Validation report form for CDM project activities

(Version 01.0)

Complete this form in accordance with the "Attachment: Instructions for filling out the validation report form for CDM project activities" at the end of this form.

VALIDATION REPORT	
Title of the project activity	Oeste de Caucaia Landfill Project Activity
Version number of the validation report	1.5Aa
Completion date of the validation report	13/04/2016
Version number of PDD to which this report applies	version 4 of 03/09/2015
Date when PDD was uploaded for global stakeholder consultation	07/08/2014
Project participant(s)	GNR Fortaleza Valorização de Biogás Ltda.
Host Party	Brazil
Estimated annual average GHG emission reductions or net removals in the crediting period (tCO2e)	523,569 annual average
Sectoral scope(s) and selected methodology(ies)	13 - Waste handling and disposal ACM0001 – "Flaring or use of landfill gas" (version 15.0.0)
Name of DOE	RINA Services S.p.A. (RINA)
Name, position and signature of the approver of the validation report	Laura Severino – Sector Manager Sustainability, Environment & Climate Change

*The validation report major number is unchanged and the minor number is increased for the following reason:
(i) 1.4 the version was updated due to change in the validation report referred to the letter of approval issued by the Brazil DNA based on version 1.3.
(ii) 1.5 the version was updated due to UNFCCC incomplete asking for the submission of the validation report using the valid version of the applicable validation report form for registration of CDM project activities.

SECTION A. Executive summary

>> **Purpose and general description of the project activity**.

The primary objective of the Oeste de Caucaia Landfill Project Activity is to avoid methane emissions from the Oeste de Caucaia Landfill by capturing the landfill gas (LFG), upgrading and using it to supply natural gas (NG) into a natural gas distribution network (after a purification process), displacing the use of natural gas. Any LFG excess is flared. GNR Fortaleza Valorização de Biogás Ltda. which is the project activity implementer, understands that flaring shall be always the very last option of any CDM project related to LFG destruction. The proposed CDM project activity is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs. The project activity is expected to have 7,500Nm^3/h processing capacity /41/. Depending on the project performance up to 2017, a second and third phase may be implemented. Then, 12,500 Nm^3/h processing capacity may be achieved from 2018 to 2028 (phase II) and 15,000 Nm^3/h in 2029 onwards (phase III).

Oeste de Caucaia landfill is a municipal solid waste landfill located in Caucaia. RINA verified that the estimated amount of waste to be received is based ECOFOR estimative (landfil operator) described in the Landtec viability study /38/ The same study presents the characterization of the municipal solid waste based on the study performed by the Federal Institute of Education, Science and Technology of Ceará in 2009. It is estimated that the landfill will be operational until 2031 /38/

Scope of the validation process.

The validation process is conduct an independent assessment of the proposed CDM project activity against the applicable CDM rules and requirements.

The scope of validation process is:

(a) Determine whether the proposed CDM project activity comply with the requirement of paragraph 37 of the CDM M&Ps, the applicability conditions of the selected methodology, and guidance by the Board;

(b) Assess the claims and assumptions of the PDD.

Validation process.

Validation was conducted for assessing the information provided by the project participants using RINA procedures in line with the requirements specified in the CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques.

The validation consisted of the following three phases:

- Document review involving a review of data and information; cross checks between information provided in the PDD and information from sources other than those used.
- Follow-up actions including on-site inspection and interviews with relevant stakeholders and cross checks between information provided by interviewed personnel to ensure that no relevant information has been omitted ;
- The resolution of outstanding issues and the issuance of the final validation report.

Validation is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

Conclusion.

RINA Services S.p.A. (RINA), commissioned by GNR Fortaleza Valorização de Biogás Ltda., has performed the validation of the project activity Oeste de Caucaia Landfill Project Activityin Brazil, with regard to the relevant requirements for CDM activities.

In conclusion, it is RINA's opinion that the project activity Oeste de Caucaia Landfill Project Activity, in Brazil, as described in the PDD version 4 of 03/09/2015, meets all relevant requirements for CDM activities and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013.

SECTION B. Validation team, technical reviewer and approver

B.1. Validation team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Validation findings
1.	Team Leader, Validator, Technical expert TA 13.1	IR	Carvalho	Thaís	RINA Brazil	x	x	x	x
2.	Financial Expert (until 17/03/2015)	IR	Varkulya	Américo	RINA Brazil	x	x	x	x
3	Financial Expert in training	EI	Rocha	Mayra	RINA Brazil				x

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

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Valoroso	Rita	RINA Central Office
2.	Approver	IR	Severino	Laura	RINA Central Office

SECTION C. Means of validation

C.1. Desk review

>>The PDD, version 4 of 03/09/2015 and previous versions /01/, in particular the applicability of the methodology, the baseline determination, the additionality of the project activity, the starting date of the project, the monitoring plan, the emission reduction calculations provided in the form of a spreadsheet, “Ecofor_CERs_v.3_2015.07.23.xlsx” version 3 of 23/07/2015 and previous versions /22/, were assessed as part of the validation. All documents reviewed or referenced during the validation are listed in Appendix 3.

C.2. On-site inspection

Duration of on-site inspection: 09/09/2014				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Approval, authorization and contribution to sustainable development. Project activity design and implementation. Assessment of choice and applicability of the baseline methodology, project boundary and emissions sources included in the project boundary. Additionality. Ex-ante parameters, baseline, project and leakage emissions calculation. Monitoring Plan. Environmental impacts. Interviewing project proponent on operation and maintenance. Local stakeholders and consultation.	Landfill/ office	09/09/2014	Thaís Carvalho

C.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Veiga	Ana Paula	EQAO	09/09/2014	Emissions reduction calculation, PDD development, Project description, additionality, local stakeholder consultation	Thaís Carvalho
2.	Batista	Pedro Jorge	GNR Fortaleza Valorização de Biogás Ltda.	09/09/2014	Project description, project implementation, installed equipments, additionality, monitoring plan, Environmental issues	Thaís Carvalho

C.4. Sampling approach

>>N/A

C.5. Clarification requests, corrective action requests and forward action requests raised

Areas of validation findings	**No. of CL**	**No. of CAR**	**No. of FAR**
Global stakeholder consultation	0	0	0
Approval	1	0	0
Authorization	0	0	0
Contribution to sustainable development	0	0	0
Modalities of communication	0	1	0
Project design document	0	1	0
Description of project activity	2	2	0
Application of selected baseline and monitoring methodology and selected standardized baseline			

- Applicability of methodology and standardized baseline	0	1	0
- Deviation from methodology	0	0	0
- Clarification on applicability of methodology, tool and/or standardized baseline	0	0	0
- Project boundary	0	1	0
- Establishment and description of baseline scenario	0	0	0
- Demonstration of additionality	5	8	0
- Emission reductions	5	7	0
- Monitoring plan	3	3	0
Duration and crediting period	2	1	0
Environmental impacts	0	0	0
Local stakeholder consultation	0	0	0
Others (please specify)	0	0	0
Total	18	25	

SECTION D. Validation findings

D.1. Global stakeholder consultation

Means of validation	The PDD version 01 of 25/06/2014 /01/ was made publicly available on the CDM UNFCCC website and Parties, stakeholders and NGOs through the CDM website (https://cdm.unfccc.int/Projects/Validation/DB/50UE0T76Y95M438HOOIT5RSIQAX8OL/view.html) invited to provide comments during a 30 days period from 07/08/2014 to 05/09/2014.
Findings	N/A
Conclusion	No comments were received during the Global stakeholder consultation. It is RINA's opinion that the changes in the PDD during the validation process does not require the publication of the revised PDD for global stakeholder consultation.

D.2. Approval

Means of validation	The project's host Party is Brazil. The project participants is GNR Fortaleza Valorização de Biogás Ltda. a private entity; the project is a unilateral project and hence the host country is the only Party involved in the proposed project activity. Brazil fulfils the requirements to participate in the CDM, having ratified the Kyoto Protocol 23 August 2002 and established as DNA Comissão Interministerial de Mudança Global do Clima (CIMGC) as per the National Decree of 7th July 1999, revised in the Decree of 10th January 2006 /71/, The "Ministério da Ciência, Tecnologia e Inovação (MCTI) / Ministry of Science, Technology and Innovation" /71/ also described the UNFCCC website /06/ is the Executive Secretariat of the CIMGC, in accordance with the Brazilian National Decree /71/. The project participant is correctly listed in table A.4 of the PDD and the information is consistent with the contact details provided in Appendix 1 of the PDD /01/. The DNA of Brazil issued a Letter of Approval on 13/01/2016, authorizing GNR Fortaleza Valorização de Biogás Ltda. as project participant and confirming that the project assists in achieving sustainable development and the CDM project activity contributes to the sustainable development of the Host Country /72/. The Letter of Approval was received from GNR Fortaleza Valorização de Biogás Ltda., and refers to the precise project proposed project activity in the PDD submitted for registration /1/. The authenticity of the letters of approval has been validated by verifying Brazilian DNA email /73/. The letter has been issued by the Brazilian DNA for the specific proposed project activity and RINA has not found reason to doubt their authenticity By checking the above documents /72/ /73/ RINA considers the LoA in accordance with paragraphs 39-42 of the CDM-VVS /4/. The proposed project does not involve any public funding from an Annex I Party, and the validation did not reveal any information that indicated that the project could

	be seen as a diversion of official development assistance (ODA) funding towards the host country.
Findings	CL 3: There is no public funding in the project activity, however PP did not present the evidence
Conclusion	To close out CL 3 PP has presented a declaration that there is no public funding By checking the above documents /70/ /71/ RINA considers the LoA in accordance with paragraphs 44-48 of the CDM-VVS /4/. The validation report was updated (Revision 1.4) to reflect the receipt of the letter of approval and that is the only change that has been made compared to the version (Revision 1.3Aa, dated 09/12/2015) listed in the Brazilian DNA letter of approval dated 13/01/2016.

D.3. Authorization

Means of validation	The project participant is correctly listed in table A.4 of the PDD and the information is consistent with the contact details provided in Appendix 1 of the PDD /01/ and no other entities than those authorizes as PP are included in the above sections of the PDD.

Project participants	GNR Fortaleza Valorização de Biogás Ltda.	No Annex 1
Parties involved	Brazil	-
APPROVAL		
LoA received	Yes	-
Date of LoA	13/01/2016	-
LoA received from	GNR Fortaleza Valorização de Biogás Ltda.	-
Validation of authenticity	Yes /73/	-
Validity of LoA	Yes /72/	-
PARTICIPATION		
Party is party to Kyoto Protocol	Yes	-
Voluntary participation	Yes /72/	-
Project contribution to SD	Yes /72/	-

Findings	N/A
Conclusion	RINA confirms that the DNA of Brazil issued a Letter of Approval on 13/01/2016, authorizing GNR Fortaleza Valorização de Biogás Ltda. as project participant /72/ and as described in § D.2 of the report there is no doubt validating the authenticity of the letter of approval by verifying Brazilian DNA email /73/

D.4. Contribution to sustainable development

Means of validation	As per section A.1 of PDD, the Oeste de Caucaia Landfill Project Activity will have a substantial positive impact in terms of sustainable development as it will be one of the first projects that purify the LFG and injects it to a network distribution grid being developed in Brazil that, as consequence, directly displaces natural gas. An environmental benefit with the implementation of the Oeste de Caucaia Landfill Project is the destruction of methane that otherwise would be emitted to the atmosphere, increasing the impact on global warming. Despite of being possibly flared if necessary, the landfill gas collected will be primarily injected (after the

	upgrading process) into the natural gas distribution grid, therefore avoiding the consumption of natural gas. The contribution to sustainable development is confirmed in the LoA /72/
Findings	N/A
Conclusion	RINA confirms that the DNA of Brazil issued a Letter of Approval on 13/01/2016, confirming that the project assists in achieving sustainable development and the CDM project activity contributes to the sustainable development of the Host Country /72/

D.5. Modalities of communication

Means of validation	The MoC dated 24/11/2015 /39/ was provided by GNR Fortaleza Valorização de Biogás Ltda. with whom RINA has a contractual relationship confirmed by the request of services signed on 29/07/2014 /40/. The corporate identity of all PPs and focal points included in the MoC statement, as well the personal identities, the signatures and the related authorized signatures, and the employment status have been cross-checked for GNR Fortaleza Valorização de Biogás Ltda. through the social contract and letter nominating the personnel responsible for the project activity communication with UNFCCC and respective personnel ID and for Ecopart Assessoria em Negócios Empresariais Ltda through the power of attorney and letter nominating the personnel responsible for the project activity communication with UNFCCC and respective personnel ID /39/
Findings	CAR 2: PP did not provide the MOC and support documents
Conclusion	To close out CAR 2 PP has provided the MOC and support documents. RINA confirms that the MoC statement provided by the PP /39/ is based on the currently valid form "Modalities of Communication Statement" (F-CDM-MOC) /07/, the information required by the form including its Annex 1 is correctly completed, and the PP(s) authorized signatories signing the MoC correspond to the PP(s) authorized signatories included in Annex 1. RINA confirms that the MoC statement submitted by the PP complies with all relevant forms and requirements.

D.6. Project design document

Means of validation

The PDD for the project activity "Oeste de Caucaia Landfill Project Activity", in Brazil, version 4 of 03/09/2015 and previous versions /01/ submitted by the GNR Fortaleza Valorização de Biogás Ltda. has been the basis for the validation process.

RINA confirms that the above PDD is based on the currently valid PDD template version 6 and is completed in accordance with the applicable guidance document /23/

The main changes between the PDD version version 01 of 25/06/2014 published for GSC and the PDD version version 4 of 03/09/2015 submitted for registration are the following:

Section of the PDD	Description and reason for changing the information in that section
All sections	Update the CDM-PDD template to version
A.1; A3	Description based on installed capacity of the project purification plant and provisions of project expansion
A.4	Exclusion of PP Ecopart Assessoria em Negócios Empresariais Ltda. and revision PP name to be in accordance with the revised social contract.
B.1	Update the list of tools applied in the project activity
B.2	Update the applicability of the tools
B.3	Revision in the project boundary to be in accordance with the methodology
B.4	Revision on the investment analysis input parameters to be in line with the evidences provided
B.4	Revision to uniform the equations presented in the PDD and in the wacc calculation spreadsheet
B.4	Revision in the sensitivity analysis, to include the

		breakeven analysis
	B.4	Revision in the common practice analysis to consider the installed capacity of the project
	B.6.1	- Revision on the $F_{CH4,BL,y}$ tobe in accordance with AM_CLA_0265 -Revision on the estimatives of $F_{CH4,PJ,y}$ considering the installed capacity of the project plant - update the grid emission factor to consider the latest data available at the time of the PDD publication
	B.6.2	Inclusion of the parameters available at validation in the tools "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"; "Tool to calculate the emission factor for an electricity system"
	B.6.3	Update the CERs calculation estimative, considering the operation of the landfill until 2031. The estimatives from the waste received are from the Landtec study, provided during the onsite visit
	B.7.1	Update the monitored parameters to be in accordance with the monitoring methodology ACM0001 and tools: "Emissions from solid waste disposal sites"; "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"; "Project and leakage emissions from transportation of freight"; "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"; "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
	B.7.3	Detailed the meters applicable to the project activity and calibration by an accredited person or institution
	C.1.1	Update the evidences of the main events related to the implementation of the project activity and starting date of the project activity
	D.1	Update the environmental licenses applicable to the project activity.
	Annex 1	Update PP list and contact person
Findings	CAR 19: PDD version 2 is not applying the last version of the template CDM-PDD-FORM.	
Conclusion	In order to close out CAR 19, PP has provided the revised PDD using the latest template available. RINA confirms that the version 4 of 03/09/2015 is based on the currently valid PDD template version 6 and is completed in accordance with the applicable guidance document /23/.	

D.7. Description of project activity

Means of validation	**Purpose and general description of the project activity** The primary objective of the Oeste de Caucaia Landfill Project Activity is to avoid methane emissions from the Oeste de Caucaia Landfill by capturing the landfill gas (LFG), upgrading and using it to supply natural gas (NG) into a natural gas distribution network (after a purification process), displacing the use of natural gas. Any LFG excess is flared. GNR Fortaleza Valorização de Biogás Ltda., which is the project activity implementer, understands that flaring shall be always the very last option of any CDM project related to LFG destruction. The proposed CDM project activity is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs. The project activity is expected to have 7,500Nm^3/h processing capacity /41/. Depending on the project performance up to 2017, a second and third phase may be implemented. Then, 12,500 Nm^3/h processing capacity may be achieved from 2018 to 2028 (phase II) and 15,000 Nm^3/h in 2029 onwards (phase III).

Oeste de Caucaia landfill is a municipal solid waste landfill located in Caucaia. RINA verified that the estimated amount of waste to be received is based ECOFOR estimative (landfil operator) described in the Landtec viability study /38/ The same study presents the characterization of the municipal solid waste based on the study performed by the Federal Institute of Education, Science and Technology of Ceará in 2009. It is estimated that the landfill will be operational until 2031 /38/

Project location
The project is located in Caucaia municipality, Ceará State, Brazil, in the following geographical coordinates 3º47'20.29'' S and 38º40'24.99''W, confirmed in the SCS Energy assessment report /32/

Project starting date/ Project implementation
The start date of the project activity is 25/10/2013 and represents first capital increase for the project implementation /48/. Rina verified the events for the project activity, such as the preliminary contract between Ecometano and Ecofor, signed on 21/12/2012 /49/, and confirmed that this contract neither anticipated penalties in the case the project was not implemented nor incurred in expenses from the project owner side. The contracts for the equipment's purchase were signed after 25/10/2013 /41/ /42/ /47/. Therefore, confirmed that the start date is in accordance with the CDM Glossary and corresponds to the earliest date at which either the implementation or construction or real action of a CDM project activity or CPA begins. During the onsite visit, verified the project was implementing the construction of the Gas extraction wells. The equipment's were not installed.

Scenario existing prior to the implementation of the project activity
The primary objective of the Oeste de Caucaia Landfill Project Activity is to avoid greenhouse gases emission by the Oeste de Caucaia Landfill through landfill gas capture, purification and injection in a distribution grid. Any LFG excess is flared. Previously to the implementation of the proposed CDM Project Activity, no active collection of LFG took place at the project site and only a small portion of LFG was destructed through a passive venting system. The wells used in the passive venting system were shallow and very inefficient even for just venting. Therefore, LFG flow could not be controlled to avoid free methane emissions to the atmosphere.

Technology(ies) employed
- Collecting system: installation of horizontal collectors and vertical wells, and the installation of wellheads on top to collect the LFG emitted directly to the atmosphere in the baseline.

- Gas station and Upgrading gas facility: The project is expected to have 2 blowers, with a capacity of 5,000Nm³/hour each /42/. In the project expansion scenario, one more blower maybe installed at the project site. The project activity is expected to have 7,500Nm^3/h processing capacity /41/. Depending on the project performance up to 2017, a second and third phase may be implemented. Then, 12,500Nm3/h processing capacity may be achieved from 2018 to 2028 (phase II) and 15,000 Nm3/h in 2029 onwards (phase III).

- Flare System: Whenever LFG exceeds the processing capacity of the purification plant or it is not operational, the gas will be sent to the flaring system. The project activity has one open flare with a capacity of 8,200 Nm³/hour /42/. In order to ensure safety and, depending on the project performance, two more flares may be installed at the project site.

- Upgraded gas pipeline: The upgraded gas will be transported to the injection point through a pipeline. Within the landfill area the gas will be collected using a Flex Steel pipeline. From the landfill border until CEGÁS pipeline (consumer), a Carbon Steel pipeline is to be used. This technology will reduce the environmental impacts produced in a conventional mechanical construction, as it requires the use of fewer machines during its construction.

Technology will have to come from abroad and mainly from the United States and Europe /41/. Hence, technology transfer will occur from countries with strict environmental legislative requirements and environmentally sound technologies.

Findings	CL 1: PDD version 1, describes that the project expects to inject an average of 4,096 Nm3/h of upgraded biogas to the distribution grid. However, it is not clear how this value was estimated. Moreover, PDD does not describe the installed capacity of the project equipments CL 11: During the on site visit it was not clear if the project activity will consider the distribution of compressed/liquefied LFG using trucks. CAR 1: During the on site visit it was provided an updated study from Landtec /38/ considers the operation of the landfill until 2031, impacting in a new estimative of waste collected, biogas generated. PP is requested to clarify how it affects the project description, CERs estimative and additionality of the project activity, considering the estimative of upgraded biogas that will be delivered to the grid, updating the documents accordingly. CAR 5: PP did not provide a timeline of the project activity to demonstrate that the starting date described in published PDD is in accordance with CDM Glossary. Moreover, it is not clear if the contract corresponds to the earliest date at which either the implementation or construction or real action of a CDM project activity or CPA begins. Evidence was not provided
Conclusion	To close CL 1 and CAR 1 the installed capacity and related documents were revised. To close CL11, PP clarified that distribution by trucks is not forecasted. To close CAR 5 PP has provided a timeline or the project implementation and related evidences. RINA was able to verify all the documented evidence during the validation process and can confirm that data and considerations are complete and accurate. Moreover RINA confirms that the description of the proposed CDM project activity, as contained in the PDD sufficiently covers all relevant elements, is accurate and complete and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity.

