions related to the determination of project emissions due to grid sourced electricity to be promoted by the project activity during the 2nd 7-year crediting period were improved. • Revised figures for ex-ante estimations of baseline emissions, project emissions and emission reductions to be achieved by the project activity during the 2nd 7-year crediting period were added. • The value of the CO_2 emission factor for grid electricity to be consumed by the project activity was revised in the context of ex-ante estimates of emission reduction by taking into account official 2012 vintage values of operational margin emission factor and build margin emission factor for the national electricity grid of Brazil as published by the DNA of Brazil.	

Corrective Action Requests by the assessment team		
Assessment Means of validation	-The revised PDD explains and justifies explicitly that with the project activity no reduction of recycling of organic waste (compared to the situation in the absence of the project activity) occurs. Besides, the previously missing explanation regarding the compliance with the applicability criterion of the tool "Project emissions from flaring", namely that "the tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity" has been added in section B.2. of the PDD. -The wording of the applicability criteria is now in all cases fully consistent with the text provided in the applied methodology/tools. -Technical transmission and distribution losses for grid sourced electricity is now considered in the respective equations of the PDD. -k values indicated in section B.6.2. of the PDD (assuming a temperature of 19°C) are now in line with the tool 'emissions from solid waste disposal sites' and are consistent with the excel file. The DOE by assessing the revised PDD and the tool 'emissions from solid waste disposal sites' confirms the same. -The DOE by assessing the website of the Brazilian DNA (MCT, www.mct.gov.br), confirms that the revised PDD indicates the most recent available emissions factor data. -The DOE by assessing the revised PDD and methodology/tools confirms that measurement methods/procedures/purpose of data of all parameters mentioned in section B.7.1. are in accordance with the applied methodology/tools. -The DOE by assessing the revised PDD confirms that it is sufficiently explained now why the option "LFG sold to the industry" is not an option for the baseline scenario. **2nd DOE Request:** -Documentation which has been used for showing compliance with each applicability criterion is still missing in B.2. (see PDD guidelines, section B.2.). -It has not been transparently justified/explained yet why not option (b)(i) of the methodology applicability criteria but instead (a) has been applied. There was an existing LFG capture system, namely that of venting (prior to the implementation of the project activity) and an investment has been made into this LFG capture system to increase the recovery rate.	

Corrective Action Requests by the assessment team		
	-Information of the amount of total emission reductions is still missing in section A.1. of the PDD (see PDD guidelines, section A.1.). **2nd PP response:** As a response to the comments, the following changes were performed in the PDD and emission reduction calculation spreadsheet: • Reference to documentation which has been used for showing compliance with each applicability criterion was added in Section B.2 of the PDD. • The demonstration on how the project activity meets applicability criteria of ACM0001 (version 13.0.0) was revised once again by taking into account that there was an existing LFG capture system available in the pre-project scenario and an investment in a more complete LFG capture system with increased recovery rate was made. • Revised information about the total emission reductions to be achieved by the project activity during the 2nd 7-year crediting period was added in Section A.1. of the PDD. **Conclusion (after 2nd DOE Request):** It has now been transparently justified and explained why option (b)(i) of the methodology applicability criteria has been applied. There was an existing (passive) LFG capture/combustion system (using conventional passive LFG venting/combustion drains) and an investment has been made to convert this existing LFG capture system into an active (forced) LFG capture system to increase the recovery rate. The DOE by assessing the technical project description issued by the 3rd party Arquipelago Engenharia Ambiental (IRL 4c) as well as samples of invoices for flares and blowers (IRL 4a) and design of the landfill after project implementation including the LFG unit (IRL 4d) confirms that there was an investment into an existing LFG capture system to increase the recovery rate and to systematically flare the captured LFG. **3rd DOE Request:** -Documentation which has been used for showing compliance with each applicability criterion is still missing in B.2. for most of the applicability criteria thus 2nd PP response is not in line with what was found by the DOE in the revised PDD.	