D.8. Application of selected baseline and monitoring methodology and selected standardized baseline

D.8.1. Applicability of methodology and standardized baseline

Means of validation

The project correctly applies the approved baseline and monitoring methodology "ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013 /05/.
The applicability criteria of methodology and tools were assessed as follow:

Applicability criteria	Project activity	Criteria is met?
(a) Install a new LFG capture system in a new or existing SWDS where no LFG capture system was installed prior to the implementation of the project activity; or	Verified during the onsite visit and environmental licenses /27/ that the project consists on an installation of a new LFG capture system in an existing SWDS. Prior the project activity LFG was passive venting to the atmosphere. /32/ /38/	Yes
(b) 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	Not applicable	Yes.

	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;		
	(c) 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; and/or (iii) Supplying the LFG to consumers through a natural gas distribution network; (iv) Supplying compressed/liquefied LFG to consumers using trucks;	Verified during the onsite visit and project studies and documents /32/ /38/ /41/ /42/ that the project activity will apply option: (iii) Supplying the LFG to consumers through a natural gas distribution network. Moreover, as an emergency procedure, the LFG also can be flared. The main purpose of the project activity is to upgrade and commercialize biogas. however, for emergency purposes, a flare system is installed at the project site, in case the purification plant stops or if the LFG surpasses the upgrading capacity of the plant.	OK
	(d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.	Verified during the onsite visit that the LFG will be captured from the Oeste de Caucaia landfill. Through interview during the on site visit, verified that there is no recycle system in the region of the landfill.	OK
	4. 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) Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and (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.	The baseline scenario is the partial or total atmospheric release of the gas (usual practice of the Oeste de Caucaia landfill management) /32/ /38/	OK

5. This methodology is not applicable: (a) 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; (b) 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.	The project applies only the approved methodology ACM0001. Moreover the management of the Oeste de Caucaia landfill will not be changed to increase the methane generation, confirmed through interview during the onsite visit.	Yes

The applicability of the tools are also assessed:

* The “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” /12/, is applicable because the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions.

* The methodological tool ¨Emissions from solid waste disposal sites” /16/ is applicable as it is used under 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. 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 (e.g. measuring the amount of methane captured from the SWDS).

* The “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” /14/ is applicable since the project activity consumes electricity from the grid (a source of project emissions)

* The “Tool to calculate the emission factor for an electricity system” /15/ is applicable as off-grid power plants are not considered. Hence, the requirements of Annex 2 of the tool, referring to the applicability conditions that shall be met when this kind of plants are considered, are not applicable. Besides, the Brazilian Electric System is neither partially nor totally located in any Annex-I country.

*The methodological tool “Project emissions from flaring” /13/ is applicable to the flaring of flammable greenhouse gases where:
- Methane is the component with the highest concentration in the flammable residual gas;
- The source of the residual gas is coal mine or gas from biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).
The flammable residual gas is LFG (gas from biogenic source), which is composed by CH4, H2S, CO2 and N2, among other components. By default, the methodology adopts that the default fraction of methane in the LFG is 50%. Therefore, it can be assumed that methane is the component with the highest concentration in the LFG. In this sense, both applicability conditions of the tool are met.

* The “Tool to calculate project or leakage CO2 emissions from fossil fuel” /09/ combustion is applicable for calculating the project CO2 emissions from the combustion of fossil fuels - i.e. diesel generator used for emergency purposes - which are determined based on the quantity of fuel used.

	* The "Combined tool to identify the baseline scenario and demonstrate additionality" is used to demonstrate additionality of the project activity as required by the applied methodology ACM0001 /05/.
Findings	CAR 3: The version of the tool "Tool to calculate the emission factor for an electricity system" described in the PDD version 1 is not the valid version.
Conclusion	To close out CAR 3, PDD was revised to consider the current version of the "Tool to calculate the emission factor for an electricity system". RINA confirms that the selected baseline and monitoring methodology has been previously approved by the CDM Executive Board, and is applicable to the Project, which complies with all the applicability conditions therein and the selected version is valid at the time of submission of the proposed project activity for registration. It is also confirmed that the methodology is correctly applied by comparing it with the actual text of the applicable version of the methodology.

D.8.2. Deviation from methodology

Means of validation	N/A
Findings	N/A
Conclusion	N/A

D.8.3. Clarification on applicability of methodology, tool and/or standardized baseline

Means of validation	N/A
Findings	N/A
Conclusion	N/A

D.8.4. Project boundary

Means of validation

According to the approved baseline and monitoring methodology ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013 /05/ the project boundary includes the site where the LFG is captured and, as applicable:

(a) Sites where the LFG is flared or used (e.g. flare, power plant, boiler, air heater, glass melting furnace, kiln, natural gas distribution network or biogas processing facility): in the case of the proposed CDM Project Activity, the sites where the LFG is flared/used consists of the collection system, biogas upgrading facility, pipeline, gas station facilities (including flaring);

(b) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity to the project activity: the national grid is included in the boundary in accordance with the Brazilian DNA resolution nº 8 of 26/05/2008 /25/.

(c) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity in the baseline that is displaced by electricity generated by captured LFG in the project activity: not applicable since electricity generation to the grid is not included in the project activity.

(d) Heat generation equipment or sources which are supplying heat in the baseline that is displaced by heat generated by captured LFG in the project activity: not applicable since heat is not included in the project activity.

(e) The transportation of the compressed/liquefied LFG from the biogas processing facility to consumers: not applicable, the gas transportation by trucks is not expected to occur during the project crediting period.

Emissions sources included in the project boundary are shown in the table below:

	GHGs involved	Description
Baseline emissions	CH_4	Emissions from decomposition of waste at the SWDS site and Emissions from the use of natural gas (Major emission source if supply of LFG through a natural gas distribution network)
Project emissions	CO_2	Emissions from fossil fuel

			consumption (LPG) for flare ignition; Emissions from electricity consumption from the grid for consumed for the operation of the active LFG collection system and LFG upgrading facility. Depending on the intermittences of electricity supply from the local utility, a fossil fuel generator maybe installed at the project site;
		CH_4	Emissions from flaring
	Leakage	-	According to ACM0001 there is no need to account for leakage

Emission sources which are not addressed by the applied methodology and which are expected to contribute more than 1% of the overall expected average annual emissions reduction have not been identified during the onsite visit and reviewing the assessment report /32/ /38/.

Findings	CAR 4: In accordance with the guidance, PDD has to include in the section B.3 a flow diagram all the equipment, systems and flows of mass and energy described in that section. In particular, indicate in the diagram the emissions sources and GHGs included in the project boundary and the data and parameters to be monitored.
Conclusion	To close out CAR 4 PP has revised the PDD in accordance with the guidance. By checking the information and evidences available /32//38/ and by the physical site, RINA can confirm that all the emission sources and gases have been included in the project boundary and the description in the PDD is accurate and complete, and also that the selected sources and gases are justified for the proposed project activity.

D.8.5. Establishment and description of baseline scenario

Means of validation	The project activity applies the Combined tool to identify the baseline scenario and demonstrate additionality /08/ as required by the methodology ACM0001 /05/. ***Step 0: Demonstration that the proposed project activity is the fist-of-its-kind*** Not applicable **STEP 1: identification of alternative scenarios** ***Step 1a: Identification of alternative scenarios:*** In accordance with the applied methodology, the following alternatives were identified for the destruction of the LFG in the absence of the project activity: *a) LFG1*: Project Activity undertaken without being registered as a CDM Project Activity (capture, flare and use of LFG), b) *LFG2*: Continuation of the landfill operation, continuation of atmospheric release of the landfill gas (Business as Usual – BAU scenario) or partial capture of landfill gas and destruction trough flaring to comply with regulations or contractual requirements, or to address safety and odour concerns; c) *LFG3*: LFG is partially not generated because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS; d) *LFG4*: LFG is partially not generated because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS; e) *LFG5*: LFG is partially not generated because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS. The electricity generation is not part of the project activity since the LFG captured will be upgraded and injected in the natural gas distribution network as verified by RINA during site visit /32/ /38/; thus the alternatives were not assessed. The heat generation is not part of project activity since there is no need for heat in the site or nearby facilities as verified by RINA during site visit /32/ /38/ thus the

	alternatives were not assessed. In addition to the scenarios presented above, as described in the ACM0001, for the supply of LFG to a natural gas distribution network, the baseline is assumed to be the supply with natural gas. ***Step 1b: Consistency with mandatory laws and regulations*** Verified that all alternatives comply with local laws and none of them are mandatory. The Política Nacional de Resíduos Sólidos (National Solid Waste Policy) was approved in 2010, and it does not foreseen the obligation of landfill gas destruction or landfill gas use /31/. ***STEP 2: Barrier analysis*** ***Step 2a. Identify barriers that would prevent the implementation of alternative scenarios*** It has been demonstrated by PP that the project activity faces the Barriers due to prevailing practice. Verified there are no polices or regulations in Brazil that requires landfill gas capture or destruction. According to the Brazilian National Policy on Solid Waste /31/, which regulates the solid waste management and final destination, there is no mandatory obligation for landfill gas destruction or landfill gas use /31/. In Brazil, the existing landfills operate with passive venting and only few of the existing landfills that have installed a collection and flaring LFG system were implemented under CDM. According to the "Brazilian Atlas of Greenhouse Gas Emissions and Energetic Potential in the Residues Destination" published by ABRELPE in 2013 /45/, there are 22 (twenty-two) LFG projects whose encompass electricity generation and only 1 (one) predicts the upgrading of biogas to NG distribution system. All the 23 projects identified in the ABRELPE study are CDM projects, and the similar project was identified as Gramacho landfill, reference number. 9087. Therefore, the scenario LFG 1 is not realistic as no landfill gas project in Brazil was implemented without CDM revenues. According to the latest official statistics on urban solid waste in Brazil /46/, most of the waste collected is sent to sanitary landfills (64.6%) or open dumps (17.6%) and only 0.02%, 0.62% and 1.2% of the waste is sent to incineration, composting and recycling, respectively. As consequence, alternatives LFG 3, LFG 4 and LFG 5 are prevented by this barrier. In conclusion the only alternative not prevent by barrier due to prevailing practice is LFG 2. Consequently, the baseline scenario is LFG2: Continuation of the landfill operation and LFG atmospheric release of the landfill gas or partial LFG capture and destruction trough flaring to comply with regulations or contractual requirements, or to address safety and odour concerns, or for other reasons and the continuation of the fossil NG supply to the distribution network.
Findings	N/A
Conclusion	RINA was able to verify all the documented evidence listed above during the validation process and can confirm that: a) All the assumptions and data used by the project participants are listed in the PDD, including their references and sources; b) All documentation used /31/ /38/ /45/ /46/ is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD; c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence /31/ /38/ /45/ /46/ and can be deemed reasonable; d) Relevant national policies and circumstances are considered and listed in the PDD./31/ e) The approved baseline methodology ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013 /05/ has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity

D.8.6. Demonstration of additionality

Means of validation	According to the approved baseline and monitoring methodology ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013 /05/, the additionality of the project has been established applying the Combined tool to identify the baseline scenario and demonstrate additionality, version 5.0.0, dated 23/11/2012 /08/. **Demonstration of prior consideration of the CDM** The start date of the project activity is 25/10/2013 and represents first capital increase for the project implementation /48/. Rina verified the events for the project activity, such as the preliminary contract between Ecometano and Ecofor, signed on 21/12/2012 /49/, and confirmed that this contract neither anticipated penalties in the case the project was not implemented nor incurred in expenses from the project owner side. The contracts for the equipment's purchase were signed after 25/10/2013 /41/ /42/ /47/. Therefore, confirmed that the start date is in accordance with the CDM Glossary and corresponds to the earliest date at which either the implementation or construction or real action of a CDM project activity or CPA begins. The notification of prior consideration dated 19/06/2013 was sent to UNFCCC and Brazilian DNA on 19/06/2013 (public available at UNFCCC web site 19/06/2013) /21/ /37/. Therefore RINA confirms that the proposed CDM project activity complies with the applicable requirements related to the prior consideration of CDM. **Identification of alternatives** As per the analysis described in section D.8.5 of this report, the alternative scenarios for the project activity consistent with all applicable and enforced legislation have been identified, as shown below: a) LFG1: Project Activity undertaken without being registered as a CDM Project Activity (capture, flare and use of LFG), b) LFG2: Continuation of the landfill operation, continuation of atmospheric release of the landfill gas (Business as Usual – BAU scenario) or partial capture of landfill gas and destruction trough flaring to comply with regulations or contractual requirements, or to address safety and odour concerns; c) LFG3: LFG is partially not generated because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS; d) LFG4: LFG is partially not generated because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS; e) LFG5: LFG is partially not generated because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS. RINA can confirm that the alternatives identified in the PDD are credible and complete. **Investment analysis** **Choice of approach** Project participants applied the Option III Benchmark Analysis, in line with the applied additionality tool /08/ and with the "Guidelines on the Assessment of Investment Analysis" /33/. The simple cost analysis is not applicable because the project will generate financial and economic benefits (from the gas sales) other than CDM related income. The financial/economic indicator used for the proposed project activity is the Project's Net Present Value (NPV). The NPV of the project without CDM revenues was determined considering the appropriate benchmark of the sector, which is the Weighted Average Cost of Capital (WACC) /35/. The spreadsheet with investment analysis provided by the project participants, "Ecofor_Cash Flow_investment decision.xlsx" /34/ and the spreadsheet with cost of equity calculation "WACC WasteSector_1st sem 2013_v.1" /35/ indicates that the NPV obtained to for project activity is negative, when the value of Weighted Average Cost of Capital (WACC) is 9.97 %. **Benchmark selection** The selected benchmark is calculated based on weighted average costs of capital (WACC) which is appropriate benchmark for the project activity and complies with the "Guidelines on the Assessment of Investment Analysis" version 5.0 /33/, as per the guidelines the project benchmark needs to be calculated based on bond rates. The WACC calculation uses data the first semester of 2013 as the investment decision was made in 25/10/2013, which corresponds to the date when the approval of the capital

contribution for the implementation of the proposed project occurred. The weighted average cost of capital is calculated as follows:
WACC = Wd x Kd + We x Ke

We and **Wd** are, respectively, the weights of equity and debt typically observed in the sector. The weights were derived from the "*Guidelines on the assessment of investment analysis*" /33/, which considers a default value for CDM projects: 50% debt (**Wd**) and 50% (**We**) equity are assumed as a default value. **Kd** and **Ke** are, respectively, the cost of debt and cost of equity.

The calculation of the cost of debt Kd is given by the formula following formula:

Kd = [1 + (a + b + c) x (1 - t)] / [(1 + d) -1]

Where:

1. a is the financial cost calculated as 5.88% based on the long term interest rate given by the BNDES on a 5-year average range /57/
2. b is the spread calculated as 1.50% based on the BNDES spread, as per the credit policy for power generation activities /58/;
3. cis the credit risk rate calculated as 4.18%.The reference value used is the maximum credit risk defined by BNDES /59/.
4. d is the inflation forecast in Brazil, calculated as 4.5% for 2013 /60/.
5. t is the marginal tax rate assumed as zero since the project IRR calculation is based on assumed profit, according to Brazilian tax regulation, is not applicable /61/.

Thus, the after-tax cost of debt is calculated to be 6.75%.

The Cost of Equity **Ke** represents the rate of return for equity investments, and is given by the formula:

$K_e = ((1+R_f) /(1+ \pi)-1)+ ß * (R_m – R_f) +R_c$

Where:

6. Rf (risk free rate): calculated based on the average of return rates of American Bond (TBond), in accordance with "Guidelines on the assessment of investment analysis" version 5.0 /33/, considering the average of values of from 2008 to 2013, the value achieved is 3.26%, in accordance with investment period and crosschecked with data available at Federal Reserve website, RINA cross-checked the values presented with the Federal Reserve home page /62/.
7. R_m (equity risk premium): calculated as 5.49%, based on difference between the average earnings of S&P 500 versus the long term US T bonds yields for the period between 1928-2012. RINA cross-checked the values presented with the Damodaran home page /63/. The period applied in the analysis includes the investment decision date and it is in accordance with the suggested by the Appendix of the "Guidelines on the assessment of investment analysis" version 5.0 /33 /.
8. R_c (estimated country risk premium): calculated as 2.32%, based on Brazilian Risk Premium for the period between 2008 and 2013. RINA cross-checked the values presented with the JP Morgan data available at IPEA home page /64/;
9. ß (adjusted industry beta): calculated as 1.71%, based on the covariance of the daily return of power industries listed on S&P500 of year 2013. Beta when re-levered used the conditions of presumed (or assumed) profit regime, for which tax rate is zero when releveraging beta. The power industry type companies were selected for calculation of beta /63/ ;
10. (I) US expected inflation: considered as 1.76%, assuming that relative to the US

risk-free debt market EMBI+ is 0, then Brazil's EMBI+ would calculate for the added or reduced risk relative of Brazils debt markets to the US /65/.

Thus, K_e is calculated to be 13.18%.

Considering the values presented above, The WACC of the sector is equal to 9.97%:

WACC = 50% x 6.75% + 50% x 13.18% = 9.97%

This benchmark is not specific to the project participants, since it was calculated based on public data considering the risks faced by any waste project in Brazil. Although CAPM model is generally used to calculate a benchmark on an equity basis, in this case it is accepted to be applied for a benchmark on a project basis, because it was adapted to the project using re-levered beta for condition of a presumed (or assumed) profit regime, for which tax rate is zero in re-levering.

RINA confirmed that the assumptions taken and the values considered for the benchmark calculation are reasonable.

Input parameters

RINA has validated the input parameters used in the investment analysis and the following steps have been followed to assess the investment analysis:

Assessment of the sources used for input parameters. RINA confirms that the input parameters used in the financial analysis have been taken from third party sources as listed in the below table.

Confirmation that the values used in the PDD and investment analysis are fully consistent with the sources. RINA compared the input parameters for the financial analysis included in the PDD with the parameters stated in the third party sources and was able to confirm that the values applied are consistent with the values stated in the document listed in the below table.

Assessment of the period between the time of the investment decision and the starting date of the proposed project activity. All the data used for the investment analysis were available at the time of the investment decision. The investment decision and the starting date of project activity are 25/10/2013 which corresponds to the date when the approval of the capital contribution for the implementation of the proposed project occurred. All data applied in the spreadsheet of investment decision were assessed by Rina and it will be explained on the table below.

Cross-check of the main input parameters used in the financial analysis. The input parameters used in the financial analysis were cross-checked and all the data sources used for crosschecking were checked during the validation process. The following is carried out:

Input value	Assessment
Investment - US$ 34,053,260	RINA compared the input parameters used in the financial analysis with the parameters stated in the third party report LANDTEC_Feasibility Report – ASMOC – Caucaia/Fortaleza /38/ and was able to verify that the values in the PDD and investment analysis are fully consistent with the source used.
Average of upgraded gas - 34,155,000 (Nm3/yr)	RINA compared the minimum value between LFG generation in the landfill as presented in the third party report "LANDTEC_Feasibility Report-ASMOC – Caucaia/Fortaleza" /38/ and the purification plant maximum capacity of 7,500Nm^3/h based on ECOFOR_MORROW_Supply Agreement /41/ and was able to verify that the assumption made by PPs that the upgrading system with 95% upgrading efficiency (20 days maintenance during the year) and 0% of LFG flared is conservative.

	Natural Gas Price - 0.38 US$/m3 (including taxes)	As there is still no contract signed for supplying the gas to the network, the price used for the investment analysis is the published by the official source MME, which is the average price the distribution networks pays to the gas producers per month. RINA compared the values used in the financial analysis with the monthly reports of natural gas price used as reference from September 2012 to August 2013 published by Mines and Energy Ministry ("MME" from the Portuguese Ministério de Minas e Energia) and was able to verify that the values used are according to the monthly reports /69/.
	Operational costs - US$ 6,932,500/year	Since the project is not operational yet and reference of costs that composted the annual Opex were not found in literature and even though there is a project called Dois Arcos that is under validation, the operational costs were based on third-party specific technical study contracted by the project sponsor, (SCS Assessment Report nr. 06212012.00) /32/ RINA compared the input parameters used in the financial analysis with the parameters stated in the third party report "SCS Assessment Report nr. 06212012.00"/32/ and confirmed that the operational costs considered in the project cash flow are consistent with the Report SCS Assessment nr. 06212012.00 and that OPEX are composed by the following costs: • Power costs: US$ 3.00/MMBTU average during the assessment period • Operation and maintenance (O&M): US$ 1.46/MMBTU average during the assessment period • Property tax and insurance: US$ 937,500/year • General and administrative: US$ 312,500/year
	PIS - Social Contribution - 0.65%	Rina verified Brazilian Law 10.637/2002 /67/ and was able to verify that the value applied is in accordance with the legislation.
	COFINS - Social Security - 3.00%	Rina verified Brazilian Law 10.637/2002 /67/ and was able to verify that the value applied is in accordance with the legislation.
	Assumed Income for Income Tax - 8.00%	Rina verified Brazilian Decree No. 3.000 dated 26/03/1999 /68/ and was able to verify that the value applied is in accordance with the legislation.
	Assumed Income for Social Tax - 12.00%	Rina verified Brazilian Law No. 8.981 dated 20/01/1995 /68/ and was able to verify that the value applied is in accordance with the legislation
	IR - Income Tax - 25%	Rina verified Law No. 8.541 dated 23/12/1992 /68/ and was able to verify that the value applied is in accordance with the legislation.
	CSLL - Social Contribution on Net Profit - 9%	Rina verified Law No. 105 dated 10/01/2001 /69/ and was able to verify that the value applied is in accordance with the legislation.
	ICMS tax - 17%	Sales revenues tax is based on the Brazilian regulations, which is public available information: RINA verified RN State Secretariat for the ICMS tax on the circulation of goods and services (from the Portuguese Imposto sobre Circulação de Mercadorias e

	Serviços) that is collected by each state /65/ and was able to verify that the value applied is in accordance with the legislation. .
Lifetime (years) - 20 years	Rina verified the information sent by a manufacturer of upgrading systems /44/.The period considered for the investment analysis is 20 years according to the project lifetime.

Based on the information verified, RINA was able to confirm that the input parameters used in the investment analysis are reasonable and adequately represent the economic situation of the project activity at the time of the investment decision

Calculation and conclusion

The NPV calculation was provided in the spreadsheet "Ecofor_Cash Flow investment decision.xlsx" /34/. The calculation were verified and found to be correct by RINA as well as the assumptions used in the calculation were deemed to be correct. The project Net Present Value (NPV) is negative which confirms that the proposed project activity in absence of the CDM benefits is not financially attractive.

Sensitivity analysis

A sensitivity analysis has been carried out for parameters contributing more than 20% revenues and costs, to demonstrate the robustness of the financial analysis. Reasonable variations of the Investment, gas generation, gas price and operational costs were checked by varying the parameters +/- 10% and also calculating the variations necessary to the NPV equal to zero when considering the calculated benchmark of 9.97%. The result of sensitivity analysis is presented in table below:

Variations	**Initial value**	**Variation value**	**NPV**
Variation in the gas price in + 10% (US$/$Nm^3$)	0.38	0.42	-1,528,323
Variation in the gas generation in +10% (Nm^3/year)	34,155,000	37,570,500	-1,528,323
Variation in investment / CAPEX in - 10% (US$)	34,053,260	30,647,934	-5,777,178
Variation of the operational costs in - 10% (US$/year)	6,932,500	6,239,250	-3,737,667

The project NPV remains negative when the above parameters fluctuated within the range of ± 10%. According to the sensitivity analysis, even with ± 10% variations of the financial key parameters, the project NPV is still negative considering the benchmark of 9.97%.

The parameters of the above sensitivity analysis should present the following variations to make the NPV equal to zero:

Key Indicators	Variation of the parameter indicator needed to make the NPV equal to zero
Gas price	+ 12.1%
Gas generation	+ 12.1%
CAPEX	- 28.7%

Operational Costs	- 17.3%

In all scenarios, the project's NPV is not likely to reach zero, as discussed below:

11. **Natural Gas price:** to make the NPV equal to zero, gas price must increase at least by 12.1% the NG price would increase and reach US$0.42/m^3 (equivalent to US$9.75/MMBTU). However, there is a tendency of a reduction in the NG price considering the *shale gas* offer, since the *shale gas* has introduced new parameters for the NG price by reducing it and unlinking it with the petroleum price. Considering the increase of gas offer with the shale gas and pre-salt basins discovered in Brazil, it is expected an increase in the NG offer and, consequently, a reduction in the NG price. Moreover, according to a reference study from the National Forum of State Secretaries for Energy Matters from June 2012 /56/ the competitive price of natural gas for 2020 year scenario in a range of US$5.50-7.50MMBtu. Therefore, an increase in the NG price of 12.1% to the NPV equals to zero would not be reasonable in the project making context and it is not expected to occur.

12. **Natural Gas generation:** The estimated upgrade gas generation considered in the project cash flow is based on the Landtec Feasibility Study for the Oeste de Caucaia landfill /38/, which a third-party engineering company contracted by the project developer in order to perform technical and financial analysis of the project activity. According to this Feasibility Study the initial installed capacity of the proposed project is 7,500 Nm3/h or 34,155,000 Nm^3/year. Considering an increase of 12.1% in the gas generation to the NPV equals to zero, the average of upgraded gas generation would reach 38,281,129 Nm^3/year. In fact, the Feasibility Study by Landtec presents a possibility of an increase in the LFG generation in case an increase in the waste deposited in Oeste de Caucaia landfill occurs. Therefore, depending on the project performance, the project activity could pass from 7,500Nm^3/h to 12,500 Nm^3/h (phase II) and 15,000Nm^3/h (phase III). This expansion scenario includes an increase in the project revenues with upgraded gas sale, but it also requires an increase of costs with investment and maintenance. In order to demonstrate additionality in the possible expansion scenario, another investment assessment was presented by PPs. Since the project expansion was not predicted to the project developers at the time of the investment decision, Landtec conducted a financial and feasibility study /38/ only for the first phase of the project (7,500Nm^3/h). Then, values considered at the time of the investment decision were proportionally applied to the possible expansion capacity of the project.

	Phase I	**Phase II**	**Phase III**
Operation start	from 2016 onwards	from 2018 onwards	from 2028 onwards
Upgrade capacity (Nm^3/h)	7,500	12,500	15,000
Capex (US$)	34,053,260	Plus 16,835,507	Plus 8,417,753
Opex (US$/yr)	6,932,500	11,554,167	13,865,000
Annual average of LFG commercialization (Nm^3/yr)	34,155,000	49,506,079	57,078,318

Considering values above presented for the expansion scenario and the spreadsheet provided "Ecofor_Cash Flow_expansion" /34/ the NPV of the project would still be negative (– US$24,631,652), demonstrating that the project is not feasible, RINA also checked that varying the parameters considered in the

expansion scenario by +/- 10% , the project NPV would still be negative considering the benchmark of 9.97% as presented in table below:

:

Parameters	Variation	NPV
LFG price	+10%	-14,159,767
LFG generation	+10%	-14,159,767
Capex	-10%	-20,091,679
Opex	-10%	-16,236,574

Considering explanations above, the upgraded gas generation and commercialization was based on the Landtec Feasibility study /38/ and a 12.1% increase in the upgraded gas generation was not taken into consideration at the time of the investment decision (25/10/2013). Even in the expansion scenario of the project, the project remains additional even with the sensitivity analysis. Therefore, RINA concludes that an increase of 12.1% was not expected to occur and if it occurs, the project remains additional.

13. **Investment costs (CAPEX):** RINA was able to confirm that a decrease of 28.7% in investment costs is unlikely to happen, as investment considered in the project cash flow is based on the LANDTEC Landtec Feasibility Study for the Oeste de Caucaia landfill /38/, which is a reliable documented evidence (a third-party contracted by the project developer). According to this Feasibility Study, the investment required for the project activity implementation results in US$ 32.5 MM. Considering a reduction of 28.7% in the project investment to the NPV equals to zero the total investment would be approximately US$ 24.3 MM. Since there is one project registered as CDM, and there is one project called Dois Arcos that is under validation the proposed project in Brazil (energetic use of LFG, except for those which generates electricity considering CDM revenues), faces several barriers due to the lack of manufacturers, and consequently equipment, experienced personnel, know-how, regulations regarding licensing and renewable natural gas, and others, which reflects in the increase of project Capex. Moreover, PPs presented a study from Bacon and Besant-Jones (1998) /68/ that states that real investments in developing countries are usually higher than the original estimative. The study indicates that although the ratio of actual and estimated cost can be smaller than one (indicating actual investment smaller than estimated), less than 10% of the analyzed projects had investments lower than those forecasted. One of the conclusions is that "*the estimated values were significantly based below actual values*". Therefore, RINA concludes that a 28.7% reduction in project investment is not reasonable and not expected to occur.

14. **Operational costs:** A reduction in the project costs until the NPV equals to zero would result in a decrease of 17.3% from the estimated operational costs. Total operational costs result in US$ 6.9 MM/year as presented in the "Ecofor_Cash Flow_investment decision" /32/. Since the project is not operational yet and reference of costs that composted the annual Opex were not found in literature, as mentioned above, there are no similar projects to Ecofor in Brazil, thus operational costs were based on a specific technical study contracted by the project sponsor, a third-party Assessment Report by SCS /32/. According to the

SCS Assessment Report the operational costs are composed by commodities, operation and maintenance, labor, office expenses, electric power, property tax, insurance, general and administrative. RINA concludes that the values considered for the OPEX in the project cash flow are based on reliable documented evidence (a third-party contracted by the project developer). Therefore, RINA concludes that a reduction of 17.3% is not expected to occur.

Barrier analysis
Not applicable.

Common practice analysis
For the common practice analysis, the Geographical area considered is the Host country Brazil. For the measure, the project falls under category (c) Methane destruction. The output capacity is 7,500Nm3/h processing capacity /41/. Depending on the project performance up to 2017, a second and third phase may be implemented. Then, 12,500Nm3/h processing capacity may be achieved from 2018 to 2028 (phase II) and 15,000 Nm3/h in 2029 onwards (phase III). The following steps is applicable

Sub-step 4a(1): Calculate the applicable output range as +/-50% of the design output or capacity of the proposed project activity.
Confirmed in the technical specification that the project activity is projected to have an installed capacity of 7,500 Nm^3/h, i.e. 65,700,000 Nm^3/year (at full capacity) /41/. Therefore, the applicable range is 32,850,000Nm3/year and 98,550,000Nm3/year. If the capacity expansion is considered (15,000Nm3/h), 131,400,000 Nm3 LFG is resulted in the year at full capacity. Then, the range is 65,700,000-197,100,000Nm3/year. PP has consider a phase II and phase III of the project activity to confirm the results of the common practice analysis.

Sub-step 4a(2): In the applicable geographical area, identify all plants that deliver the same output or capacity within the applicable output range, calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities and projects activities undergoing validation shall not be included in this step.

It was considered the geographical area of Brazil and the projects operational before the starting date of the Oeste de Caucaia Landfill Project Activity (25/10/2013) /48/.

Verified in the 2012 Management Diagnosis of Municipal Solid Waste" (from the Portuguese "Diagnóstico do Manejo do Resíduos Sólidos Urbanos 2012") prepared by the Brazilian Ministry of the Cities, that it was not identified any landfill which collects LFG and upgrades it to natural gas quality. Moreover, According to the "Brazilian Atlas of Greenhouse Gas Emissions and Energetic Potential in the Residues Destination" published by ABRELPE in 2013, there are 22 (twenty-two) LFG projects whose encompass electricity generation and 1 (one) predicts the upgrading of biogas to NG distribution system /45/. However, the identified project similar to Oeste de Caucaia Landfill Project Activity is Gramacho landfill, which is also a CDM project activity (ref. 9087). Therefore, N_{all}= 0

Sub-step 4a(3): Within the plants identified in Step 2, identify those that apply technologies different to the technology applied in the proposed project activity. Note their number N_{diff}.

Since there is no similar projects identified without being CDM. N_{all} = 0, N_{diff} = 0.

Sub-step 4a(4): Calculate factor $F=1-N_{diff}/N_{all}$, representing the share of plants using a technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity. The proposed project activity is regarded as common practice within a sector in the applicable geographical area if both the following conditions are fulfilled:

	(a) The factor F is greater than 0.2; and (b) N_{all}-N_{diff} is greater than 3. From the above, there are no projects similar to Oeste de Caucaia Landfill Project Activity.
Findings	CL 4: Project participants are requested to clarify why the fair value was not considered in the calculation of IRR. CL 5: Project participants are requested to clarify how the project activity is qualified on financial programs available at the Brazilian Development Bank CL 6: Project participants are requested to provide the evidences, taking in consideration the period of investment decision, of all input parameters applied on the investment analysis, as per VVS: • Price of biogas; • The yearly amount of biogas produced; • The investment values; • Electric energy; • Operation and Maintenance; • Civil works; • Insurance; • Administrative costs; • others CL 7: Project participant are requested to clarify why the depreciation was not included in the investment spreadsheet. CL 8: For the prevailing practice barrier, PDD has presented data from the Pesquisa Nacional de Saneamento Básico of 2008, however it is not possible to confirm that data remained the same at the time of project implementation. CAR 6: The date of the notification (prior consideration) described in the PDD is not in accordance with the evidences provided CAR 7: Project participants are requested to include in PDD the values each parameter on the sensitivity analysis that allows to the project activity the achievement of benchmark CAR 8: For the common practice analysis PDD version 1 is not considering the installed capacity of the project plant. CAR 9: For the common practice analysis PP has presented a study from 2008, however it is not possible to confirm that the situation remained the same at the time of project starting date. CAR 22: The price of the NG presented in the investment analysis for the northeast region are not according to the Monthly Reports of the Mines and Energy Ministry CAR 23: The unit for the NG price presented in the sensitivity analysis when considering an increase in the NG price of 12.1% to NPV zero is not correct, moreover, the table 7-Projection of NG price in Brazil presents the values in different units of the investment analysis. CAR 24: The value presented for the investment in 17.6km of pipeline from the landfill to the NG network in the investment analysis could not be found in the evidence presented (LANDTEC_Feasibility study ASMOC). CAR 25: The annual operating costs for the project activity as 6,932,500 (US$/yr) was estimated based on values available for a similar project that has been developed from the same shareholders of the proposed project activity. PPs shall further justify how the

	O&M costs for the similar project are representative for the project activity under consideration. In particular, the PPs shall explain how the O&M costs of the CDM similar project have been validated, as the similar project is under validation. In doing so, the PPs shall provide a breakdown of the O&M costs and clarify how the value of O&M costs used in the NPV calculations has been checked with actual values since the similar CDM project is not operational. Please refer to VVS paragraph 154 (b).
Conclusion	To close out CAR 6, the date of prior notification was revised. To close out CAR 7 PP included the breakeven analysis in the investment spreadsheet. The common practice analysis was revised considering the project starting date and installed capacity of the project, therefore CAR 8, CAR 9 and CI 8 were closed. To close out CL 4 and CL 7, the fair value and depreciation were considered in the analysis. To close out CL 5 PP has presented the support information regarding BNDES programs and to close out CL6 PP has provided the evidences of the input parameters used in the financial analysis. To close out CAR 22, CAR 23 the natural gas prices and unit were revised. PP clarified the OPEX applied in the analysis and CAR 24 and CAR 25 were closed. RINA can confirm that all data, rationales, assumptions, justifications and documentation provided by the project participants to support demonstration of additionality are credible and reliable. By assessing the evidences presented and cross-checking the information contained in, RINA considers the reasonings for the proposed project additionality demonstration is credible and reasonable i.e. the proposed project has the ability to reduce anthropogenic emissions of greenhouse gases by sources below those that would have occurred in the absence of the registered CDM project activity.

D.8.7. Emission reductions

Means of validation

The approved baseline and monitoring methodology ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013 /05/ has been applied.

The ex-ante parameters that are mentioned in the methodology are included in the PDD and are provided in compliance with the methodology:

	Data/parameter	Unit	Value applied	Assessment
1	OX_{top_layer} (Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline)	Dimension less	0.1	Consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal sites" /16/.
2	GWP_{CH4}: Global Warming Potential of CH_4.	tCO_2e/tCH_4	25	In accordance with Standard for application of the global warning potentials to clean development mechanism project activities and programmes of activities for the second commitment period of the Kyoto protocol /19/
3	**NCV_{CH4}:** Net calorific value of methane at reference conditions	TJ/t_{CH4}	0.0504	PP applied the value in accordance with the methodology /05/
4	- η_{PJ} : Efficiency of the LFG capture system that will be installed in the project activity.	Dimension less	50%.	PP applied the value in accordance with the methodology /05/

	5	$\varphi_{default}$: Default value for the model correction factor to account for model uncertainties.	-	0.75	Value applied considering MAT = 26.6ºC and MAP= 1.643 mm, considering data for Ceará state. /52/ In accordance with "Emissions from solid waste disposal sites" /16/. This parameter is used to determine the baseline emissions following the procedures related to Application A.	
	6	***fy*** (Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y)	-	0	In accordance with the ACM0001 methodology this value is to be assigned since the amount of LFG that would have been captured and destroyed is already accounted for in Equation 2. As per the applicable methodological tool "Emissions from solid waste disposal sites", for application A, this parameter is determined once for the crediting period (fy = f).	
	7	***OX***: Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)	-	0	Value applied in accordance with the tool "Emissions from solid waste disposal sites" /16/. As per the AM_CLA_0259 clarification request final response, it was opted not to account for this effect while determining the ex-ante estimative of baseline emissions /53/.	
	8	***F***: Fraction of methane in the SWDS gas (volume fraction).	-	0.5	Value applied in accordance with the tool "Emissions from solid waste disposal sites"/16/	
	9	$DOC_{f,default}$: Default value for the fraction of degradable organic carbon (DOC) in MSW	Weight fraction	0.5	The proposed project activity corresponds to *Application A* described in the applicable methodological tool	

		that decomposes in the SWDS.			*"Emissions from solid waste disposal sites" /16/*. Therefore, in accordance with the requirements set out by tool, the default value was chosen.
	10	***MCF*$_{default}$**: Methane correction factor.	-	1.0	The proposed project activity corresponds to *Application A* described in the applicable methodological tool *"Emissions from solid waste disposal sites" /16/*. Therefore, in accordance with the requirements set out by tool, the default value was chosen. The Oeste de Caucaia Landfill Project Activity meets the criteria of managed SWDS. Hence, the value corresponding to anaerobic managed solid waste disposal sites is chosen considering option a) 1.0 for anaerobic managed solid waste disposal sites. These must have controlled placement of waste (i.e. waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) levelling of the waste; The choice chosen by PP was confirmed during the onsite visit.
	11	***DOC*$_j$**: Fraction of degradable	weight fraction	***DOC*$_j$ (% wet** | ***Waste type j***	Value applied in accordance with the tool

		organic carbon in the waste type *j*		***waste)*** | | 43% | Wood and wood products 40% | Pulp, paper and cardboard 15% | Food, food waste, beverages and tobacco 24% | Textiles 20% | Garden, yard and park waste 0% | Glass, plastic, metal, other inert waste	"Emissions from solid waste disposal sites"/16/ Industrial sludge and domestic sludge are not applicable to this project in accordance with third part report /32/ and fruit brunches is classified as Food, food waste, beverages and tobacco.
	12	***k_j:*** Decay rate for the waste type *j*	1/yr	***Waste type j*** | ***k_j*** | **Slowly degrading** | Pulp, paper, cardboard (other than sludge), textiles | 0.07 | **Slowly degrading** | Wood, wood products and straw | 0.035 | **Moderately degrading** | Other (non-food) organic putrescible garden and park waste | 0.17 | **Rapidly degrading** | Food, food waste, sewage sludge, beverages and tobacco | 0.40	Value applied considering MAT = 26.6ºC and MAP= 1.643 mm, considering data for Rio de Janeiro. /52/.In accordance with "Emissions from solid waste disposal sites" /16/.- Tropical (MAT>20°C) – Wet (MAP > 1000 mm)
	13	***W_x*** Total amount of waste disposed in a SWDS in year *x*	T	Several data is presented in the CERs spreadsheet /22/	Verified that data is in accordance with the Landtec report /38/ considering the operation of the landfill until 2031.

14	**Ru**: Universal ideal gases constant	Pa.m3/kmol.K	8,314	Value applied in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/.
15	MM_i: Molecular mass of greenhouse gas i (i = CH4)	kg/kmol	16.04	Value applied in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/.
16	MM_k: Molecular mass of greenhouse gas ki (k = N_2)	kg/kmol	28.01	Value applied in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/.
17	P_n: Total pressure at normal conditions	Pa	101,325	Value applied in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/.
18	T_n: Temperature at normal conditions	K	273.15	Value applied in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/.
19	$FC_{i,m,y}$, $FC_{i,y}$, $FC_{i,k,y}$, $FC_{i,n,y}$ *and* $FC_{i,n,h}$ Amount of fuel type i consumed by power plant/unit m, k or n (or in the project electricity system in case of $FC_{i,y}$) in year y or hour h)	mass or volume unit	Several values presented in the emission factor spreadsheet /30/	Calculated based on data from Official publications (data from ONS) /50/, IPCC default values /19/ and default values provided by the *"Tool to calculate the emission factor for an electricity system" /15/*
20	$EF_{CO2,i,y}$ ***and*** $EF_{CO2,m,i,y}$: CO_2 emission factor of fossil fuel type i used in power unit m in year y	tCO_2/GJ	Several values presented in the emission factor spreadsheet /30/	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories /28/. IPCC default values are being used since this information is neither provided by fuel suppliers nor regional and/or local default values are

					publicly available. RINA verified that the values used are from IPCC /28/	
	21	$EG_{m,y}$ **and** $EG_{k,y}$ Net electricity generated by power plant/unit *m* or *k* in year *y*.	MWh	Several values presented in the emission factor spreadsheet /30/	Based on data published by the National Operator System (ONS) for 2011, 2012 and 2013 years /50/.	
	22	$\eta_{m,y}$: Average net energy conversion efficiency of power unit *m* in year *y*.	-	Several values presented in the emission factor spreadsheet /30/	Default values provided in Annex 1 of the *"Tool to calculate the emission factor for an electricity system"* Value applied: several values./15/	
	23	$EF_{grid,OM-adj,y}$: Simple adjusted operating margin CO_2 emission factor in year *y*	tCO_2/MWh	0.3612	Calculated based on Official publications (data from ONS) /50/ IPCC default values and default values provided by the "Tool to calculate the emission factor for an electricity system". Ex ante option chosen. Data for the years 2011, 2012 and 2013 latest data available at the time of the validation /30/. PP has provided the raw data /50/ for the calculation of the emission factor. RINA has randomly cross checked some values in order to confirm the correct data transference	

24	***$EF_{BM,2013}$*** **:** Build Margin CO_2 emission factor in year *y*.	tCO_2/MWh	0.2850	Calculated based on Official publications (data from ONS), IPCC default values and default values provided by the "Tool to calculate the emission factor for an electricity system" /08/. Ex ante option chosen. Data for the year 2013 /30/. PP has provided the raw data /50/ for the calculation of the emission factor. RINA has randomly cross checked some values in order to confirm the correct data transference.