Corrective Action Requests by the assessment team		
	-Information of the amount of total emission reductions is still missing in section A.1. of the PDD (see PDD guidelines, section A.1.). **3rd PP response:** As a response to the 3rd DOE Request, the following changes were performed in the PDD and emission reduction calculation spreadsheet: • Reference to documentation which has been used for showing compliance with each applicability criterion was revised in Section B.2 of the PDD. • Information about the total emission reductions to be achieved by the project activity during the 2nd 7-year crediting period was revised once again in Section A.1. of the PDD. **4th DOE Request:** -Documentation which has been used for showing compliance with each applicability criterion is still missing in B.2. for most of the applicability criteria thus 3rd PP response is not in line with what was found by the DOE in the revised PDD. -Information of the amount of total emission reductions has been added in section A.1. of the PDD however is inconsistent with the ER calculation excel file. **4th PP response:** · The revised version of the PDD refers to documented evidence which was used for demonstrating compliance with the applicability criteria of ACM0001 (version 13.0.0). · Information about the estimated amount of total emission reductions to be achieved by the project activity is consistent in both the revised PDD and emission reduction calculation spreadsheet. **Conclusion (after 4th DOE Request):** -Documentation which has been used for showing compliance with each applicability criterion has been added in section B.2. of the PDD. The indicated documentation has been validated by the DOE and is indicated in the Information Reference List and further described in section 3.3.1 of the validation report. -The DOE by assessing the final revised PDD and final ER excel calculation spreadsheet con-	

Corrective Action Requests by the assessment team		
	firms that information about the amount of total emission reductions is indicated in the PDD (section A.1.) and consistent with the ER excel calculation spreadsheet.	
Adjustment on project design	PDD and ER excel calculation spreadsheet have been revised.	
	Comments and Results	Conclusion and IRL
Issue	While applying the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", the same requires the use of the "Tool to calculate the emission factor for an electricity system". The PP has properly followed the requirement but in the revised PDD the most recent version is not used. Besides, as per the PDD, the EF_{BM} will be determined ex-post, whereas the 'Tool to calculate the emission factor for an electricity system' mentions that for the 2nd crediting period the build margin emission factor shall be calculated ex-ante. Furthermore, the weighing factors for the calculation of the combined margin emission factor applied in the PDD/ER calculation excel sheet are not the ones foreseen for the 2nd crediting period as indicated in the 'Tool to calculate the emission factor for an electricity system';	CAR is closed. 1h ☑
Requirement	VVS, §297 "When contracted by project participants to validate an existing project activity for a second or further renewal of crediting period, the DOE shall determine whether the project participants have updated sections of the PDD relating to the baseline, estimated emission reductions and the monitoring plan using the most recent version of baseline and monitoring methodology applicable for the project activity." PS §227 a) Project participants shall use the latest approved version of the methodology applied in the original PDD, i.e. the version that is valid at the time of submission of the revised PDD for the renewal of the crediting period.	
Corrective Action Request	**Corrective Action Request No.2** PP has to comply with the requirement presented in the PS and VVS and apply the last approved version of the rules and references available at the UNFCCC webpage.	

Corrective Action Requests by the assessment team		
Response	As a response to the raised CAR, the PDD and the emission reduction calculation spread sheet were edited/corrected as follows: • The revised PDD applies the most recent version of the "Tool to calculate the emission factor for an electricity system". Equations to be used for the determination of project emissions due to the consumption of grid electricity by the project activity were corrected. • The approach applied for the determination of the combined margin CO_2 emission factor for the electricity grid was corrected with (a) Build Margin emission factor being determined ex-ante and (b) the weighing factors for the calculation of the combined margin emission factor being corrected too.	
Assessment Means of validation	The DOE confirms that the revised PDD applies the most recent version of the "Tool to calculate the emission factor for an electricity system". All steps are correctly followed in the PDD as per the most recent version (version 03) of the Tool. Further, the revised PDD was corrected with the $EF_{grid,BM}$ being determined and applied ex-ante (as requested in the Tool to calculate the emission factor for an electricity system'). The parameter $EF_{grid,BM}$ was removed from the section of parameters to be monitored (B.7.1.) and is instead mentioned in the section of parameters fixed ex-ante (B.6.2.) now. The weighing factors for the calculation of the combined margin emission factor applied in the PDD/ER calculation excel sheet are now in accordance with the ones stated in the 'Tool to calculate the emission factor for an electricity system' for the 2nd crediting period.	
Adjustment on project design	PDD has been revised.	

Clarification Requests by the assessment team		
	Comments and Results	Conclusion and IRL

Clarification Requests by the assessment team		
Issue	Some of the information presented in the PDD and the ER calculation file submitted for the renewal of the 2nd crediting period is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. Some examples of unclear information are as follows: -Some of the yearly figures of "volume of disposed waste at the landfill" indicated in the ER excel spreadsheet are not consistent between the ER excel spreadsheet and the primary data source. The primary data source presented during the on-site visit is an excel spreadsheet with figures of volume of waste received by the landfill which are based on monthly consolidated reports of weighing tickets; - The PDD refers in some sections to the use of LFG for power generation/electricity generation facility (e.g. A.1., A.3.) which is not consistent with other sections of the same PDD (e.g. footnote 1 of the PDD (version 01), B.2.) indicating the exclusion of LFG use for power generation. -Section A.3. of the PDD describes the increase of the average daily MSW disposal rate at Caieiras landfill, however according to the wording in the PDD it is not clear that the increase is "to 7,500 tons per day/to 10,000 tons per day" and no concrete information is given how much more waste was directed to Caierias landfill due to the accident at Sao Joao landfill and closure of Bandeirantes landfill. Besides, the date (March 2007) referring to the accident in Sao Joao landfill is not consistent with the one indicated in the ER calculation excel spreadsheet (August 2007). -Characteristics of the blowers and information whether "technologies and measures and know-how to be used are transferred to the host Party" (as per PDD guidelines, A.3.) are missing in section A.3. of the PDD; -Section B.4., step 1b mentions that "the identification of the baseline scenario is further performed in section B.5. As further demonstrated in section B.5., the baseline scenario….". However, B.5. does not provide any information regarding the baseline scenario. -B.6.1. mentions the use of fossil fuel for the purpose of electricity generation ("since the project activity will not consume any fossil fuel for purpose other than electricity generation") whereas other sections of the PDD mention that there is no fossil fuel used for electricity generation.	CR is closed. 1h,4b,6c,6e ☑

Clarification Requests by the assessment team		
	-The starting date of the crediting period is not consistent between the PDD and the ER calculation excel sheet. -GPS measurements carried out during the on-site visit resulted in slightly different values (location of the flares: Latitude -23.343232, Longitude -46.769788) than stated in the PDD (section A.4.2.4.). -The minimum destruction efficiency of the flares as per the manufacturer's specifications (indicated as 99.5% in the manufacturer's technical specifications submitted during the DOE's on-site visit) is not transparently indicated in the PDD. -The DOE during the on-site visit was informed about the use of LPG for igniting the flares (after maintenance/repair) however the PDD does not mention nothing regarding this LPG use and the same is not considered in the project emission calculation. Clarity shall be provided.	
Requirement	Project standard, §16 Completeness, §17 Consistency, §19 Transparency, PDD guidelines (EB66, Annex 8, version 01.0) VVS §26 The DOE shall raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.	
Clarification Request	**Clarification Request No. 1** The PP is request to provide clear and sufficient information as part of this response and/or as within the revised documents in order to allow the DOE to determine whether the applicable CDM requirements have been met.	
Response	As a response to the raised CAR, the PDD and the emission reduction calculation spread sheet were edited/corrected as follows: • Correct data related to historical amount of MSW disposed in the CTR Caieiras landfill (and used in the context of the ex-ante estimation of emission reductions to be achieved by the project activity during the 2nd 7-year crediting period) was applied in the emission reduction calculation spread sheet. • Incorrect references to utilization of LFG as fuel for electricity generation as part of the project design were removed. The PDD provides consistent information that there is no	