The emission reduction ER_y by the proposed project actiity during the crediting period is the difference between baseline emissions (BE_y), project emission (PE_y) and emissions due to leakage (L_y) as follows.

Baseline emissions

In accordance with the applied methodology the baseline emissions is calculated as follow:

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

Where:

BE_y= Baseline emissions in year y (t CO2e/yr)

$BE_{CH4,y}$= Baseline emissions of methane from the SWDS in year y (t CO2e/yr)

$BE_{EC,y}$ = Baseline emissions associated with electricity generation in year y (t CO2/yr). Not applicable to this project activity.

$BE_{HG,y}$= Baseline emissions associated with heat generation in year y (t CO2/yr). Not applicable to this project activity.

$BE_{NG,y}$ = Baseline emissions associated with natural gas use in year y (t CO2/yr).

Baseline emissions associated with heat generation in year y ($BE_{HG,y}$) and electricity generation in year y ($BE_{EC,y}$) are not applicable to the proposed project activity and, therefore, they are zero.

Baseline emissions of methane from the SWDS (*$BE_{CH4,y}$*)

$$BE_{CH4} = \left(\left(1 - OX_{top_{layer}}\right) \times F_{CH4,PJ,y} - F_{CH,BL,y} \right) \times GWP_{CH4}$$

Where:

$BE_{CH4,y}$ = Baseline emissions of methane from the SWDS in year *y* (t CO_2e/yr)

$OX_{top_{layer}}$ = Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)

$F_{CH4,PJ,y}$ = Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (t CH_4/yr)

$F_{CH4,BL,y}$ = Amount of methane in the LFG that would be flared in the baseline in year *y* (t CH_4/yr)

GWP_{CH4} = Global warming potential of CH_4 (t CO_2e/t CH_4)

Ex post determination of $F_{CH4,PJ,y}$

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

Where:

$F_{CH4,PJ,y}$ = Amount of methane in the LFG which is flared and/or used in the project activity in year y (t_{CH4}/yr)

$F_{CH4,flared,y}$ = Amount of methane in the LFG which is destroyed by flaring in year *y* (tCH_4/yr)

$F_{CH4,EL,y}$ = Amount of methane in the LFG which is used for electricity generation in year *y* (tCH_4/yr)

$F_{CH4,HG,y}$ = Amount of methane in the LFG which is used for heat generation in year *y* (tCH_4/yr)

$F_{CH4,NG,y}$= Amount of methane in the LFG which is sent to the natural gas distribution network and/or to the trucks in year *y* (tCH_4/yr)

In the project activity $F_{CH4,EL,y}$ and $F_{CH4,HG,}$y are not applicable, therefore are zero, confirmed during the onsite visit.

The parameter $F_{CH4,NG,y}$ is done using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/.

The proposed project activity is under commissioning and it is not known if temperature/pressure will be monitored in all metering points, the PDD presents the most possible scenario for biogas and methane monitoring. In spite of the options chosen at the time of the project verification, monitoring will be followed according to ACM0001 /05/ and the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/

The most plausible scenario for calculating $F_{CH4,NG,y}$ is Option A of the Tool (i.e. mass flow biomethane and volumetric fraction of methane measured in dry basis). Then, $F_{CH4,NG,y} = F_{i,t}$.

While considering this option, it is necessary to demonstrate that the gaseous stream is dry by:

(a) Measuring the moisture content of the gaseous stream (CH2O,t,db,n) and demonstrate that this is less or equal to 0.05 kg H2O/m^3 dry gas; or

(b) Demonstrating that the temperature of the gaseous stream (Tt) is less than 60°C (333.15 K) at the flow measurement point

If it cannot be demonstrated that the gaseous stream is dry, then the flow measurement should be assumed to be on a wet basis and the corresponding option available in the tool should be applied instead.

$F_{i,t} = V_{t,db} * v_{i,t,db} * \rho_{i,t}$ and $\rho_{i,t} = (P_t * MM_i) / (R_u * T_t)$

Where:

$F_{i,t}$ = Mass flow of CH4 in the gaseous stream (gas sent to electricity generation facility) in time interval t (kg gas/h)

$V_{t,db}$ = Volumetric flow of the gaseous stream in time interval t on a dry basis (m3 dry gas/h) – of the gas sent to electricity generation facility

$v_{i,t,db}$ = Volumetric fraction of CH4 in the gaseous stream in time interval t on a dry basis (m3 gas i/m3 dry gas)

$\rho_{i,n}$ = Density of CH4 in the gaseous stream in time interval t (kg gas i/m3 gas i)

P_t = Absolute pressure of the gaseous stream in time interval t (Pa)

T_t = Temperature of the gaseous stream in time interval t (K)

MM_i = Molecular mass of CH_4 (kg/kmol)

R_u = Universal ideal gases constant (Pa.m^3/kmol.K)

Amount of methane destroyed by flaring ($F_{CH4,flared,y}$)

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

Where:

$F_{CH4,flared,y}$= Amount of methane in the LFG which is destroyed by flaring in year y (t CH_4/yr)

$F_{CH4,sent\_flare,y}$ = Amount of methane in the LFG which is sent to the flare in year y (t CH_4/yr)

$PE_{flare,y}$ = Project emissions from flaring of the residual gas stream in year y (t CO_2e/yr)

GWP_{CH4} = Global warming potential of CH4 (t CO_2e/t CH_4)

For calculating $F_{CH4,sent\_flare,y,}$ Option C of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/ is the most plausible scenario (i.e., LFG and volumetric fraction of methane measured in wet basis). Then, $F_{CH4,sent\_flare,}y = F_{i,t}$

$F_{i,t} = V_{t,wb,n} * v_{i,t,wb} * \rho_{i,n}$ and $\rho_{i,n} = (P_n * MM_i) / (R_u * T_n)$

Where:

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

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

$v_{i,t,wb}$ = Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a wet basis (m^3 gas i /m^3 wet gas);

$\rho_{i,n}$ = Density of greenhouse gas i in the gaseous stream at normal conditions (kg gas i/m^3 wet gas i);

P_n = Absolute pressure at normal conditions (Pa);

MM_i= Molecular mass of greenhouse gas i (kg/kmol);

R_u = Universal ideal gases constant (Pa.m3/kmol.K).

T_n = Temperature at normal conditions (K);

The following equation should be used to convert the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure:

$V_{t,wb,n} = V_{t,wb} \times [(T_n/T_t) \times (P_t/P_n)]$

Where:

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

$V_{t,wb}$ = Volumetric flow of the gaseous stream in time interval t on a wet basis (m^3 wet gas/h);

T_n= Temperature at normal conditions (K)

T_t= Temperature of the gaseous stream in time interval t (K);

P_t= Pressure of the gaseous stream in time interval t (Pa);

P_n= Absolute pressure at normal conditions (Pa);

It is important mentioning that the upgraded gas that does not reach specifications to be delivered in the NG pipeline will be flared. For the determination of biogas resulted from the upgrade system return that will be flared, Option A is the most plausible scenario to be applied (volume flow of biomethane and volumetric flow of methane measured in dry basis) following equations described above

Considering the possibility of installation of two more flares in the project expansion scenario, $PE_{flare,y}$ will be determined as the sum of the emissions for each flare determined separately following ACM001.

RINA verified that for the ex ante calculation it is estimeted that 95% of the biogas collected will be upgraded and 5 % will be flared /22/

The GWP_{CH4} is 25 tCO_2e/tCH_4, in accordance with IPCC Fourth Assessment Report: Climate Change 2007 /19/

Project emissions from flaring

Project emissions are related to the amount of methane not destroyed in the flare and will be calculated following the procedures of the methodological tool “Project emissions from flaring”.

The project will install an open flare and Oeste de Caucaia Landfill Project will adopt the default flare efficiency.

The calculation of flare efficiency will be made by the following steps:

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

The mass flow of methane in the residual gaseous stream in the minute *m* ($F_{CH4,m}$) will be determined using the procedures set out by the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”.

$F_{CH4,m}$, which is measured as the mass flow during minute *m*, shall then be used to determine the mass of methane in kilograms fed to the flare in minute *m* ($F_{CH4,RG,m}$). $F_{CH4,m}$ shall be determined on a dry basis. Please note that this parameter corresponds to $F_{CH4,flared,y}$. Therefore, the same methodological approaches apply to both parameters (Option C of the tool described above). However, the upgraded gas, which does not reach quality specifications to be delivered into the NG pipeline, will be flared. In this case, Option A of the tool will be applied as explained

above. Please refer to methodological explanations for the ex-post determination of $F_{CH4,sent\_flare,y}$ and monitoring equipment in section B.7.3

STEP 2: Determination of flare efficiency

The Oeste de Caucaia Landfill Project will install one open flare. Therefore, in accordance with the methodological tool, the flare efficiency in the minute *m* ($\eta_{flare,m}$) is 50% when the flame is detected in minute *m* ($Flame_m$), otherwise $\eta flare,m$ is 0%.

STEP 3: Calculation of project emissions from flaring
Project emissions from flaring are calculated as the sum of emissions from each minute *m* in year *y*, based on the methane flow rate in the residual gas ($F_{CH4,RG,m}$) and the flare efficiency ($\eta_{flare,m}$), as follows:

$$PE_{flare,y} = GWP_{CH_4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \cdot \left(1-\eta_{flare,m}\right) \times 10^{-3}$$

Where,

$PE_{flare,y}$ = Project emissions from flaring of the residual gas stream in year *y* (tCO_2e)

GWP_{CH4}= Global Warming Potential (tCO_2e/tCH_4) valid for the commitment period

$F_{CH4,RG,m}$ = Mass flow of methane in the residual gas in the minute *m* (kg)

$\eta_{flare,m}$ = Flare efficiency in the minute *m*

- RINA verified that for the ex ante calculation it is estimeted that 95% of the biogas collected will be upgraded and 5 % will be flared /22/
-

Year	$PE_{flare,v}$ *(tCO_2e/year)*
2016	148,672
2017	15,329
2018	16,358
2019	17,290
2020	18,154
2021	18,970
2022	19,753

Ex ante estimation of $F_{CH4,PJ,y}$, in accordance with ACM0001 /05/

$$F_{CH4,PJ,y} = \eta_{PJ} \cdot BE_{CH4,SWDS,y}/GWP_{CH4}$$

$F_{CH4,PJ,y}$= Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH_4/yr)

$BE_{CH4,SWDS,y}$= Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year y (t CO_2e/yr);

η_{PJ}= Efficiency of the LFG capture system that will be installed in the project activity, this is considered as 50% considering the default value provide in the methodology.;

GWP_{CH4}= Global warming potential of CH_4 (t CO_2e/t CH_4);

$BE_{CH4,SWDS,y}$ is determined using the methodological tool *"Emissions from solid waste disposal sites"* /16/;

PDD applies the "Application A" of the tool: The CDM project activity mitigates methane emissions from a specific existing SWDS. The amount of methane that would in the absence of the project activity be generated from disposal of waste at the solid waste disposal site ($BE_{CH4,SWDS,y}$) is calculated with a multi-phase model. The calculation is based on a first order decay (FOD) model.

$BE_{CH4,SWDS,y}$= φyx (1-f_y)* GWP_{CH4}*(1-OX)*16/12*F*$DOC_{f,y}$*MCFy*∑∑ $W_{j,x}$* DOC_jx$e^{-k(y-x)}$*(1-e^{-kj})

$BE_{CH4,SWSD,\ y}$= Baseline methane emissions occurring in year y generated from waste disposal at the solid waste disposal site (SWDS) during a period ending in year y (tCO_2e/y);

φ= Model correction factor to account for model uncertainties (default value of 0.75), Option 1 in the Tool has been selected, value as per Table 3 of the Tool (Application A and humid wet conditions);

f= Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y. As this is already accounted for in $\boldsymbol{F_{CH4,BL,y}}$, "f" in the Tool shall be assigned a value of 0;

GWP_{CH4}= Global Warming Potential (GWP) of methane, valid for the relevant commitment period

OX= Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) (default Tool value 0.1);

F= Fraction of methane in the SWDS gas (volume fraction) (0.5);

$DOC_{f,y}$= Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWSD for year y (weight fraction). Default value of 0.5 used as per page 65 of the Tool;

MCF_y= Methane correction factor for year y (1.0);

$W_{j,x}$= Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year *x* (t);

DOC= Fraction of degradable organic carbon (by weight fraction) in the waste type *j;*

k_j= Decay rate for the waste type *j (1/yr);*

j= Type of residual waste or types of waste in the MSW;

x= Years in the time period in which waste is disposed at the SWSD, extending from the first year in the time period (x=1) to year (x = y);

y= Year for which methane emissions are calculated (considering a consecutive period of 12 months)

RINA verified that the estimated amount of waste to be received is based ECOFOR estimative (landfil operator) described in the Landtec viability study /38/

Determination of $F_{CH4,BL,y}$

In accordance with the methodology /05/ and AM_CLA_0265 /51/ the project falls into case 3, the project falls into case 3, where $F_{CH4,BL,y} = F_{CH4,BL,sys,y}$. As there is no monitored or historic data on the amount of methane that was captured in the year prior to the implementation of the project situation (option C), the following equation applies:

$F_{CH4,BL,sys,y}$ =0.2 x $F_{CH4,PJ,y}$

Baseline emissions associated with natural gas use ($BE_{NG,y}$)

$BE_{NG,y}$ is estimated as follows:

$BE_{NG,y}$ = 0.0504 x $F_{CH4,NG,y}$ x $EF_{CO2,NG,y}$

Where,

$BE_{NG,y}$ = Baseline emissions associated with natural gas use in year y (t CO_2/yr);

$EF_{CO2,NG,y}$ = Average CO_2 emission factor of natural gas in the natural gas network or in trucks in year y (tCO_2/TJ);

$F_{CH4,NG,y}$ = Amount of methane in the LFG which is sent to the natural gas distribution network or in trucks in year y (t_{CH4}/yr);

$EF_{CO2,NG,y}$ is determined using the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /09/. For the ex ante estimative it is applied the IPCC default value at the upper limit of the uncertainty at a 95% confidence equal to 58.3tCO2e/TJ /28/

RINA verified that for the ex ante calculation it is estimeted that 95% of the biogas collected will be upgraded and 5 % will be flared /22/

The results of the baseline estimatives are summarized bellow:

Year	*$BE_{CH4,y}$ (tCO_2/yr)*	*$BE_{NG,y}$ (tCO_2/yr)*
2016	407.786	31.619
2017	441.474	68.463
2018	471.107	73.058
2019	497.940	77.220
2020	522.824	81.078
2021	546.342	84.726
2022	568.897	88.223

Project emissions

In accordance with ACM0001, emissions are electricity and fossil fuel consumption:

$PEy = PE_{EC,y} + PE_{FC,y} + PE_{DT,y}$

$PE_{EC,y}$= Emissions from consumption of electricity due to the project activity in year y (t CO_2/yr).
$PE_{FC,y}$= Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (t CO_2/yr).
$PE_{DT,y}$= Emissions from the distribution of compressed/liquefied LFG using trucks, in year y (tCO_2/yr)

$PE_{DT,y}$ is zero, since the project activity will not make use of trucks to distribute compressed/liquefied LFG. The project emissions from electricity consumption ($PE_{EC,y}$) will be calculated following the procedures set out by the "Tool to estimate the baseline, project and/or leakage emissions from electricity consumption". During the crediting period, electricity from the grid will be consumed for the operation of the active LFG collection system and LFG upgrading facility. In addition, it will also be considered the emissions of the potential diesel generator for emergency purposes.

The project will consume electricity from the grid. Therefore, Option A.1 of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" is used. Under this option, project emissions from consumption of electricity from the grid are calculated based on the power

consumed by the project activity and the emission factor of the grid, adjusted for transmission losses, using the following formula:

$$PE_{EC,grid,y} = \sum_{j} EC_{PJ,j,y} \times EF_{EL,j,y} \times \left(1 + TDL_{j,y}\right)$$

$PE_{EC,grid,y}$= Project emissions from electricity consumption from the grid by the project activity during the year y (tCO_2/year);
$EC_{PJ,y}$= Quantity of electricity consumed by the project electricity consumption source j in year y (MWh)
$EF_{EL,j,,y}$= Emission factor for electricity generation for source j in year (tCO_2/MWh)
$TDL_{j,y}$= Average technical transmission and distribution losses for providing electricity to source j in year y
j= Sources of electricity consumption in the project

The Emission Factor is calculated according with the "Tool for calculation of emission factor for electricity systems"./15/
STEP 1 - Identify the relevant electricity systems
The grid considered by PP was defined by Brazilian DNA and correspond to the Brazilian Interconnected Grid as a single system. /25/

STEP 2 – Choose whether to include off-grid power plants in the project electricity system

(optional).
Option I of the tool is chosen, which is to include only grid power plants in the calculation.

STEP 3 - Select a method to determine the operating margin (OM) ($EF_{grid,OM,y}$).
For the calculation of the operating margin, in the PDD version 1 PP has chosen the option (b) Simple adjusted OM, using the *ex-ante* option, considering data available for 2011, 2012 and 2013 /30/

STEP 4 - Calculate the operating margin emission factor according to the selected method

$$EF_{grid,OM-adj,y} = (1-\lambda_y) \cdot \frac{\sum_m EG_{m.y} \times EF_{EL,m,y}}{\sum_m EG_{m.y}} + \lambda_y \cdot \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}}$$

$EF_{grid,OM-adj,y}$= Simple adjusted operating margin CO_2 emission factor in year y (tCO_2/MWh)
λ_y= Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year y
$EG_{m,y}$= Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EG_{k,y}$= Net quantity of electricity generated and delivered to the grid by power unit k in year y (MWh)
$EF_{EL,m,y}$= CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$EF_{EL,k,y}$= CO_2 emission factor of power unit k in year y (tCO_2/MWh)
m= All grid power units serving the grid in year y except low-cost/must-run power units
k= All low-cost/must run grid power units serving the grid in year y
y= The relevant year as per the data vintage chosen in Step 3

Determination of $EF_{EL,m,y}$

$$EF_{EL,m,y} = \cdot \frac{EF_{CO2,m,i,y} \cdot 3.6}{\eta_{m,y}}$$

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$EF_{CO2,m,i,y}$= Average CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ)
$\eta_{m,y}$ = Average net energy conversion efficiency of power unit m in year y (ratio)
m= All power units serving the grid in year y except low-cost/must-run power units
y= The relevant year as per the data vintage chosen in Step 3

RINA verified that the emission factor values of the fuels are from IPCC /28/

RINA verified that the values for the Average net energy conversion efficiency of power unit used are the ones recommended by the Board in Appendix 1 of the Tool to calculate the emission factor for an electricity system. /15/

Determination of $EG_{m,y}$

PP has used data provided by ONS /50/ that is responsible for coordinating and controlling the operation of generation and transmission facilities in the Brazilian Interconnected System (SIN) under supervision and regulation of the ANEEL.
$EF_{grid,OM-adj,2011-2013}$= 0.3612 tCO_2e/MWh /30/

STEP 5 - Calculate the build margin (BM) emission factor

PP has chosen option 1 in the first crediting period, therefore, data was updated with most recent data available at the time of the validation, from 2013.
$EF_{grid,BM,2013}$= 0.2850 tCO_2e/MWh /30/

STEP 6 – Calculate the combined margin (CM) emissions factor

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

$EF_{grid,BM,y}$= Build margin CO_2 emission factor in year y (tCO_2/MWh);
$EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (tCO_2/MWh);
w_{OM}= Weighting of operating margin emissions factor (%)

w_{BM}= Weighting of build margin emissions factor (%).