Clarification Requests by the assessment team		
	fossil fuel use for electricity generation in the project activity. • Clarification about the occurred increment in the amount of MSW disposed at the CTR Caieiras landfill since year 2007 was added with related minor inconsistencies being corrected. • Clarification/justification about the inclusion of details/specifications only for the currently installed project's LFG combustion sources (high temperature enclosed flares) and not for other ancillary equipment (e.g. centrifugal blowers) was added. • Clarification about technology transfer promoted by the project activity was also added in the revised version of the PDD. • Content of Section B.4 and B.5. was entirely revised. • Project design and monitoring details related to the use of Liquefied Petroleum Gas (LPG) for igniting the flares were added in different sections in the PDD thus correcting and complementing information related to the project description, GHG emission calculations and monitoring requirements applicable for the project activity. • Correct references to the revised starting date of the crediting period were added in both the emission reduction calculation spreadsheet and revised version of the PDD. • Project's geographical coordinates were corrected. • Value for destruction efficiency of the flares (as per the manufacturer's specifications) was more appropriately indicated.	
Assessment Means of validation	-All mentions in the PDD related to the use of LFG for power generation/electricity generation facility have been removed from the revised PDD since the LFG is exclusively flared in the project activity. -Information about technology transfer has been added in section A.3. of the PDD. Characteristics of the blowers however have not been added into the PDD and this has been justified by the PP. While, differently than the case of the high temperature enclosed flares, compliance of maintenance requirements and specifications for blowers are not required to be monitored through dedicated monitoring parameters and blowers may change during the 2nd crediting	

Clarification Requests by the assessment team		
	period. The DOE confirms that the non-inclusion of blower specifications is not against applicable CDM rules and requirements (incl. requirements of ACM0001 – version 13). -Sections B.4. and B.5. were revised in a way that the previously inconsistent information was amended. -It is consistently mentioned now throughout the PDD that there is no fossil fuel used for electricity generation in the project activity. -The starting date of the crediting period is now consistent between the PDD and the ER calculation excel sheet. -GPS measurements indicated in the revised PDD are consistent with the ones measured by the DOE during the on-site visit. -The DOE by assessing the revised PDD confirms that details related to the use of Liquefied Petroleum Gas (LPG) for igniting the flares were added in different sections of the PDD including information related to the project description, GHG emission calculations and monitoring requirements applicable for the project activity. **2nd DOE Request:** -Not all of the yearly figures of "volume of disposed waste at the landfill" indicated in the ER excel spreadsheet are yet consistent between the ER excel spreadsheet and the primary data source. The primary data source presented during the on-site visit is an excel spreadsheet with figures of volume of waste received by the landfill which are based on monthly consolidated reports of weighing tickets; -Section A.3. of the PDD describes the increase of the average daily MSW disposal rate at Caieiras landfill due to closure of Bandeirantes landfill and the accident that happened in Sao Joao landfill. However, the indicated increase of MSW disposal (t/day) due to these two events is not plausible if comparing the figures with the historic MSW disposal figures indicated in the ER excel calculation sheet, -The minimum destruction efficiency of the flares as per the manufacturer's specifications (indicated as 99.5% in the manufacturer's technical specifications submitted during the DOE's on-site visit) has not been indicated in the PDD yet. **2nd PP response:**	

Clarification Requests by the assessment team		
	As a response to further comments received, the revised version of the PDD includes the following additional changes/corrections: • Correct figures for "volume of disposed waste at the landfill" was added in the emission reduction calculation spreadsheet • Details about occurred quantitative increase in the historical amount of municipal solid waste disposed in the CTR Caieiras landfill were revised in Section A.3. of the PDD. • Reference to the minimum CH_4 destruction efficiency of the flares currently installed as part of the project activity was added. **Conclusion (after 2nd DOE Request):** -The description in Section A.3. of the PDD regarding the quantitative increase in the historical amount of municipal solid waste disposed at Caieiras landfill due to closure of Bandeirantes landfill and the accident that happened in Sao Joao landfill has been revised. The increase in percentage indicated in the PDD is consistent with the ER calculation excel sheet and waste disposal figures in the past are further supported by IRL 6c and 6e, hence the information is deemed to be credible. **3rd DOE Request:** -Not all of the yearly figures of "volume of disposed waste at the landfill" indicated in the ER excel spreadsheet are yet consistent between the ER excel spreadsheet and the primary data source. The primary data source presented during the on-site visit is an excel spreadsheet with figures of volume of waste received by the landfill which are based on monthly consolidated reports of weighing tickets; Hence PP response is not in line with the information found by the DOE in the revised PDD. -The minimum destruction efficiency of the flares as per the manufacturer's specifications has been indicated in the revised PDD, however the mentioned figure is not consistent with the manufacturer's technical specifications submitted during the DOE's on-site visit. **3rd PP response:** As a response to the 3rd DOE Request, the following changes were performed in the PDD and	

Clarification Requests by the assessment team		
	emission reduction calculation spreadsheet: • Historical values for "volume of disposed waste at the landfill" were revised in the emission reduction calculation spreadsheet. • Information about the minimum CH_4 destruction efficiency in the installed flares were revised in the PDD. **Conclusion (after 3rd DOE Request):** -The minimum destruction efficiency of the flares indicated in the revised PDD is now consistent with the flare manufacturer's specifications. The same has been validated by the DOE through IRL 4b. **4th DOE Request:** Not all of the yearly figures of "volume of disposed waste at the landfill" indicated in the ER excel spreadsheet are yet consistent between the ER excel spreadsheet and the primary data source. The primary data source presented during the on-site visit is an excel spreadsheet with figures of volume of waste received by the landfill which are based on monthly consolidated reports of weighing tickets; Hence PP response is not in line with the information found by the DOE in the revised PDD. **4th PP response:** The project participant acknowledges that data regarding historical waste disposed at the CTR Caieiras landfill which was previously presented to the DOE indeed includes some inconsistencies. The ex-ante estimates of emission reductions are calculated in accordance with revised data (which was made available to the DOE). A revised version of the internal control file named "*Toleladas Recebidas Classe II*" was made available to the DOE. **Conclusion (after 4th DOE Request):** The DOE by assessing the yearly figures of "volume of disposed waste at the landfill" indicated in the final (revised) ER excel spreadsheet confirms that the figures indicated in the ER excel spreadsheet are consistent with the primary data source. The DOE compared the figures in the primary data source (Print-screens of monthly consolidated reports of weighing tickets (IRL 6e) and an consolidated excel spreadsheet (IRL 6c) indicating the yearly figures calculated based	

Clarification Requests by the assessment team		
	on the print-screens of monthly consolidated reports (with the ER excel spreadsheet and found the figures to be consistent.	
Adjustment on project design	PDD and ER excel calculation spreadsheet have been revised.	

Forward Action Requests by the assessment team	
	Comments and Results
No Forward Action request at this stage of the process.	

Annex 2
Information Reference List

Project title: Caieiras landfill gas emission reduction

Interviewed Persons during onsite assessment:

Name	Function	Company
Fabricio Luis Ventura	Operational Engineer	Essencis Soluções Ambientais S.A
Fernando Freitas	Operational Coordinator	Essencis Soluções Ambientais S.A
Mark Zulauf	Consultant	ZLF Consultoria

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
1.	UNFCCC Webpage	**Project Design Documents, Previous Verification Reports, Previous Monitoring Reports** a. PDD (1st crediting period) of the CDM project "Caieiras landfill gas emission reduction" (CDM Registration Nr. 0171), version 3, dated 12/09/2005 b. PDD (1st crediting period resulting from post-registration changes of registered CDM project activity of the CDM project "Caieiras landfill gas emission reduction" (CDM Registration Nr. 0171, version 4, dated 10/01/2013 c. Validation Report for the CDM project "Caieiras landfill gas emission reduction" (Report Nr. 2005-0458) issued by DNV on 12/12/2005 d. Validation Report for the CDM project "Caieiras landfill gas emission reduction" resulting from post-registration changes of registered CDM project activity (Report Nr. 253.1, rev.05) issued by GLC on 18-03-2013 e. Monitoring reports for the 1st crediting period as available on the UNFCCC web page f. Verification reports for the 1st crediting period as available on the UNFCCC web page g. PDD (2nd crediting period) of the CDM project "Caieiras landfill gas emission reduction" (CDM Registration Nr. 0171), version 5, dated 28/03/2013 h. Final PDD (2nd crediting period) of the CDM project "Caieiras landfill gas emission reduction" (CDM Registration Nr. 0171), version 5.9, dated 05/09/2013	Various, see left column.	PDD, Validation Report, Monitoring Reports, Verification Reports