According with the Tool, values adopted for W_{OM} and W_{BM} were equal to 0.50 and 0.50, respectively.
$EF_{grid,CM,y}$= 0.3231 tCO_2e/MWh /30/

The electricity consumed by the LFG capture system and LFG upgrading facility was ex-ante estimated from the PP, based on a similar project, considering that equipment will operate at full capacity during 8,760hours/year, resulting in 16,673MWh/year /54/. For the ex-ante estimative for the energy consumption PP is considering data from the local electricity distribution company (Companhia Energética do Ceará - COELCE) published by the Brazilian Electricity Regulatory Agency – ANEEL that describes losses as 9.36 % /55/. Therefore, the ex ante estimative results:
$PE_{EC,grid,y}$ = 16,673 MWh/yr * 0.3231 tCO2/MWh * (1+9.36%) = 5,892 $tCO2_e$/yr

In order to calculate project emissions resulting from combustion of fossil fuels (LPG for ignition of the flare), the ¨Tool to calculate project or leakage emissions from fossil fuel combustion¨ will be used. Project emissions related to this source are estimated using the following formulae
$PE_{FC,j,y}$ = SUM($FC_{i,j,y}$ * $COEF_{i,y}$)

$PE_{FC,j,y}$ = Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);

$FC_{i,j,y}$ = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);

$COEF_{i,y}$= Is the CO_2 emission coefficient of fuel type i in year y (tCO2/mass or volume unit)

i= Are the fuel types combusted in process j during the year y

The CO2 emission coefficient COEFi,y will be calculated using Option B of the Tool since the necessary data for Option A is not available. As per Option B, the CO2 emission coefficient COEFi,y is calculated based on net calorific value and CO2 emission factor of the fuel type i, as follows:

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

$COEF_{i,y}$ = Is the CO2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

$NCV_{i,y}$ = Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)

$EF_{CO2,i,y}$= Is the weighted average CO2 emission factor of fuel type i in year y (tCO2/GJ)

i= Are the fuel types combusted in process j during the year y

It is estimated that the project activity will consume 240.35 Kg of LPG for the flare ignition, based on a similar project. The NCVi,y of 0.0465 GJ/kg is in accordance the 2014 Brazilian Energy Balance /43/ and $EF_{CO2i,y}$ of 0.0656tCO2/GJ is from the 2006 IPCC Guidelines on National GHG Inventories (at the upper limit of the uncertainty at a 95% confidence interval following the Tool) /26/, resulting in a COEFi,y = 0.00305 tCO_2/kg while using Option B of the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”.

The ex ante estimative is $PE_{FC,j,y}$ = 240.35kg/yr * 0.00305 tCO_2/kg = 0.73tCO_2/yr

If a fossil fuel generator is installed at the project site for electricity generation, fuel consumption will be also monitored following equations above

Leakage

According to ACM0001, there is no need to account for leakage.

Emission Reductions

Emission reductions will be calculated using the formula below:
ERy = BEy – PEy

Where,

ERy = Emission reductions during the year y (tCO2e)
BEy = Baseline emissions in year y (tCO2e)
PEy = Project emissions in year y (tCO2e)

The summary of the ex ante calculation of emissions reductions are summarized bellow:

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2016	439.406	154.564	0	284.841
2017	509.937	21.221	0	488.715
2018	544.166	22.250	0	521.916
2019	575.159	23.182	0	551.978
2020	603.902	24.046	0	579.856
2021	631.067	24.862	0	606.205
2022	657.120	25.646	0	631.475
Total	**3.960.757**	**295.771**	**0**	**3.664.985**
Total number of crediting years	7			
Annual average over the crediting period	565.822	42.253	0	523.569

Findings

CL 10: PP is requested to clarify how the methane collected in the passive system was considered in the determination of the $F_{CH4,BL,y}$

CL 12: For the calculation of the operating margin, in the PDD version 1 PP has chosen the option (b) Simple adjusted OM, using the ex-ante option, considering data available for 2010, 2011 and 2012, however, it is not clear why data from 2013 was not used.

CL 13: PP did not provide the raw data from ONS used to calculate the emission factor

CL 14: For the operation margin, PDD version 1 describes that option 1 was chosen, using data from 2012. However, it is not clear why data from 2013 was not considered.

CL 15: The evidence for the estimative of fossil fuel consumption was not provided.

CAR 10: PP has described in the PDD version 1 that option A of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" was chosen to determine the parameter however it is not possible to confirm during the on site visit that the monitoring of the requirements of option A will be monitored (the temperature of the gaseous stream (Tt) is less than 60ºC (333.15 K) at the flow measurement point).

CAR 11: In the PDD version 1, ex ante estimative described on section B.6.3 it is not possible to confirm the fossil fuel that will be used in the project activity (diesel x LPG or both)

CAR 12: The CERs estimated in the PDD version 1 does not take into consideration the installed capacity of the purification plant and flare capacity.

CAR 13: PP has considered data from 1973-1990 to determine the MAT and MAP/PET values . PP is requested to clarify why most recent data from was not used

	CAR 14: PDD version 1 do not list in the parameters available at validation the parameters ***Pn*** (Pa) Atmospheric pressure at normal conditions and ***Tn*** (K). Temperature at normal conditions in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" CAR 20: The values presented in the section B.6.3 for the ex ante calculation are not in accordance with the values in the CERs spreadsheet (also consider the years of the crediting period) CAR 21: PDD describes in the section A.3 that there in order to ensure safety and, depending on the project performance, two more flares may be installed at the project site. However, it is not possible to confirm that the requirements of the paragraph 36 of the methodology will be followed: *$PE_{flare,y}$ shall be determined using the methodological tool "Project emissions from flaring". If LFG is flared through more than one flare, then $PE_{flare,y}$ is the sum of the emissions for each flare determined separately.*
Conclusion	To close out CAR 10, PDD was revised and describes the options to the $F_{CH4,NG,y}$ and $F_{CH4,sent\_flare,y}$. To close out CAR 11, PDD included the monitoring of the LPG and diesel. Additional information was done to the passive system and then CL 10 was closed. To close CAR 13, PP presented data to cross check the the values. The parameters Pn (Pa) and Tn (K) were included in the PDD and CAR 14 was closed The CERs estimative was revised to consider the installed capacity of the project activity, and section B.6.3 was revised accordingly therefore CAR 12 and CAR 20 were closed. To close out CL 12, CL 13 and CL 14 the emission factor data was revised to consider the year 2013 and the evidences were provided. PP also provided the evidences of the estimative of fossil fuel consumption and CL 15 was closed. To close CAR 21 PP confirmed that the methodology will be followed in case of more than one flare installed. It is RINA's opinion: (a) All assumptions and data used by the PP are listed in the PDD; (b) All documentation used by the PP as the basis for assumption and source of data is correctly quoted and interpreted in the PDD /05/ /10/ /12/ /13/ /15/ /16/ /19/ /28/ /30/ /32/ /50/ /52/; (c) All values used in the PDD and CERs spreadsheet. including GWPs are considered reasonable in the context of the proposed project activity (d) The baseline methodology and methodological tools have been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions; 05/ /08/ /09/ /10/ /12/ /13/ /14/ /15/ /16/ /17/ All estimates of the baseline emissions can be replicated using the data and parameters values provided in the PDD and CERs spreadsheet.

D.8.8. Monitoring plan

Means of validation

The approved baseline and monitoring methodology ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013 /05/ has been applied. The ex-post parameters that are mentioned in the methodology are included in the PDD and are provided in compliance with the methodology, and they will be monitored during the crediting period:

	Parameter	Description/Assessment
1	***Management of SWDS*** (-).	Value applied: not applicable. Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications. Monitoring frequency: annually.
2	$Op_{j,h}$ (-).Operation of the equipment that consumes the LFG.	Value applied: not applicable. *For the LFG upgrading facility* • Products generated. Monitor the generation of upgraded LFG which is sold to the consumer. This information can be cross-checked with

			invoices; *For the flaring system* • Flame. Flame detection system is used to ensure that the equipment is in operation; $Op_{j,h}$=0 when: No products are generated in the hour *h* Flame is not detected continuously in hour *h* (instantaneous measurements are made at least every minute); Otherwise, $Op_{j,h}$=1 Monitoring frequency: Hourly
	3	**$EG_{EC,y}$ (MWh).** Amount of electricity consumed by the project activity in year y	Value applied: 16,673. Sources of consumption include electricity consumed for the operation of the plant (process and administrative office). Electricity meters will measure the electricity consumed by the consumed by the LFG capture system and LFG upgrading facility. Monitoring frequency: continuous, aggregated at least annually. For the ex-ante estimative for the energy consumption PP is considering internal estimatives, based on a similar project /54/.
	4	$V_{t,wb}$ (m^3 wet gas/h). Volumetric flow of the gaseous stream in time interval *t* on a wet basis.	Value applied: Not used for ex-ante calculation. Data is measured continuously by a flow meter and at least hourly aggregated. Volumetric flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required. This parameter will be monitored in Option C, in order to calculate $F_{CH4,sent\_flare,y}$ (LFG flared) Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications.
	5	$V_{t,db}$ (m^3 dry gas/h). Volumetric flow of the gaseous stream in time interval *t* on a wet basis.	Value applied: Not used for ex-ante calculation. Data is measured continuously by a flow meter and at least hourly aggregated. Volumetric flow measurement should always refer to the actual pressure and temperature. Calculated based on the wet basis flow measurement plus water concentration measurement. Instruments with recordable electronic signal (analogical or digital) are required. This parameter will be monitored in Option A, , in order to calculate $F_{CH4,NG}$ and $F_{CH4,sent\_flare,y}$ (upgraded gas that does not reach specifications to be sent to the NG pipeline).Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications.
	6	$V_{i,t,db}$= (m^3 gas i/m^3 dry gas). Volumetric fraction of greenhouse gas i in a time interval t on a dry basis	Value applied: Not used for ex-ante calculation. Data is measured continuously by a gas analyzer and at least hourly aggregated. This parameter will be monitored in Option A, , in order to calculate $F_{CH4,NG}$ and $F_{CH4,sent\_flare,y}$ (upgraded gas that does not reach specifications to be sent to the NG

			pipeline). Calibration should include zero verification with an inert gas (e.g. N2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period
	7	**$V_{i,t,wb}$=** (m^3 gas i/m^3 wet gas). Volumetric fraction of greenhouse gas i in a time interval t on a wet basis	Value applied: Not used for ex-ante calculation. Data is measured continuously by a gas analyzer and at least hourly aggregated. This parameter will be monitored in Option C, in order to calculate $F_{CH4,sent\_flare,y.}$ Calibration should include zero verification with an inert gas (e.g. N2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period
	8	**Tt (K):** Temperature of the gaseous stream in time interval t.	Value applied: not applicable. Instruments with recordable electronic signal (analogical or digital) are required. The temperature will be measured by the flow meters turbines which possesses temperature sensors. Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be according to the manufacturer's specifications. Measured continuous and aggregated at least hourly. Applicable to Options A and C in order to determine $F_{CH4,NG}$ and $F_{CH4,sent\_flare,y}$ parameters.
	9	**Pt (Pa):** Pressure of the gaseous stream in time interval t	Value applied: not applicable. Instruments with recordable electronic signal (analogical or digital) are required. Examples include pressure transducers, etc.. Periodic calibration against a primary device must be performed periodically and records of calibration procedures must be kept available as well as the primary device and its calibration certificate. Pressure transducers (either capacitive or resistive) must be calibrated monthly. Measured continuous and aggregated at least hourly. Applicable to Options A and C in order to determine $F_{CH4,NG}$ and $F_{CH4,sent\_flare,y}$ parameters.
	10	***$Flame_m$*** (Flame on or Flame off). Flame detection of flare in the minute *m*.	Value applied: not applicable. Measure using a fixed installation optical flame detector type Ultra Violet detector. Monitoring frequency: Once per minute. Equipment shall be maintained and calibrated in accordance with manufacturer's recommendations
	11	**$TDL_{project,y}$** (%).Average technical transmission and distribution losses for providing electricity to source j in year y.	Value applied: 9.36% in accordance with data from the local electricity distribution company (Companhia Energética do Ceará - COELCE) published by the Brazilian Electricity Regulatory Agency – ANEEL /55/ Monitoring frequency: Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years
	12	***-$FCi_{,j,y}$ (kg/yr).*** Quantity of fuel type i combusted in process j during the year y (i = LPG).	Value applied: 240.35. Data will be monitored at every purchase. Conservatively, it shall be considered that all LPG purchase will be used.

	13	**NCV,i,y (GJ/kg).** Weighted average net calorific value of fuel type i in year y (i= LPG)	Value applied: 0.0465, in accordance with the Brazilian Energy Balance /43/. Review appropriateness of the values annually. Verify if the value is within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
	14	**$EF_{CO2,i,y}$** (tCO_2/GJ): Weighted average CO2 emission factor of fuel type i in year y (i = LPG).	Value applied: 0.0656. RINA verified that the value presented is in accordance with IPCC, upper limit of uncertainty 95% /28/. Any future revision should be taken into account
	15	**$EF_{CO2,i,y}$ (tCO_2/TJ):** Weighted average CO2 emission factor of fuel type i in year y (i = natural gas)	Value applied: 58.3. RINA verified that the value presented is in accordance with IPCC, upper limit of uncertainty 95% /28/. Any future revision should be taken into account.
	16	**$FC_{i,j,y}$** (kg/yr): Quantity of fuel type i combusted in process j during the year y	Value applied: not applicable. Conservatively, it shall be considered that all fossil fuel purchase will be used. The installation of a fossil fuel generator is possible considering intermittences of electricity supply at the project site. If this type of generator is installed at the project site, fossil fuel shall be monitored in order to calculation project emissions.
	17	**$NCV_{i,y}$** (GJ/m^3): Weighted average net calorific value of fuel type *i* in year *y*	Value applied: not applicable. Data from the Regional or national default values will be used. Data will be monitored in the case of installation of a fossil fuel generator due intermittences of electricity supply at the project site, applicable to option B of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". Verify if the value is within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
	18	**$EF_{CO2,i,y}$** (tCO_2/GJ): Weighted average CO2 emission factor of fuel type i in year y	Value applied: not applicable. Data from IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories following the tool. Data will be monitored in the case of installation of a fossil fuel generator due intermittences of electricity supply at the project site, applicable to option C of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion".

Management system and quality assurance

PDD establishes that the variables described in item B.7.1 will be automatically registered in a supervisory computer system. There will be a responsible person in charge of data checking in order to keep the process functioning. If the automatic transmission fails, the responsible person will contact an operator to register data

	manually. If data can be retrieved subsequently, they will be reintegrated on the server. Additionally, PDD describes that the CDM aspects of the project are managed by the administrators of the biogas and purification plant, who is in charge of monitoring activities. It is the ultimate responsibility of the Director to ensure the content of the monitoring report is correct at the time of requesting issuance. The CDM Project Managers supervises the calibration and maintenance procedures. Maintenance programs are carried out on site by the Field Technician, who also makes sure the monitoring tools are operating correctly. Moreover it is described that Employees involved in the monitoring will be periodically trained internally and/or externally. Training will include: Review of equipment, Calibration requirements, Configuration of monitoring equipment, maintenance requirements. It is also described that copies of the files will be stored up to two years after the end of the crediting period or the last issuance of CERs for this project activity whichever occurs later. Maintenance and calibration of the monitoring equipment and system will be made in accordance with manufacturer's recommendations and following national/international standards. Calibrations of measuring equipment will be carried out by an accredited person or institution. The plant is expected to have, which measures: (i) the landfill gas (LFG) sent to flare, (ii) the LFG sent to the upgrading system, (iii) the biomethane resulted from upgrading, (iv) the biomethane sent to the NG distribution system, (v) the biomethane which does not reach the required parameters to be delivered to the NG distribution system and, for this reason, is flared . The project sponsor ensures that if delays during the NG pipelines occur, the required monitoring will be proceeded to determine the biomethane loaded in trucks and delivered to off-site consumers in order to calculate baseline and project emissions, otherwise, emission reductions will be considered as zero during this period.
Findings	CL 9: PDD version 1 describes that the flow meter will convert automatically the volumetric flow to normal conditions, considering the temperature and pressure, however, the evidences were not presented CL 16: PDD version 1 describes that Weighted average CO2 emission factor of fuel type i in year y (i = natural gas) is from IPCC default values at the upper limit of the uncertainty at 95% confidence interval, however the value described is the lower limit CL 17: PP did not provide the evidences for the description and accuracy of measurements equipment's described in the PDD version 1. CAR 15: PDD version 1 describes the monitoring of the parameter $\boldsymbol{V_{t,db}}$ (m^3 wet gas/h). name and unit of the parameter are not coherent (dry x wet) . Moreover, in page 25, it is described that option A of the tool was chosen to monitor the parameter $F_{CH4,flared,y}$. CAR 16: The value presented in the PDD version 1 for the NCV is not for the diesel. CAR 17: The monitoring plan do not describe that all meters will be calibrated by an accredited person or institution.
Conclusion	The, parameters $V_{t,db}$; NCV, EFCO2,I,y (i= natural gas), were revised and CAR 15, CAR 16, and CL 16 were closed. To close out CAR 17 and CL 17 the monitoring plan included that the meters will be calibrated by an accredited person or institution, following the manufacturers. specification. Additional information of the meters applicable to the Project were included in the PDD and CL 9 was closed. It is RINA's opinion that the monitoring plan is in accordance with the monitoring methodology; the monitoring plan will give opportunity for real measurement of achieved emission reductions. RINA has checked all the parameters presented in the monitoring plan against the requirements of the methodology and methodological tools; no deviations relevant to the project activity have been found in the plan. RINA confirms that the monitoring arrangements described in the monitoring plan, including the data management and quality assurance and quality control

	procedures, are feasible within the project design, and the means of implementation of the monitoring plan are sufficient to ensure the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified

D.9. Duration and crediting period

Means of validation	The expected operational lifetime of the project activity is 20 years in accordance with the declaration of the main equipments' manufacturer (Morrow Renewables), dated 23/07/2015 that describes that the expected lifetime of projects' equipment with proper maintenance is 20 years or more /44/. There is not any equipment in operation prior to the project activity implementation. A renewal crediting period is chosen for the project activity and the length of the first crediting period is 7 years starting from 01/01/2016, or the date of registration of the project activity under UNFCCC, whichever is later. The GHG emission reductions are estimated to be average 523,569 tCO2e per year and 3,664,985 tCO2e over the 7 years crediting period.
Findings	CL 2: PP did not provide the evidence for the operational lifetime of the project activity CL 18: PP is requested to clarify if starting date of the crediting period is in line with project implementation chronogram
Conclusion	To close out CL 2 and CL 18 PP has provided declaration of the main equipments' manufacturer /44/ and the starting date of the crediting period was updated . It is RINA's opinion that, expected operational lifetime, type and duration of the crediting period and star date of the crediting period described in the PDD are in accordance with the provisions of the Project Standard.

D.10. Environmental impacts

Means of validation	The environmental aspects of the project activity were analysed by the environmental agency when it issued the licenses /27/. Regarding the LFG capture and upgrading for delivering it to the NG distribution network, the Environmental Impact Study ("EIA", from the Portuguese Estudo de Impacto Ambiental), Environmental Impact Report ("RIMA", from the Portuguese Relatório de Impacto Ambiental) and the Risk Analysis Study ("EAR", from the Portuguese Estudo de Análise de Risco) were prepared for the licensing process /70/. The following licenses were presented: **Operation of the landfill**: * SEMACE Operation license for the Oeste de Caucaia landfill, nº 352/2014 dated 08/05/2014 valid until 08/05/2015 *SEMACE renewal requested protocol dated 15/12/2014. **Biogas plant** * * SEMACE Previous License nº 100/2014 dated 24/03/2014 valid until 23/03/2016 (LP_GNR ECOFOR_31 03 2014.pdf) * SEMACE Installation License nº 172/2014 dated 02/07/2014 valid until 01/07/2016
Findings	CAR 18: PDD version 1 does not describe the latest environmental licenses available for the project activity and landfill.
Conclusion	To close out CAR 18, PDD was revised and included the operation license applicable to the project activity. RINA verified that environmental aspects of the project activity were analyzed by the environmental agency when it issued the licenses /27/ /70/.

D.11. Local stakeholder consultation

Means of validation	As per the Brazilian DNA Resolution nº 7 /20/, the local stakeholder consultation must start 15 days prior the PDD publication for the Global Stakeholder Consultation. PP has followed the requirements of the Brazilian DNA /20/. Letters inviting to comment on the project dated 25/07/2014 and the acknowledge receipt (AR) were provided as follows:

	- City Hall of Caucaia – CE dated 10/07/2014; - Environment Agency of Caucaia – CE dated 10/07/2014; - Municipal Assembly of Caucaia – CE dated 30/06/2014; - Ceará state Enviromental Agency (SEMACE) dated 30/06/2014; - State Attorney for the Public Interest of Ceará dated 30/06/2014; - Brazilian Forum of NGOs and Social Movements for the Development and Environment dated 27/06/2014; - Brazilian Association of Sanitary and Environment Engineering/ABES- Ceará dated 02/07/2014; - Federal State Attorney for the Public Interest dated 03/07/2014. Moreover, as requested by the Brazilian DNA Resolution nº 7 /20/, PP has published in Portuguese the PDD and a declaration describing how the project activity contributes to the sustainable development in the following web site: <https://sites.google.com/site/dcpconsulta/home/aterro-oeste-de-caucaia>. No comments were received.
Findings	N/A
Conclusion	RINA can confirm that the process is adequate and credible for local stakeholder consultation and in compliance with the Brazilian requirements in place for the local stakeholder consultation.