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
2.	UNFCCC IPCC	**References and requirements at UNFCCC** a. UNFCCC homepage http://cdm.unfccc.int/Projects/DB/DNV-CUK1134509951.62/view b. Approved consolidated baseline and monitoring methodology ACM0001, version 13.0.0, EB67 – Flaring or use of landfill gas c. Guidelines for completing the project design document form, version 01.0, EB66, Annex 8 d. 2006 IPCC Guidelines for National Greenhouse Gas Inventories e. CDM Glossary version 06, EB66 http://cdm.unfccc.int/Reference/glossary.html f. CDM Validation and Verification Standard, version 04.0, EB74, Annex 4 g. CDM Project Standard, version 04.0, EB74, Annex 3 h. CDM Project Cycle Procedure, version 04.0, EB74, Annex 11 i. Combined tool to identify the baseline scenario and demonstrate additionality, version 5.0.0, EB70, Annex 9 j. Tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”, version 3.0.1, EB66, Annex 47 k. Tool “Emissions from solid waste disposal sites”, version 6.0.1, EB66, Annex 46 l. Tool “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, version 1, EB39, Annex 7 m. Tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”, version 2.0.0, EB61, Annex 11	Various, see left column	

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		n. Tool "Project emissions from flaring", version 2.0.0, EB68, Annex 15		
3.	TÜV SÜD	List of participants in the on-site interviews conducted by the TÜV SÜD assessment team.	06/05/2013	Onsite audit
4.	Various, see right column	**Baseline and Project Implementation** a. Samples of invoices for flares, issued by BTS – Termodinamica de Sistemas Ltd. (dated 08/2008) and for blowers, issued by Anton Blaselbauer – Artecnica Ltda. (dated 05/2008 and 08/2010) b. Technical specifications of the flares, issued by BTS – Termodinamica de Sistemas Ltd. (dated 10/04/2013) and blowers, issued by Anton Blaselbauer (dated 03/08/2010) c. Technical project description, issued by Arquipelago Engenharia Ambiental (dated 06/2006) explaining amongst others the situation prior to the implementation (baseline scenario) of the project activity including original design and photos of the landfill, and project implementation d. Design of the landfill after project implementation including the LFG unit, issued by AMB Consult, without date e. TAGs from flares, blowers; photos taken during on-site visit;	Various, see left column.	
5.	Various, see right column	**Procedures and standards** a. Technical Specifications for the management of the SWDS (landfill) and LFG unit, ISO 9001 and 14001 Procedures issued by ESSENCIS, amongst others the following: Landfill Procedures:	Various, see left column	

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		• Maintenance and conservation of the landfill, CA.AT.01.03, dated 10/10/2012 • Geotechnical monitoring, CA.AT.01.04, dated 06/10/2012 • Landfill operations, CA.AT.01.01, dated 06/10/2012 • Traceability, CA.AT.01.05, dated 06/10/2012 • Landfill verification, CA.AT.01.02, dated 06/10/2012 • Technical instruction sheets, dated 29/06/2012 describing amongst others the mechanical compacting at the landfill <u>Landfill Gas Procedures:</u> • Operational procedure for the start-up of the LFG unit, CA.BG.01.01-004, dated 10/12/2012 • Operational procedure for the LFG unit, CA.BG.01.02-012, dated 10/12/2012 • Operational procedure for the shutdown of the LFG unit, CA.BG.01.03-002, dated 10/12/2012 • Operational procedure for the optimization of LFG extraction, CA.BG.01.04-002, dated 10/12/2012 • Operational procedure for the calibration of the gas analyzer, CA.BG.01.05-006, dated 10/12/2012 b. Brazilian Norm NBR 10.004, issued by ABNT (dated 30/11/2004), referring to solid waste classification;		

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
6.	Various, see right column	**Calculation Tool and related documents to the ex-ante ER calculation** a. Emission reductions calculation tool, version 5 dated 28/03/2013 b. Final Emission reductions calculation tool, version 5.9 dated 05/09/2013 c. Excel spreadsheet showing the waste volume received in the past and expected to be received until 2030; (without date) d. Paper "Measuring landfill gas collection efficiency using surface methane concentrations", issued by R. L. Huitric and Dung Kong (without date) supporting the collection efficiency of 92.80% used in the project activity, http://www.arb.ca.gov/cc/ccea/comments/april/huitric_kong.pdf, accessed on 06/05/2013 e. Print-screens of monthly consolidated reports of weighing tickets as supporting documentation for the calculation of waste volume received in the past (2002 to 2012)	Various, see left column	
7.	Various, see right column	**External Data** a. Annual Solid Waste Inventory in São Paulo State – Base year 2012, issued by CETESB (dated 2013) b. National Basic Sanitation Research (from the Portuguese: *Pesquisa Nacional de Saneamento Básico - PNSB*) issued by IBGE (Brazilian Institute of Geography and Statistics, from the Portuguese: "*Instituto Brasileiro de Geografia e Estatística*") (dated 2000); c. National Basic Sanitation Research (from the Portuguese: *Pesquisa Nacional de Saneamento Básico - PNSB*) issued by IBGE (dated 2008); d. Municipal Solid Waste Management Diagnostic (from the Portuguese: "*Diagnóstico do Manejo de Resíduos Sólidos Urbanos*") issued by the	Various, see left column.	

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		Ministry of Cities, National Secretary of environmental sanitation (SNIS) (dated 2010); e. Brazilian Greenhouse Gases (GHG) Emissions Inventory, issued by Ministry of Technology and Science (dated 2010) f. Brazilian Energetic Balance Report, base year 2011, issued by Ministry of Mines and Energy (dated 2012)		
8.	Various, see right column	**Environment, Legislative Conformance, Licenses** a. Environmental licenses, issued by CETESB, amongst others: • Operational license, N° 29002638 (dated 17/03/2006, valid until 17/03/2011); license issued prior to implementation of the project activity which indicates amongst others the requirement to maintain and operate the landfill and its waste disposal as well as the landfill cover in an adequate way to avoid odour from the landfill; Operational licence N° 32005929 (dated 25/08/2011, valid until 25/08/2016); indicating the requirement for covering waste residues; • Operational licenses N° 29004485 (dated 03/11/2009, valid until 03/11/2014), N° 32005931 (dated 25/08/2011, valid until 25/08/2016), N° 32006461 (dated 28/06/2012, valid until 28/06/2017) indicating the equipment of the LFG unit (including amongst others flares, blowers) b. Decree N° 7.404, dated 23/12/2010 regulating the law N° 12.305 (National Policy on Waste management), dated 02/08/2010 and law N° 12.305 (National Policy on Waste management) c. Email from LEMA AMBIENTAL (company contracted by Essencis Soluções Ambientais S.A. and responsible for the evaluation of new	Various, see left column	

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		laws, regulations, norms for the landfill and LFG unit), dated 25/06/2013 confirming that there is no law/regulation in Brazil requiring the capture/flare/use of LFG d. Article TAUIL & CHEQUER about the National Policy on waste management in Brazil, http://www.tauilchequer.com.br/publications/Brazil-National-Policy-on-Waste-Management-08-16-2010/, accessed on 06/05/2013		
9.	Various, see right column	**Other/Miscellaneous** a. Notification Email sent from Essencis Soluções Ambientais S.A. to the UNFCCC secretariat informing about its intention for renewal of the crediting period and selection of the DOE "TÜV SÜD South Asia Private Limited" (dated 26/04/2013) and confirmation Email received by UNFCCC (dated 02/05/2013) b. Emails (dated 29/04/2013 and 06/05/2013) sent by CENBIO confirming that electricity from pilot tests of a portable electricity generation facility fuelled by LFG was not used neither for electricity consumption nor export to the grid; c. Certificates issued by BSI, ISO 14001 (dated 26/04/2012, valid until 24/04/2015), ISO 9001 (dated 26/04/2012, valid until 24/04/2015), OHSAS 18001 (dated 16/01/2013, valid until 16/03/2016) d. Analysis report of LFG, issued by White Martins, N° 026/09, dated 03/07/2009 e. Grid electricity consumption invoices (samples of different months in 2009, 2012, 2013) f. News of municipality of Sao Paulo about the closure of Bandeirantes landfill in March 2007 (dated 22/09/2009)	Various, see left column	