SECTION E. Internal quality control

>> The draft final validation report before being submitted for registration was subjected to an independent internal technical review to confirm that all validation activities had been completed according to the pertinent RINA instructions. The technical review was performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for CDM validation and verification.

SECTION F. Validation opinion

>> RINA Services Spa (RINA) has performed validation of the project activity “Oeste de Caucaia Landfill Project Activity” in Brazil, with regard to the relevant requirements for CDM activities.

The review of the project design document and the subsequent follow-up interviews have provided RINA with sufficient evidence to determine the fulfillment of the stated criteria.

The host Party is Brazil. Brazil fulfills the requirements to participate in the CDM. The project is an unilateral project thus no Annex I Party is identified. The project participant is GNR Fortaleza Valorização de Biogás Ltda. The DNA from Brazil confirmed that the project assists in achieving sustainable development.

The project correctly applies the approved baseline and monitoring methodology ACM0001, “Flaring or use of landfill gas”, version 15.0 of 08/11/2013

By capturing the landfill gas (LFG), upgrading and using it to supply natural gas (NG) off-site the project results in reduction of CH_4 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the Oeste de Caucaia Landfill Project Activity are estimated to be on an average 523,569 tCO_{2e} per year over the selected 7 years renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project’s emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is RINA’s opinion that the project participants are able to implement the monitoring plan.

In conclusion, it is RINA’s opinion that the project activity “Oeste de Caucaia Landfill Project Activity in Brazil, as described in the PDD, version 4 of 03/09/2015, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0001, “Flaring or use of landfill gas”, version 15.0 of 08/11/2013.

Appendix 1. Abbreviations

Abbreviations	Full texts
BE	Baseline Emissions
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM M&P	Modalities and Procedures CDM
CDM-PCP	Clean Development Mechanism Project Cycle Procedure
CDM-PS	Clean Development Mechanism Project Standard
CDM-VVS	Clean Development Mechanism Validation and Verification Standard
CER(s)	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification Request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CRT	Coordination and Technical Control Staff
DCI	Certification Division of RINA Services Spa
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
EIA	Environmental Impact assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG(s)	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of Approval
MoV	Means of Verification
MOC	Modalities of Communication Statement
MP	Monitoring Plan
MR	Monitoring Report
NGO	Non-governmental Organization
ODA	Official Development Assistance
PDD	Project Design Document
PE	Project Emission
PP(s)	Project Participant(s)
Ref.	Document Reference
RINA	RINA Services Spa
SS(s)	Sectoral Scope(s)
TA(s)	Technical Area(s)
SSC	Small Scale
UNFCCC	United Nations Framework Convention on Climate Change

Appendix 2. Competence of team members and technical reviewers

RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Thais De Lima Carvalho**
è qualificato come[1]: *is qualified as:*	**CDM -TEC, -VAL, -VER, -TL**
per le seguenti aree tecniche: for the following technical areas:	**1.1, 1.2, 2.1, 13.1**

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA *TECHNICAL AREA DESCRIPTION*	SCOPO SETTO *SECTORAL SC*
1.1	Thermal energy generation	1
1.2	Renewables	1
2.1	Electricity distribution	2
13.1	Solid waste and wastewater	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	19-08-2009	-
12	15-01-2015	Added TA 2.1

Il Resp. QPT
Head of QPT

[redacted]

RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: **Americo Junior Varkulya**

We declare that Mr/Mrs/Ms:

è qualificato come[1]: **CDM –TEC, -VAL,-VER,-TL, -FIN EXP**
is qualified as:

per le seguenti aree tecniche: **1.1, 1.2**
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA *TECHNICAL AREA DESCRIPTION*	SCOPO SETTOR *SECTORAL SC*
1.1	Thermal energy generation	1
1.2	Renewables	1

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	30-01-2009	-
13	22-12-2014	Update qualification according to AS v6.0

Il Resp. QPT
Head of QPT

RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: / *We declare that Mr/Mrs/Ms:* **Mayra Rocha**

è qualificato come[1]: / *is qualified as:* **CDM-FIN EXP, CDM-TEC**

per le seguenti aree tecniche: / *for the following technical areas:* 1.2

AREE TECNICHE *TECHNICAL AREAS*	DESCRIZIONE DELL'AREA TECNICA *TECHNICAL AREA DESCRIPTION*	SCOPO SETTOR *SECTORAL SC*
1.2	Renewable Energy	1

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	05-08-2015	First issue

Resp. QPT
Head of QPT

Rina Severini

[redacted]

RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Rita Valoroso**
è qualificato come1: *is qualified as:*	**CDM -TEC, -VAL, -VER, -TL TECHNICAL REVIEWER**
per le seguenti aree tecniche: for the following technical areas:	**1.2, 13.1**

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA *TECHNICAL AREA DESCRIPTION*	SCOPO SETTO *SECTORAL SC*
1.2	Renewables	1
13.1	Solid Waste and waste water	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	18-01-10	-
9	22-12-2014	Update qualification according to AS ver.6.0

Il Resp. QPT
Head of QPT

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	Ecopart Assessoria em Negócios Empresariais Ltda	CDM-PDD for project activity "Oeste de Caucaia Landfill Project Activity" in Brazil,	version 4 of 03/09/2015 Version 03 of 10/08/2015 Version 2 of 24/06/2015 version 01 of 25/06/2014	PP
2	CDM Executive Board	Clean Development Mechanism Project Cycle Procedure,	version 9 of 20/02/2015	Other
3	CDM Executive Board	Clean Development Mechanism Project Standard,	version 9 of 20/02/2015	Other
4	CDM Executive Board	Clean Development Mechanism Validation and Verification Standard,	version 9 of 20/02/2015	Other
5	CDM Executive Board	Baseline and monitoring methodology ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013	version 15.0 of 08/11/2013	Other
6	UNFCCC	web site status of ratification available at < http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php> and national authorities available at < http://cdm.unfccc.int/DNA/index.html>. Available in English.	accessed on 14/08/2014	Other
7	CDM Executive Board	CDM-MOC-FORM - Modalities of communication statement CDM Executive Board: F-CDM-MOC (Modalities of Communication Statement) form,.	version 2.3 of 22/05/2015 Version 02.1, dated 16/03/2012	Other
8	CDM Executive Board	Combined tool to identify the baseline scenario and demonstrate additionality,	version 5.0.0, dated 23/11/2012	Other
9	CDM Executive Board	Tool to calculate project or leakage CO2 emissions from fossil fuel combustion,	version 2.0.0, dated 02/08/2008	Other
10	CDM Executive Board	Project and leakage emissions from transportation of freight,	version 1.1.0, dated 23/11/2012	Other
11	CDM Executive Board	Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period,	Version 03.0.1 dated 02/03/2012	Other
12	CDM Executive Board	Tool to determine the mass flow of a greenhouse gas in a gaseous stream,	version 02.0.0 dated 03/06/2011	Other
13	CDM Executive Board	Project emissions from flaring,	version 02.0.0 dated 20/07/2012	Other
14	CDM Executive Board	Tool to calculate baseline, project and/or leakage emissions from electricity consumption,	version 01 dated 16/05/2008	Other
15	CDM	"Tool to calculate the emission factor for an electricity	version 4.0 of	Other

	Executive Board	system",	04/10/2013	
16	CDM Executive Board	"Emissions from solid waste disposal sites",	version 07.0 of 15/04/2015 version 06.0.1 of 02/03/2014	Other
17	CDM Executive Board	"Tool to determine the baseline efficiency of thermal or electric energy generation systems",	version 01 of 17/07/2009	Other
18	CDM Executive Board	"Tool to determine the remaining lifetime of equipment",	version 01 of 16/10/2009	Other
19	IPCC	Fourth Assessment Report: Climate Change 2007, available in English at http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html	assessed on 14/08/2014	Other
20	"Comissão Interministerial de Mudanças Globais do Clima" (Brazilian DNA	Resolution nº 7 dated 05/03/2008, establishes the requirements for the local stakeholder consultation, available in Portuguese at http://www.mct.gov.br/upd_blob/0219/219489.pdf	assessed on 28/07/2014	Other
21	UNFCCC	web site: prior consideration of the CDM, available in English at < http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html>, describes the notification received on 27/03/2013	assessed on 14/08/2014	Other
22	GNR Fortaleza Valorização de Biogás Ltda. and Ecopart Assessoria em Negócios Empresariais Ltda	CERs spreadsheet "Ecofor_CERs_v.3_2015.07.23.xlsx" "Ecofor_CERs_v.2_2015.06.24.xlsx" "Ecofor_Estimativa CERs_2014.xlsx"	version 3 23/07/2015 version 2 of 24/06/2015 version 1 of 25/06/2014	PP
23	CDM Executive Board	Project design document form for CDM project activities and its Attachment: Instructions for filling out the project design document form for CDM project activities,	version 6 of 09/03/2015	Other
24	RINA and GNR Fortaleza Valorização de Biogás Ltda.	contract signed on 29/07/2014 for the validation of the project Oeste de Caucaia Landfill Project Activity (also refer to reference /39/: Amendment to the articles of association dated 30/09/2014 (Social contract) changing the PP name from GNR Ecofor Ltda to GNR Fortaleza Valorização de Biogás Ltda. Also describes director's of the company (GNR ECOFOR_1ª Alteração Contrato Social_30set14.zip))	29/07/2014	PP
25	"Comissão Interministerial de Mudanças Globais do Clima" (Brazilian DNA):	Resolution nº 8 of 26/05/2008, that defines the Boundaries of National Grid http://www.mct.gov.br/upd_blob/0024/24719.pdf	assessed on 18/08/2014	Other
26	Eqao and GNR Fortaleza Valorização de Biogás	Documents for the local stakeholder consultation: * Eqao PDD and annex III (contribution to the sustainable development) available in Portuguese at <https://sites.google.com/site/dcpconsulta/home/aterro-	accessed on 06/10/2014	PP

	Ltda.	oeste-de-caucaia> * Letters dated 25/07/2014 and acknowledge receipt (AR): - City Hall of Caucaia – CE dated 10/07/2014; - Environment Agency of Caucaia – CE dated 10/07/2014; - Municipal Assembly of Caucaia – CE dated 30/06/2014; - Ceará state Enviromental Agency (SEMACE) dated 30/06/2014; - State Attorney for the Public Interest of Ceará dated 30/06/2014; - Brazilian Forum of NGOs and Social Movements for the Development and Environment dated 27/06/2014; - Brazilian Association of Sanitary and Environment Engineering/ABES- Ceará dated 02/07/2014; - Federal State Attorney for the Public Interest dated 03/07/2014.		
27	SEMACE	Landfill Operation: *SEMACE Operation license for the Oeste de Caucaia landfill, nº 352/2014 valid until 08/05/2015 (LO_Caucaia.pdf) *SEMACE renewal requested protocol. (Protocolo_LO.JPG) **Biogas plant** * SEMACE Previous License nº 100/2014 valid until 23/03/2016 (LP_GNR ECOFOR_31 03 2014.pdf) * SEMACE Installation License nº 172/2014 valid until 01/07/2016 (LI - ECOMETANO.PDF)	dated 08/05/2014 dated 15/12/2014 dated 24/03/2014 dated 02/07/2014	PP
28	IPCC	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1 table 1.4, available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf>	accessed on 18/08/2014	Other
29	ABNT	NBR 13.896 – Aterros de Resíduos Não Perigosos – Critérios para Projeto, Implantação e Operação. (Landfill for non hazardous waste- Project criteria, implementation and operation),	valid from 30.07.1997	PP
30	Eqao	emission factor calculation spreadsheet “BR EF ex ante 2011 to 2013 - v.3-EB.xlsx” BR EF ex ante 2010 to 2012-2014.08.01.xlsx, “BR EF ex ante 2010 to 2012-2013.10.31.xlsx”.	version 3, no date available version 2, no date available version 1, no date available	PP
31	National Congress	Política Nacional de Resíduos Sólidos (National Solid Waste Policy) available in Portuguese at http://www.camara.gov.br/sileg/integras/501911.pdf	accessed on 20/08/2014	PP
32	SCS	Energy Assessment report For Oeste de Caucaia landfill, file nº 06213005.00 Task 1, (SCS_Fortaleza Landfill Assessment Report DRAFT Final 05312013.pdf) Assessment report file nº 06212012.00, (SCS_ Landfill Assessment Report 16 08 12.pdf)	dated May 2013 dated August 2012	PP
33	CDM Executive Board	Guidelines on the Assessment of Investment Analysis,	version 05 of 15/07/2011	Other

34	EQAO and GNR Fortaleza Valorização de Biogás Ltda.	financial analysis: "Ecofor_Cash Flow_investment decision.xlsx" version 1 no date available and version 2 no date available referent from the PDD version 2 "Ecofor_Cash Flow_expansion.xlsx", version 1 no date available and version 2 no date available referent from the PDD version 2	No date available	PP
35	EQAO and GNR Fortaleza Valorização de Biogás Ltda.	WACC calculation: "WACC WasteSector_1st sem 2013_v.1.xlsx", no date available referent from the PDD version 2 "WACC WasteSector 2012.xlsx" version 1, no date available.	No date available	PP
36	CDM Executive Board	CDM Terms Glossary,	version 8 of 20/02/2015 version 7 of 23/11/2012	Other
37	GNR Fortaleza Valorização de Biogás Ltda. UNFCCC mail	* Prior consideration form, dated 19/06/2013 in Portuguese (Ecofor-Consideracao Previa do MDL.pdf) * Prior consideration form, dated 19/06/2013 in English (Ecofor-CDM Prior Consideration.pdf) * Email sent to UNFCCC with the prior consideration, dated 19/06/2013 (Re Notification about the intention to register Oeste de Caucaia Landfill Project Activity as CDM.msg) and CDM Registration and Issuance <Cdmregistration@unfccc.int> email confirming the receipt of the notification, dated 24/06/2013 *email sent to Brazilian DNA with the prior consideration, dated 19/06/2013 (Notificação sobre a intenção de registrar o Atividade de Projeto do Aterro Oeste de Caucaia.msg) and Comissão Interministerial de Mudança Global do Clima cimgc@mct.gov.br confirming the receipt of the notification, dated 20/06/2013 (Re Notificação sobre a intenção de registrar o Atividade de Projeto do Aterro Oeste de Caucaia.msg)	Several dates described aside	PP
38	lANDTEC	Landtec Feasibility Study for the Oeste de Caucaia landfill, considering operation until 2031, no date available. (LANDTEC_Feasibility study ASMOC - Ecofor R000 (Port).pdf)	-	PP
39	MOC documents:	- MoC signed signed on 24/11/2015 (Ecofor_MoC_2015.12.08.pdf); - Amendment to the articles of association dated 30/09/2014 (Social contract) changing the PP name from GNR Ecofor Ltda to GNR Fortaleza Valorização de Biogás Ltda. Also describes director's of the company. Possible to confirm the corporate identy of Mr. Marcio Schittini Pinto (GNR ECOFOR_1ª Alteração Contrato Social_30set14.zip) - GNR Fortaleza Valorização de Biogás Ltda. letter nominating Ms. Carol Inoue Dick as responsible to comunicate with UNFCCC, dated 04/09/2014, signed by the directors' (Declaração Ecofor_Moc-rev.pdf) - ID Ms. Carol Inoue Dick (CNH Carol Inoue Dick.pdf) - ID Mr. Marcio Schittini Pinto (MS - CNH.pdf) - Power of Attorney of Ecopart Assessoria em Negócios Empresariais Ltda nominating Mr. Adelino Ricardo Jacintho Esparta. Also possible to confirm the corportate identity of Mr. . Carlos de Mathias Martins Junior, registered administrator of Ecopart Assessoria em	Several dates described aside	PP

		Negócios Empresariais Ltda (Power of attorney RE_jul14_16.pdf) - Mr. Adelino Ricardo Jacintho Esparta passaport (Esparta - Passaporte.pdf) - ID Mr. Carlos de Mathias Martins Junior (Doc Carlos Martins.pdf)		
40	GNR Fortaleza Valorização de Biogás Ltda.	request of services signed on 29/07/2014 (also refer to reference /39/: Amendment to the articles of association dated 30/09/2014 (Social contract) changing the PP name from GNR Ecofor Ltda to GNR Fortaleza Valorização de Biogás Ltda. Also describes director's of the company (GNR ECOFOR_1ª Alteração Contrato Social_30set14.zip))	29/07/2014	PP
41	Morrow Renewables, LLC and GNR Ecofor Ltda.	supply agreement for the purification plant equipments, (ECOFOR_MORROW_Supply Agreement_22ago14.zip)	signed on 22/08/2014	PP
42	Koch Tecnologia Quimica Ltda and Ecomentano Empreendimentos Ltda	contract for the flare and blower, (1.b. Contrato Flare e Blower.pdf)	dated 24/04/2014	PP
43	Ministério de Minas e Energia and EPE	Brazilian Energy Balance, 2014 available in Portuguese at < https://ben.epe.gov.br/downloads/Relatorio_Final_BEN_2014.pdf>	accessed on 03/07/2015	PP
44	Greenlane	statement regarding operational lifetime of the biogas upgrading facility, (Letter regarding expected life of biogas upgrading facility.pdf)	dated 02/10/2014	PP
45	ABRELPE	"Brazilian Atlas of Greenhouse Gas Emissions and Energetic Potential in the Residues Destination" (from the Portuguese "*Atlas Brasileiro de Emissões de GEE e Potencial Energético na Destinação de Resíduos Sólidos*"),	2013	PP
46	IBGE	National Research on Basic Sanitation (from the Portuguese "*Pesquisa Nacional de Saneamento Básico"*),	2008	PP
47	Engemasa-Engenharia e materiais Ltda. And GNR Fortaleza Valorização de Biogás Ltda	supply contract for the compressing unit (GNR FORTALEZA_ENGEMASA_Contrato_24fev15.zip)	-	PP
48	MDCPAR S.A.	minutes of meetings of the first capital increase for the project implementation occurred, (5. MDCPAR_Ata de RCA 25-Out-13 ECOFOR.pdf)	dated 25/10/2013	PP
49	Ecometano and Ecofor	Preliminary contract between Ecometano and Ecofor, (4. ECOMETANO_ECOFOR AMBIENTAL_Contrato Preliminar_21dez12.pdf)	signed on 21/12/2012	PP
50	National Operator System (ONS):	Daily report of the interconnected system operation. Energy generation by source and other system information for years 2011, 2012 and 2013.	2011, 2012, 2013	PP
51	CDM	AM_CLA_0265 - Procedure to determine the amount of	-	Other