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		g. Concession contract for the distribution of piped gas between State of Sao Paulo and COMGAS (Companhia de gas de Sao Paulo), published on 11/03/1999, valid for 30 years h. News in website www.estadao.com.br (dated 13/08/2007) informing about an accident at Sao Joao landfill site, accessed on 29/04/2013 i. Declaration (dated 06/05/2013) issued and signed by Essencis Soluções Ambientais S.A. affirming -that recycling of organic waste has never been and will never be carried out in the landfill; -that the management of the SWDS has never been deliberately changed (neither prior to the implementation of the project activity nor after the project implementation) in order to increase the methane generation (like e.g. addition of liquids to the SWDS, pre-treating waste, re-circulation of slurry) -that prior to the implementation of the project activity no systematic and continuous monitoring of the landfill gas took place -an estimate of an annual increase of 2% (from 2013) for the volume of disposed waste at the landfill based on Essencis experience with landfills; j. 1st weighing ticket (dated 04/09/2002) indicating the first waste disposal at the landfill thus operation start of the landfill k. Brazilian grid emissions factors, published at website of Ministry of Science, Technology and Innovation (from the Portuguese: *Ministerio da Ciencia, Tecnologia e Inovacao*) http://www.mct.gov.br/index.php/content/view/338047.html#ancora [accessed on 10/06/2013]		

Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		l. Letter referring to the supply history of LPG to Caierias landfill site, issued by LPG supplier ULTRAGAZ, Sao Paulo, dated 09/05/2013		
10.	Essencis Soluções Ambientais S.A.	**Monitoring equipment** Instruments list	12/2012	

Annex 3
Appointment Certificates

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

South Asia

CERTIFICATE OF APPOINTMENT

Mr. Tolcach, Eric Rodolfo fulfills the requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	VER	Other
Date	21.11.12				

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		21.11.12	21.11.12	21.11.12	21.11.12	13.1

Other qualification						
Country Expertise						
Region	1	2	3	4	5	Other
Date	21.11.12	21.11.12				
Further countries						
Financial Expertise						
Date						

Qualification in technical areas	
Technical Area	**Date**
13.1_Waste handling and disposal	21.11.12

This appointment is valid until 28.02.2014 and is bound by internal requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0045/002

Date	Signature
01.03.2013	

IS-CMS-CB-POG-01/05, version 02

TÜV®

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD South Asia

CERTIFICATE OF APPOINTMENT

Mr. Thaler, Johann fulfills the requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	VER	Other
Date	21.11.12				

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		21.11.12	21.11.12			1.2, 3.1, 13.1

Other qualification						
Country Expertise						
Region	1	2	3	4	5	Other
Date	21.11.12	21.11.12				
Further countries						
Financial Expertise						
Date	21.11.12					

Qualification in technical areas	
Technical Area	**Date**
1.2_Energy generation from renewable energy source	21.11.12
13.1_Waste handling and disposal	21.11.12
3.1_Energy demand	01.03.13

This appointment is valid until 28.02.2014 and is bound by internal requirements of the Certification Body "EnVironment and Energy" of TÜV SÜD South Asia Pvt Ltd.
In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.
Your Certificate has the internal reference no. CB-IND-CCP-0044/002

Date	Signature
01.03.2013	

IS-CMS-CB-POG-01/05, version 02

TÜV®

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

South Asia

CERTIFICATE OF APPOINTMENT

Mr. Mitterwallner, Robert fulfills the requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd to participate in audits.

Qualification applicable to					
Standard	CDM	GS	VCS	VER	Other
Date	21.11.12				

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		21.11.12	21.11.12	21.11.12	21.11.12	1.1, 4.10, 1.2, 4.1, 4.3, 13.1

Other qualification						
Country Expertise						
Region	1	2	3	4	5	Other
Date	21.11.12		21.11.12			
Further countries						
Financial Expertise						
Date						

Qualification in technical areas	
Technical Area	**Date**
1.1_4.10_Thermal energy generation	01.03.13
1.2_Energy generation from renewable energy source	21.11.12
4.1_Cement sector	21.11.12
4.3_Iron and steel sector	21.11.12
13.1_Waste handling and disposal	21.11.12

This appointment is valid until 28.02.2014 and is bound by internal requirements of the Certification Body "Environment and Energy" of TÜV SÜD South Asia Pvt Ltd.

In case of loss of validity of this certificate as per result of an assessment according to internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference no. CB-IND-CCP-0030/003.

Date	Signature
01.03.2013	
31.07.2013	