	Executive Board	methane that would have been captured and destroyed (by flaring) in the baseline ($F_{CH4,BL,y}$).		
52	EMBRAPA	- Brazilian Agricultural Research Corporation, available in Portuguese at http://www.bdclima.cnpm.embrapa.br/resultados/balanco.php?UF=&COD=207,	accessed on 27/07/2015	Other
53	CDM Executive Board	AM_CLA_0259 Applicability of the oxidation factor for ex-ante baseline emissions calculation available at < http://cdm.unfccc.int/methodologies/PAmethodologies/clarifications/01582>	accessed on 23/07/2015	Other
54	GNR Fortaleza Valorização de Biogás Ltda. and Ecopart Assessoria em Negócios Empresariais Ltda	estimative for the energy consumption “Ecofor - EE.xlsx”	No date available	PP
55	ANEEL	technical note nº 80/2012-SRE/ANEEL,	04/04/2012	PP
56	Fórum Nacional de Secretários de Estado para Assuntos de Energia	National Forum of State Secretaries for Energy Matters (from the Portuguese Fórum Nacional de Secretários de Estado para Assuntos de Energia) from June 2012. Available at: http://www.forumdeenergia.com.br/nukleo/pub/cepe_ago2012.pdf	accessed on 21/07/2015	PP
57	BNDES	*Long Term Interest Rate, from January 1999 to December 2003*, available at: http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Custos_Financeiros/Taxa_de_Juros_de_Longo_Prazo_TJLP/index.html	accessed on 21/07/2015	PP
58	BNDES	*Spread - remuneration for energy projects,* available at: http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/bnset/Set2901.pdf	accessed on 21/07/2015	PP
59	BNDES	*Long term loans in Brazil for renewable energy*, available at: http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Produtos/FINEM/energias_alternativas.html	accessed on 21/07/2015	PP
60	Central Bank of Brazil	*Target inflation in Brazil for 2013:* Available in Portuguese at: http://www.bcb.gov.br/pec/metas/inflationtargetingtable.pdf	accessed on 21/07/2015	PP
61	Brazilian National Treasury	, *Note 517 for information on legislation about presumed profit companies,* available at: Available in Portuguese at, accessed on 21/07/2015: http://www.receita.fazenda.gov.br/Publico/perguntao/dipj2011/CapituloXIII-IRPJ-LucroPresumido2011.pdf and dated June 2004, available at: http://www.receita.fazenda.gov.br/PessoaJuridica/DIPJ/2005/PergResp2005/pr517a555.htm Normative Instruction #480 dated 15 December 2004, available at: http://www.receita.fazenda.gov.br/legislacao/ins/2004/in48002004.htm	accessed on 21/07/2015	PP
62	US Federal Reserve	: *20-year US Treasury Yield, period* 2008 - 2012. Available in English at:	accessed on 21/07/2015	PP

		http://www.federalreserve.gov/econresdata/researchdata.htm accessed on 21/07/2015		
63	Damodaran	website: S&P500 vs 10-year T.Bond Yield, available in English at: http://pages.stern.nyu.edu/~adamodar/ accessed on 21/07/2015	accessed on 21/07/2015	PP
64	Advanced Economic Research Institute (IPEA)	*Country risk premium (EMBI+Brazil).* Select macroeconomic data, then "source JP Morgan". Available in Portuguese at: http://www.ipeadata.gov.br/	accessed on 21/07/2015	PP
65	US Federal Reserve	*TIPS Yields for 20 years*. Available in Portuguse at: http://www.federalreserve.gov/econresdata/researchdata.htm	accessed on 21/07/2015	PP
66	Mines and Energy Ministry	monthly reports of natural gas price. Available in Portuguese at: http://www.mme.gov.br/web/guest/secretarias/petroleo-gas-natural-e-combustiveis-renovaveis/publicacoes/boletim-mensal-de-acompanhamento-da-industria-de-gas-natural/554	accessed on 21/07/2015	PP
67	Brazilian National Treasury	, *Normative Instruction nº 10.637, dated 21 November 2002. About PIS/PASEP and Cofins taxes,* available in Portuguese at: http://www.receita.fazenda.gov.br/legislacao/ins/2002/in2472002.htm,	accessed on 21/07/2015	PP
68	Brazilian National Treasury	, *information on legislation about presumed profit companies,* available in Portuguese at, • Law No. 8.981 dated 20/01/1995: <http://www.receita.fazenda.gov.br/aliquotas/ContribCsll/ApuracaAnualRecMensBascalcEst.htm>. • Law No. 8.541 dated 23/12/1992: http://www.planalto.gov.br/ccivil_03/LEIS/L8541.htm#art20 • Decree No. 3,000 dated 26/03/1999: <http://www.receita.fazenda.gov.br/PessoaJuridica/DIPJ/2005/PergResp2005/pr517a555.htm>. • Law No. 105 dated 10/01/2001: <http://www.receita.fazenda.gov.br/aliquotas/ContribCsll/Aliquotas.htm>.	accessed on 21/07/2015:	PP
69	Brazilian National Treasury	, *Article 22 of Law nº 10684 from 15 December 1988 and Article 3 of Law nº 11727 from 23 January 1995, for social contribution on net profit,* available in Portuguese at: http://www.receita.fazenda.gov.br/aliquotas/ContribCsll/Default.htm	accessed on 21/07/2015	PP
70	EcoSam CAF Quimica	Environmental Impact Study for the Caucaia Landfill, (EIA ASMOC FINAL.pdf) and Environmental Impact Report (RIMA), (RIMA ASMOC-VERSAO FINAL.pdf), Risk analisis report (RAR295 Ecometano.pdf)	dated June/2011 dated June 2011 dated 05/05/2014	PP
71	Federative Republic of Brazil Interministerial Commission in Global Climate	National Decree of 7th July 1999, revised in the Decree of 10th January 2006 available at http://www.mct.gov.br/index.php/content/view/10059/Decreto_de_7_de_julho_de_1999_alterado_pelo_Decreto_de_10_de_janeiro_de_2006.html,	accessed on 08/12/2015	PP

	Change			
72	Federative Republic of Brazil Interministerial Commission in Global Climate Change	Interministerial Commission in Global Climate Change: Letter of Approval “Proj-468-2015_Aterro_Caucaia.pdf”.	dated 13/01/2016	PP
73	Federative Republic of Brazil Interministerial Commission in Global Climate Change	Interministerial Commission in Global Climate Change: email with the LoA.	dated 21/01/2016	PP

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

Table 1. CL from this validation

CL ID	1	**Section no.**	D.7	**Date:** 14/10/2014
Description of CL				
PDD version 1, describes that the project expects to inject an average of 4,096 Nm3/h of upgraded biogas to the distribution grid. However, it is not clear how this value was estimated. Moreover, PDD does not describe the installed capacity of the project equipments				
Project participant response				**Date:** 24/06/2015// 10/08/2015
The average amount of ugraded biogas to be injected into the local natural gas distribution grid during the crediting period was revised. Please refer to the attached revised version of the Excel spreadsheet. The installed capacity of the equipment was included in the revised version of the PDD, principally the processing capacity of the purification plant. Technical information from the manufacturer is attached. PP second response: Maximum flow rate of the flare was revised in the PDD based on the specifications from manufacturer. Regarding installed capacity of the project, please refer to the PP response in CAR12. For the project expansion (phase II and III), the upgrading system is expected to have 15,000Nm^3/hr installed capacity, and then equipment will be adjusted and purchase accordantly.				
Documentation provided by project participant				
Revised PDD and CERs spreadsheet				
DOE assessment				**Date:** 27/07/2015// 13/08/2015
PP is requested to provide the evidences for the installed capacity of the project activity. Moreover, PDD describes that the flares will have an installed capacity of 10,000.00 Nm^3/hour, however it is not coherent with the contract (flow rate 8,200 Nm^3/hour).PDD describes that it is forecasted phase II and Phase III of the processing capacity, however it is not described if blowers installed capacity will change during these phases.This CL remains open 2nd response Documents were revised considering the installed capacity of equipments. Moreover it was clarified that if phase II and III are installed the equipment will be adjusted and purchase accordantly.This CL is closed.				

CL ID	2	Section no.	D.9	Date: 14/10/2014
Description of CL				
PP did not provide the evidence for the operational lifetime of the project activity				
Project participant response				**Date:** 24/06/2015// 10/08/2015
A statement from the manufacturer of the purification plant confirming the operational lifetime of the project activity is attached. PP second response: There are several project suppliers. Greenlane was one of the upgrading system possible supplier, which equipment was used for another project from the same project developer (Dois Arcos). Therefore, Greenlane declaration was presented in the first round.				
Documentation provided by project participant				
Declaration				
DOE assessment				**Date:** 27/07/2015//13/08/2015
PP has provided a declaration Greenlane, dated 02/10/2014 that the expected lifetime of projects' equipment with proper maintenance is 20 years (Greenlane - project lifetime.pdf). PP is requested to clarify if Greenlane is the project equipments' manufacturer. This CL remains open PP clarified that the lifetime is based on the supplier of a similar project. This CL is closed.				

CL ID	3	Section no.	D.2	Date: 14/10/2014
Description of CL				
There is no public funding in the project activity, however PP did not present the evidence				
Project participant response				**Date:** 24/06/2015
A statement from the project implementer confirming the project has not obtained public funding is attached.				
Documentation provided by project participant				
Declaration				
DOE assessment				**Date:** 27/07/2015
PP has provided a declaration confirming that the is no public funding in the project activity (3. Declaração Financiamento_Ecofor.pdf)				

CL ID	4	Section no.	D.8.6	Date: 14/10/2014
Description of CL				
Project participants are requested to clarify why the fair value was not considered in the calculation of IRR.				
Project participant response				**Date:** 24/06/2015
Fair value was considered in accordance with §3 of Annex 5, EB 62. According the manufacturer declaration, upgrading equipment has 20-year lifetime. Please refer to the revised financial spreadsheet.				
Documentation provided by project participant				
Revised financial spreadsheet				
DOE assessment				**Date:** 27/07/2015
The investment analysis spreadsheet and PDD were properly revised. The fair value was calculated in accordance with §3 of Annex 5, EB 62. This CL is closed.				

CL ID	5	Section no.	D.8.6	Date: 14/10/2014
Description of CL				
Project participants are requested to clarify how the project activity is qualified on financial programs available at the Brazilian Development Bank				
Project participant response				**Date:** 24/06/2015

The PP clarifies that most of Brazilian companies expect to receive funding from BNDES (the Brazilian Development Bank). BNDES, a governmentally backed entity, is the major provider of long-term loans in the country, which lacks alternatives to long term loan providers other than governmental entities. Long-term loans are scarcely provided by commercial banks, and in general, these entities do not have competitive rates compared to the BNDES.BNDES infrastructure financing is provided through FINEM (enterprise financing) for investment higher than R$ 20MM, which is the case of the proposed project activity.In summary, BNDES financing is taken into account by the project developer since it provides long-term loans with competitive rates;BNDES financing lines are applicable to the proposed project activity;Data considered for the benchmark calculation is valid since it is based on BNDES parameters available for the development of Ecofor project types;Data considered for the benchmark calculation is very conservative. Please refer to the revised PDD and financial spreadsheets (benchmark and IRR) attached to the response.
Documentation provided by project participant
revised PDD and financial spreadsheets (benchmark and IRR), web links
DOE assessment **Date:** 27/07/2015
Project participants demonstrated that the project activity is able to be included in BNDES FINEM financing line, and the use of Kd parameters are in accordance with BNDES website. This CL is closed.

CL ID	6	**Section no.**	D.8.6	**Date:** 14/10/2014
Description of CL				
Project participants are requested to provide the evidences, taking in consideration the period of investment decision, of all input parameters applied on the investment analysis, as per VVS: • Price of biogas; • The yearly amount of biogas produced; • The investment values; • Electric energy; • Operation and Maintenance; • Civil works; • Insurance; • Administrative costs; • others				
Project participant response				**Date:** 24/06/2015

The investment analysis of the project was revised to consider §6 of Annex 5, EB 62 (Guidelines on the assessment of investment analysis), where it states:

"Input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant".

As discussed in CAR5, the investment decision of the project (and the starting date) occurred when the shareholders of the project approved the capital contribution for Ecofor implementation,

This date shall be considered the starting date and the investment decision, since no major costs could be spent for the project development up to the Board's approval.

All documented evidence to the investment analysis (IRR and benchmark) is presented in the financial spreadsheets and is attached to this response.

As requested by DOE, the PPs clarify the following:

Price of biogas: NG price considered in the financial analysis is based on the Monthly Reports from the Mines and Energy Ministry ("MME" from the Portuguese Ministério de Minas e Energia) / Natural Gas Department. Since gas price presented in these reports are in US$/MMBTU, conversion to m^3 was made considering 26.81m^3/MMBTU as presented in the reports. Also, the final energy price took into account taxes and calorific value of NG presented in the MME reports and the upgraded gas. The calorific value of the upgraded gas was made following ASTM D3588-98 (Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels);

The yearly amount of biogas produced: Values based on the minimum value between LFG generation in the landfill as presented in the LANDTEC_Feasibility Report-ASMOC – Caucaia/Fortaleza, page 58, table 14 and the purification plant capacity of 7,500Nm^3/h. It was conservatively assumed that the upgrading system will have 95% upgrading efficiency (20 days maintenance during the year) and 0% of LFG will be flared;

The investment values: Values were based on the LANDTEC_Feasibility Report – ASMOC – Caucaia/Fortaleza, page 66, table 15. Please note that Capex values presented in the Landtec Report were based on 9,000Nm3/hr and, then, they were adjusted to the 7,500Nm3/hr processing capacity considered at the time of the investment decision. Furthermore, SCADA cost (Supervisory Control and Data Acquisition System) was included based on a similar project that has been developed from the same shareholders of the proposed project activity (Dois Arcos). Please refer to SCS Assessment Report nr. 06212012.00 - Dois Arcos.

Opex: Since Opex values were not detailed in the Landtec Report, the project owner considered Opex costs available for a similar project that has been developed from the same shareholders of the proposed project activity (Dois Arcos). These costs were proportionally applied to the proposed project activity. Please refer to SCS Assessment Report nr. 06212012.00 - Dois Arcos.

In order to demonstrate additionality in the possible expansion scenario, another investment assessment was made. Investment analysis is attached to this response.
As presented in the spreadsheet, the project remains additional. Even with the increase in the upgrading capacity, the IRR of the project is below the benchmark and the NPV is negative.

Documentation provided by project participant	
revised PDD and financial spreadsheet	
DOE assessment	**Date:** 27/07/2015
Please refer to the CAR 22, 23 and 24.This CL is closed.	

CL ID	7	**Section no.**	D.8.6	**Date:** 14/10/2014
Description of CL				
Project participant are requested to clarify why the depreciation was not included in the investment spreadsheet.				
Project participant response				**Date:** 24/06/2015
Depreciation was considered in accordance with §5 of Annex 5, EB 62. Please refer to the revised financial spreadsheet.				
Documentation provided by project participant				
revised PDD and financial spreadsheet				
DOE assessment				**Date:** 27/07/2015
The depreciation was properly included in the financial analysis.This CAR is closed.				

CL ID	8	Section no.	D.8.6	Date: 14/10/2014
Description of CL				
For the prevailing practice barrier, PDD has presented data from the Pesquisa Nacional de Saneamento Básico of 2008, however it is not possible to confirm that data remained the same at the time of project implementation.				
Project participant response				**Date:** 24/06/2015
Updated information was included in the mentioned section of the PDD. Nevertheless, it is worth pointing out that the Pesquisa Nacional de Saneamento Básico of 2008 is indeed the latest official diagnosis regarding the sanitation sector in Brazil.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
Information was updated in the revised PDD. This CL is closed.				

CL ID	9	Section no.	D.8.8	Date: 14/10/2014
Description of CL				
PDD version 1 describes that the flow meter will convert automatically the volumetric flow to normal conditions, considering the temperature and pressure, however, the evidences were not presented				
Project participant response				**Date:** 24/06/2015
In fact, a flow meter which converts automatically the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure is expected to be installed at the exit of the upgrading system. However, monitoring equipment is not purchased yet and, then, there is no documented evidence regarding monitoring. As described in the PPs response of CAR 10, the PDD was revised to consider the most possible scenario for biogas and methane monitoring. This scenario considers Option A and Option C of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". Please refer to the PPs response in CAR10 In spite of the options chosen at the time of the project verification, monitoring will be followed according to ACM0001 and the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". Please refer to the revised version of the PDD, which presents the options chosen by the PPs.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
PDD was revised and describes the options chosen for the monitoring. Detailed information is presented in the CAR response				

CL ID	10	Section no.	D.8.7	Date: 14/10/2014
Description of CL				
PP is requested to clarify how the methane collected in the passive system was considered in the determination of the $\mathbf{F_{CH4,BL,y}}$				
Project participant response				**Date:** 24/06/2015//10/08/2015

For the determination of $\mathbf{F_{CH4,BL,y}}$, the PP shall choose among 4 cases available in ACM0001 based on the (i) requirement to destroy methane and (ii) existing LFG capture and destruction system.

As described in section B.4 of the PDD, there are no policies regarding mandatory LFG capture or destruction requirements neither local environmental regulations nor policies which promote the productive use of LFG. Therefore, Cases 2 and 4 are discarded.

Regarding the existence of a LFG capture and destruction system, ACM0001 defines:

"Existing LFG capture system - an existing **active** LFG capture system is a system that has been in operation in the last calendar year prior to the start of the operation of the project activity"

In the SCS Assessment Report dated August 2012, and as presented in the PDD, previously to the implementation of the proposed CDM Project Activity there was a passive system and methane was burned in an uncontrolled manner. Therefore, according to the definition of the methodology, Case 1 is applicable to the proposed CDM Project Activity since there is no requirement to destroy methane and no existing active LFG capture and destruction system prior to its implementation.

It is important mentioning that SCS Energy is a third-party company contracted by the PP to perform technical and financial analysis of the project activity implementation.

Considering explanations above, $\mathbf{F_{CH4,BL,y}}$ is zero following ACM0001.

PP second response:
PDD and ER spreadsheet was revised according to AM_CLA_0265.

Documentation provided by project participant

Revised PDD and CERs spreadsheet

DOE assessment	**Date:** 27/07/2015// 13/08/2015

For determination of $F_{CH4,BL,y}$ PP is requested to follow the guidance given by AM_CLA_0265 available at: https://cdm.unfccc.int/methodologies/PAmethodologies/clarifications/90436, published on 01/04/2015.This CL remains open.

Documents were revised accordingly to consider case 3.This CL is closed

CL ID	11	**Section no.**	D.7	**Date:** 14/10/2014

Description of CL

During the on site visit it was not clear if the project activity will consider the distribution of compressed/liquefied LFG using trucks.

Project participant response	**Date:** 24/06/2015

Project Participants confirm that trucks are not going to be used to distribute the upgrade LFG. In case of any modification in the design of the proposed CDM Project Activity after its registration, the formal procedure to update the project's design will be adopted.

Documentation provided by project participant

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DOE assessment	**Date:** 27/07/2015

PP clarified that distribution of compressed/liquefied LFG using trucks is not forecasted in the project activity. This CL is closed

CL ID	12	**Section no.**	D.8.7	**Date:** 14/10/2014

Description of CL

For the calculation of the operating margin, in the PDD version 1 PP has chosen the option (b) Simple adjusted OM, using the *ex-ante* option, considering data available for 2010, 2011 and 2012, however, it is not clear why data from 2013 was not used.

Project participant response	**Date:** 24/06/2015

The grid emission factor calculation spreadsheet was revised considering ONS data from 2013. Please refer to the revised version of the EF grid spreadsheet, CER spreadsheet and PDD

Documentation provided by project participant

Revised EF grid spreadsheet, CER spreadsheet and PDD

DOE assessment	**Date:** 27/07/2015

PP updated data considering the latest data available at the time of PDD publication from 2013. This CL is closed

CL ID	13	Section no.	D.8.7	Date: 14/10/2014
Description of CL				
PP did not provide the raw data from ONS used to calculate the emission factor.				
Project participant response				**Date:** 24/06/2015//10/08/2015
Raw data from ONS used for the $EF_{grid,CM,y}$ calculation is attached to this response. PP second response: ER spreadsheet was revised according to the EF grid spreadsheet data.				
Documentation provided by project participant				
ONS data; EF spreadsheet				
DOE assessment				**Date:** 27/07/2015// 13/08/2015
PP provided the raw data. However the values presented in the revised PDD are not in accordance with the emission factor spreadsheet (BR EF ex ante 2011 to 2013 - v.3-EB.zip).This CL remains open. 2nd response Documents were revised accordingly.This CL is closed				

CL ID	14	Section no.	D.8.7	Date: 14/10/2014
Description of CL				
For the operation margin, PDD version 1 describes that option 1 was chosen, using data from 2012. However, it is not clear why data from 2013 was not considered.				
Project participant response				**Date:** 24/06/2015
Please refer to PP response in CL 12 above.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
PP updated data considering the latest data available at the time of PDD publication from 2013.This CL is closed				

CL ID	15	Section no.	D.8.7	Date: 14/10/2014
Description of CL				
The evidence for the estimative of fossil fuel consumption was not provided.				
Project participant response				**Date:** 24/06/2015// 10/08/2015
The fossil fuel consumption estimative was based on information from another project developed by the same project developer. Evidences are attached. PP second response: NCV and consumption of LPG were revised in new version of PDD and ER spreadsheet. LFG consumption is based on a similar project (Dois Arcos) and NCV is based on the 2014 National Energetic Balance.				
Documentation provided by project participant				
Revised PDD bas CERs spreadsheet				
DOE assessment				**Date:** 27/07/2015// 13/08/2015
It is not clear the estimative of the LPG consumption. Values described in the section B.6.3 and in the section B.7.1 the and the CERs spreadsheet are not coherent.This CL remains open 2nd response PP revised the documents accordingly. This CL is closed.				

CL ID	16	Section no.	D.8.8	Date: 14/10/2014
Description of CL				
PDD version 1 describes that Weighted average CO2 emission factor of fuel type i in year y (i = natural gas) is from IPCC default values at the upper limit of the uncertainty at 95% confidence interval, however the value described is the lower limit.				
Project participant response				**Date:** 24/06/2015
No revision has been made with regards to this CL. The number reported in the PDD is in accordance with the one presented in Table 1.4., Vol 2, Ch 1 of the 2006 IPCC Guidelines.				

Documentation provided by project participant	
-	
DOE assessment	**Date:** 27/07/2015
The emission factor for the natural gas is in accordance with the IPCC upper value.This CL is closed	

CL ID	17	**Section no.**	D.8.8	**Date:** 14/10/2014
Description of CL				
PP did not provide the evidences for the description and accuracy of measurements equipment's described in the PDD version 1.				
Project participant response				**Date:** 24/06/2015
The project is under conception and no monitoring equipment was purchased yet. Meters will be purchased right after the project construction and they will have all the necessary specification following national requirements in order to inject upgraded gas in the NG distribution network.Furthermore, all monitoring requirements will be proceed in accordance with ACM0001 and referred tools, otherwise, emission reductions are zero.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
PP clarified that the equipment's were not purchase yet. The revised monitoring plan describes that it is expected to have meters which measures: (i) the landfill gas (LFG) sent to flare, (ii) the LFG sent to the upgrading system, (iii) the biomethane resulted from upgrading, (iv) the biomethane sent to the NG distribution system, (iv) the biomethane which does not reach the required parameters to be delivered to the NG distribution system and, for this reason, is flared.This CL is closed				

CL ID	18	**Section no.**	D.09	**Date:** 14/10/2014
Description of CL				
PP is requested to clarify if starting date of the crediting period is in line with project implementation chronogram				
Project participant response				**Date:** 24/06/2015
The starting date of the crediting period was revised considering the project owner's schedule for the project to begin its operation. Please refer to the revised PDD and ERs calculation spreadsheet.				
Documentation provided by project participant				
Revised PDD and CERs spreadsheet				
DOE assessment				**Date:** 27/07/2015
Starting date of the crediting period was updated to 01/01/2016.This CL is closed				

Table 2. CAR from this validation

CAR ID	1	**Section no.**	D.7	**Date:** 14/10/2014
Description of CAR				
During the on site visit it was provided an updated study from Landtec /38/ considers the operation of the landfill until 2031, impacting in a new estimative of waste collected, biogas generated. PP is requested to clarify how it affects the project description, CERs estimative and additionality of the project activity, considering the estimative of upgraded biogas that will be delivered to the grid, updating the documents accordingly.				
Project participant response				**Date:** 24/06/2015
The postponement of the landfill closure date increases the biogas generation and consequently emission reductions over the considered crediting period. Nevertheless, the project description (*i.e.* design of the purification plant) remains the same. Please note that the starting date of the CDM Project Activity has been updated, as explained below in CAR5. Despite of the modification in the biogas generation and in its starting date, the proposed CDM Project Activity remains additional. Detailed information on these modifications was included in the relevant Sections of the revised version of the PDD.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
PDD and CERs calculation were updated considering the operation of the landfill until 2031. The estimatives from the waste received are from the Landtec study, provided during the onsite visit. This CAR is closed				

CAR ID	2	**Section no.**	D.5	**Date:** 14/10/2014
Description of CAR				
PP did not provide the MOC and support documents				
Project participant response				**Date:** 24/06/2015//10/08/2015
The requested documents are attached. Cover page, sections A.1, A.4 and Appendix 1 of the PDD were revised accordantly. PP second response: The PP clarifies that the corporate name of GNR Ecofor Ltda. changed to GNR Fortaleza Valorização de Biogás Ltda. as can be seen in the amendment to the articles of association dated 30/09/2014. Therefore, the name of the PP has been changed in the PDD and MoC forms. Thus, find enclosed to this response the following documents: Amendment to the articles of association dated 30/09/2014; Declaration from the GNR Fortaleza Valorização de Biogás Ltda. stating that Ms. Carol Dick and Ms. Monique Maia are the focal points of the project.				
Documentation provided by project participant				
MOC and support documents				
DOE assessment				**Date:** 27/07/2015//13/08/2015

PP has provided the following documents:

- MoC signed (Ecofor_MoC_2015.07.02.pdf);
- ID Ms. Carol Inoue Dick (CNH Carol Inoue Dick.pdf)
- ID Ms. Monique Oliveira Rodrigues Maia (ID Monique Maia - frente.pdf)
- GNR Fortaleza Valorização de Biogás Ltda. Declaration nominating Ms. Carol Inoue Dick and Ms. Monique Oliveira Rodrigues Maia as responsible to communicate with UNFCCC, dated 04/09/2014, signed by the directors' (Declaração Ecofor_Moc-rev.pdf)
- - Power of Attorney of Ecopart Assessoria em Negócios Empresariais Ltda nominating Mr. Adelino Ricardo Jacintho Esparta (Power of attorney RE_jul14_16.pdf)
- Mr. Adelino Ricardo Jacintho Esparta passaport (Esparta - Passaporte.pdf)
- ID Mr. Carlos de Mathias Martins Junior (Doc Carlos Martins.pdf)

However with the documents provided it is not possible to confirm the corporate identity of personal of GNR Fortaleza Valorização de Biogás Ltda., as required by the VVS para. 54. This CAR remains open

RINA verified in the Amendment to the articles of association dated 30/09/2014 that the PP name changed from GNR Ecofor Ltda to GNR Fortaleza Valorização de Biogás Ltda (GNR ECOFOR_1ª Alteração Contrato Social_30set14.zip).The Declaration from the GNR Fortaleza Valorização de Biogás Ltda. stating that Ms. Carol Dick and Ms. Monique Maia are the focal points of the project (Declaração Ecofor_Moc-rev.pdf) is signed by the ID Mr. Carlos de Mathias Martins Junior, corporate identity confirmed in the Amendment to the articles of association dated 30/09/2014.(OBS: During the DNA revision, MOC was updated and Ms Monique Maia was substituted by MR. Marcio Schittini. Revised documents were correctly provided to the DOE).This CAR is closed

CAR ID	3	**Section no.**	D.8.1	**Date:** 14/10/2014
Description of CAR				
The version of the tool "Tool to calculate the emission factor for an electricity system" described in the PDD version 1 is not the valid version.				
Project participant response				**Date:** 24/06/2015
The version of the mentioned methodological tool was updated. Please refer to the revised version of the PDD.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
PDD was updated accordingly.This CAR is closed				

CAR ID	4	**Section no.**	D.8.4	**Date:** 14/10/2014
Description of CAR				
In accordance with the guidance, PDD has to include in the section B.3 a flow diagram all the equipment, systems and flows of mass and energy described in that section. In particular, indicate in the diagram the emissions sources and GHGs included in the project boundary and the data and parameters to be monitored.				
Project participant response				**Date:** 24/06/2015
A diagram presenting the emissions sources and GHGs included in the project boundary was included in section B.3 of the PDD.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
PP has revised accordingly the diagram. This CAR is closed				

CAR ID	5	**Section no.**	D.7	**Date:** 14/10/2014
Description of CAR				
PP did not provide a timeline of the project activity to demonstrate that the starting date described in published PDD is in accordance with CDM Glossary. Moreover, it is not clear if the contract corresponds to the earliest date at which either the implementation or construction or real action of a CDM project activity or CPA begins. Evidence was not provided				
Project participant response				**Date:** 24/06/2015

A timeline of the project activity was included in Section C.1.1. of the revised version of the PDD as requested.

The starting date of the CDM Project Activity that was considered in version 1 of the PDD consisted of the signature date of the contract between the landfill operator (Ecofor) and the project owner (GNR Ecofor). However, this contract neither anticipated penalties in the case the project was not implemented nor incurred in expenses from the project owner side. Therefore, this information was not aligned with the definitions provided by the CDM Glossary.

Hence, the starting date of the proposed CDM Project Activity has been revised to reflect the date in which real action related to the implementation of the proposed CDM project activity have been taken, *i.e.* the capital contribution approval for the implementation of the proposed CDM Project Activity. Without the capital contribution approval (which represents around 80% of total expected investment for the project implementation), no significant investment could be made for the project implementation. Then, this date is the first real action indicating that the project would be implemented indeed.
Supporting evidences of the events described in the timeline referring to this amendment are attached.

Documentation provided by project participant

Evidences to the timeline

DOE assessment	**Date:** 27/07/2015

Revised PDD presents the project timeline. PP has presented the preliminary contract between Ecometano and Ecofor, signed on 21/12/2012. Verified that this contract neither anticipated penalties in the case the project was not implemented nor incurred in expenses from the project owner side. (4. ECOMETANO_ECOFOR AMBIENTAL_Contrato Preliminar_21dez12.pdf). PP has also presented the minutes of meetings of the first capital increase for the project implementation occurred, dated 25/10/2013 (5. MDCPAR_Ata de RCA 25-Out-13 ECOFOR.pdf). The contract for the flare and the blower is dated 19/05/2014 (1.b. Contrato Flare e Blower.pdf) and the Installation License nº 172/2014 is dated 02/07/2014 (LI - ECOMETANO.PDF).Therefore, the starting date presented in the revised PDD is the earliest date at which either the implementation or construction or real action of a CDM project activity or CPA begins.This CAR is closed.

CAR ID	6	**Section no.**	D.8.6	**Date:** 14/10/2014

Description of CAR

The date of the notification (prior consideration) described in the PDD is not in accordance with the evidences provided

Project participant response	**Date:** 24/06/2015

The requested information was amended in the revised version of the PDD.

Documentation provided by project participant

Revised PDD

DOE assessment	**Date:** 27/07/2015

Revised PDD presents the correct information. Prior notification is dated 19/06/2013.This CAR is closed.

CAR ID	7	**Section no.**	D.8.6	**Date:** 14/10/2014

Description of CAR

Project participants are requested to include in PDD the values each parameter on the sensitivity analysis that allows to the project activity the achievement of benchmark

Project participant response	**Date:** 24/06/2015

The requested information was included in sensitivity analysis. Please refer to the revised version of the PDD.

Documentation provided by project participant

DOE assessment	**Date:** 27/07/2015

The values of the parameters of sensitivity analysis that reaches the benchmark were included in the revised PDD.This CAR is closed

CAR ID	8	**Section no.**	D.8.6	**Date:** 14/10/2014

Description of CAR

For the common practice analysis PDD version 1 is not considering the installed capacity of the project plant.

Project participant response	**Date:** 24/06/2015

The common practice analysis was revised in the amended version of the PDD, taking into account the processing capacity of the biogas purification plant.

Documentation provided by project participant

Revised PDD

DOE assessment	Date: 27/07/2015
Common practice was revised considering the pahse I and phase III of the project activity.This CAR is closed	

CAR ID	9	Section no.	D.8.6	Date: 14/10/2014
Description of CAR				
For the common practice analysis PP has presented a study from 2008, however it is not possible to confirm that the situation remained the same at the time of project starting date.				
Project participant response				**Date:** 24/06/2015
Updated information was included in the revised version of the PDD confirming the proposed CDM Project Activity is not common practice in the country.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
PDD was revised accordingly.This CAR is closed.				

CAR ID	10	Section no.	D.8.7	Date: 14/10/2014
Description of CAR				
PP has described in the PDD version 1 that option A of the *"Tool to determine the mass flow of a greenhouse gas in a gaseous stream"* was chosen to determine the parameter $F_{CH4,NG,y}$ however it is not possible to confirm during the on site visit that the monitoring of the requirements of option A will be monitored (the temperature of the gaseous stream (Tt) is less than 60ºC (333.15 K) at the flow measurement point).				
Project participant response				**Date:** 24/06/2015//10/08/2015
The proposed project activity is under conception and it is not known if temperature/pressure will be hourly monitored in all metering points for the determination of one of the options presented in the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". Therefore, Sections B.6 and B.7 were revised to consider the most possible scenario for biogas and methane monitoring. This scenario considers Option C of the mentioned tool for $F_{CH4,sent\_flare,y}$ determination (volumetric flow of LFG and methane concentration in wet basis) and Option A for $F_{CH4,NG,y}$ (mass flow of biomethane and volumetric fraction of methane in dry basis). In spite of the options chosen at the time of the project verification, monitoring will be followed according to ACM0001 and the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". Please refer to the revised version of the PDD, which presents the options chosen by the PPs. Since the project is not implemented and monitoring equipment was not purchased yet, confirmation that the gas is dry will be confirmed at the time of the project verification. PP second response: Section B.6.1 of the PDD was revised to consider Option C as the most possible scenario for the determination of $F_{CH4,sent\_flare,y}$ parameter (LFG flared). However, the PP included clarification that the upgraded gas, which does not reach quality specifications to be delivered into the NG pipeline and will be flared will follow Option A of the tool. Please refer to the revised version of the PDD.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015// 13/08/2015
PP clarified that it is expected to apply Option C of the tool for $F_{CH4,sent\_flare,y}$ determination (volumetric flow of LFG and methane concentration in wet basis) and Option A for $F_{CH4,NG,y}$ (mass flow of biomethane and volumetric fraction of methane in dry basis). However, in the section *Project Emissions from flaring*, step 1 the option described for the $F_{CH4,sent\_flare,y}$ is not coherent with the option chosen. This CAR remains open 2nd response: PDD was revised accordingly.This CAR is closed.				

CAR ID	11	Section no.	D.8.7	Date: 14/10/2014
Description of CAR				
In the PDD version 1, ex ante estimative described on section B.6.3 it is not possible to confirm the fossil fuel that will be used in the project activity (diesel x LPG or both)				
Project participant response				**Date:** 24/06/2015

LPG consumption for flare ignition is the only source of project emissions related to fossil fuels expected to be used in the project. However, the project is under conception and the project sponsor is analyzing the possibility of installing a fossil fuel generator, in order to avoid intermittences of electricity supply during the project operation, it is not defined yet.
If a fossil fuel generator will be installed at the project site, this emission source will be monitored in order to be considered in the emission reduction calculation. Therefore, monitored parameters regarding the fossil fuel consumption were included in the section B.7.1 of the PDD. Sections B.6.1 and B.6.3 were also revised accordantly

Documentation provided by project participant

Revised PDD

DOE assessment	**Date:** 27/07/2015

Revised PDD describes that the fossil fuel considered is the LPG for the flare ignition. If an electricity generator is installed, the fuel consumption will be monitored in accordance with the Tool to calculate project or leakage emissions from fossil fuel combustion". In the exante estimative diesel consumption was not considered.This CAR is closed.

CAR ID	12	**Section no.**	D.8.7	**Date:** 14/10/2014

Description of CAR

The CERs estimated in the PDD version 1 does not take into consideration the installed capacity of the purification plant and flare capacity.

Project participant response	**Date:** 24/06/2015// 10/08/2015

The emission reductions *ex-ante* calculation was revised considering the processing capacity of the biogas purification plant. Please refer to the attached revised Excel spreadsheet.

PP second response:

The ER spreadsheet was revised to consider 5% LFG flared and 95% LFG sent for upgrading. These values are estimated by the project developer, since the purpose of the project is upgrading and delivering gas to the NG pipeline (and not flaring). Flaring means that the project is inefficient and will not sell upgraded gas.

Regarding the installed capacity of the project, the PPs attached to this response the signed contract for the upgrading system and compressors. These contracts were included in the project timeline in section C.1.1 of the PDD.

According to the equipment contract supply (blower, flare, compressor and upgrading system), the project equipment has the following capacities:

Equipment	Capacity Nm^3/h	Contract page
Flare	8,200	17, 18
Blower	2 x 5,000	17, 19
Upgrading system	7,500	10
Compressor	2 x 3.750	51

Considering the table above, the project capacity is 7,500Nm^3/hr. Although blowers and compressors have higher flow rate capacity, the project is limited to the upgrading system of 7,500Nm^3/hr.

Documentation provided by project participant

Revised CERs spreadsheets
Evidences equipments

DOE assessment	**Date:** 27/07/2015// 13/08/2015

The ex ante estimative was revised, however the evidences for the installed capacity were not provided.Moreover, in accordance with the response in the CL 6, it is forecated that the upgrading system will have 95% upgrading efficiency, however the CERs calculation is considering 90%.This CAR remains open

PDD and CERs calculation were revised considering that 95% of the LFG will be sent for upgrading.The equipments installed capacity were revised in accordance with the manufacturer's contract

-Flare and blower: (1.b. Contrato Flare e Blower.pdf)

-Upgrading system (ECOFOR_MORROW_Supply Agreement_22ago14.zip)

-Compressor (GNR FORTALEZA_ENGEMASA_Contrato_24fev15.zip)
This CAR is closed.

CAR ID	13	**Section no.**	D.8.7	**Date:** 14/10/2014
Description of CAR				
PP has considered data from 1973-1990 to determine the MAT and MAP/PET values . PP is requested to clarify why most recent data from was not used				
Project participant response				**Date:** 24/06/2015
Project Participant verified other sources of information, such as World Meteorological Organization (WMO) and National Meterological Institute (from the Portuguese *Instituto Nacional de Metereologia* - INMET). The result is that information from EMBRAPA is consistent with those provided by these two other institutes. Moreover, the period considered in all databases is the same, *i.e.* ending in 1990. Copies of databases from all the mentioned institutions are attached.				
Documentation provided by project participant				
Copies of databases forms				
DOE assessment				**Date:** 27/07/2015
PP provided different evidences to confirm the consistency of the values presented in the PDD.This CAR is closed.				

CAR ID	14	**Section no.**	D.8.7	**Date:** 14/10/2014
Description of CAR				
PDD version 1 do not list in the parameters available at validation the parameters ***Pn*** (Pa) Atmospheric pressure at normal conditions and ***Tn*** (K). Temperature at normal conditions in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"				
Project participant response				**Date:** 24/06/2015
The PDD was revised considering explanations presented in CAR10.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
Paremeters were correctly described in the revised PDD.This CAR is closed				

CAR ID	15	**Section no.**	D.8.8	**Date:** 14/10/2014
Description of CAR				
PDD version 1 describes the monitoring of the parameter $V_{t,db}$ (m^3 wet gas/h). name and unit of the parameter are not coherent (dry x wet) . Moreover, in page 25, it is described that option A of the tool was chosen to monitor the parameter $F_{CH4,flared,y}$.				
Project participant response				**Date:** 24/06/2015
The PDD was revised considering explanations presented in CAR10.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
PP clarified that it is expected to apply Option C of the tool for FCH4,sent_flare,y determination (volumetric flow of LFG and methane concentration in wet basis) and Option A for FCH4,NG,y (mass flow of biomethane and volumetric fraction of methane in dry basis). This CAR is closed				

CAR ID	16	Section no.	D.8.8	Date: 14/10/2014
Description of CAR				
The value presented in the PDD version 1 for the NCV is not for the diesel.				
Project participant response				**Date:** 24/06/2015// 10/08/2015
The PDD was revised considering explanations presented in CAR10 and CAR11. PP second response: The LFG NCV was revised to consider data from the 2014 National Energetic Balance ("BEN 2014"). Furthermore, estimative of LPG consumption was revised based on similar project (Dois Arcos). Please refer to the revised ER spreadsheet and PDD.				
Documentation provided by project participant				
Revised PDD, CERs spreadsheet, evidences				
DOE assessment				**Date:** 27/07/2015//13/08/2015
PP is requested to present the evidence for the NCV of the LPG. The link provided in the PDD is not working. Moreover, table of the section B.7.1 describes a different source. This CAR remains open The NCV was revised in accordance with National data. The estimative of LPG consumption is based on a similar project of the group, adjusted proportionally to the installed capacity.This CAR is closed.				

CAR ID	17	Section no.	D.8.8	Date: 14/10/2014
Description of CAR				
The monitoring plan do not describe that all meters will be calibrated by an accredited person or institution				
Project participant response				**Date:** 24/06/2015
This information was included in section B.7.3. of the revised version of the PDD.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 27/07/2015
Revised PDD describes that maintenance and calibration of the monitoring equipment and system will be made in accordance with manufacturer's recommendations and following national/international standards. Calibrations of measuring equipment will be carried out by an accredited person or institution.This CAR is closed				

CAR ID	18	Section no.	D.10	Date: 14/10/2014
Description of CAR				
PDD version 1 does not describe the latest environmental licenses available for the project activity and landfill.				
Project participant response				**Date:** 24/06/2015//10/08/2015
Information regarding the latest environmental permits issued in favor of the project was included in the revised version of the PDD. It is important mentioning that LO #352/2014 – DICOP – GECON for landfilling activities is under renewing period and waiting the environmental agency analysis. PP second response: The landfill owner requested LO renewal in December 2014 (before the expiration date of LO nr.352/2014-DICOP-GECON, 08/05/2015) as can be seen in the certificate of administration proceedings attached. Currently, the LO is still under renewal process.				
Documentation provided by project participant				
Revised PDD, license				
DOE assessment				**Date:** 27/07/2015//13/08/2015
PP is requested to provide the evidences to renewal the operation license of the landfill.This CAR remains open 2nd round PP has provided the evidences that the renewal requested was registered in the SEMACE on 15/12/2014. (Protocolo_LO.JPG)This CAR is closed				

CAR ID	19	Section no.	D.6	Date: 27/07/2015
Description of CAR				

PDD version 2 is not applying the last version of the template CDM-PDD-FORM.	
Project participant response	**Date:** 10/08/2015
The PDD was revised to apply the latest version of the CDM-PDD-FORM available.	
Documentation provided by project participant	
Revised PDD	
DOE assessment	**Date:** 13/08/2015
The PDD form was updated correctly.This CAR is closed.	

CAR ID	20	**Section no.**	D.8.7	**Date:** 27/07/2015
Description of CAR				
The values presented in the section B.6.3 for the ex ante calculation are not in accordance with the values in the CERs spreadsheet (also consider the years of the crediting period)				
Project participant response				**Date:** 10/08/2015
ER spreadsheet and PDD was revised accordantly.				
Documentation provided by project participant				
Revised PDD and CERs spreadsheet				
DOE assessment				**Date:** 13/08/2015
Documents were revised accordingly.This CAR is closed.				

CAR ID	21	**Section no.**	D.8.7	**Date:** 27/07/2015
Description of CAR				
PDD describes in the section A.3 that there in order to ensure safety and, depending on the project performance, two more flares may be installed at the project site. However, it is not possible to confirm that the requirements of the paragraph 36 of the methodology will be followed: *$PE_{flare,y}$ shall be determined using the methodological tool "Project emissions from flaring". If LFG is flared through more than one flare, then $PE_{flare,y}$ is the sum of the emissions for each flare determined separately.*				
Project participant response				**Date:** 10/08/2015
Currently, the project is expected to have only one flare (phase I of the project). Depending on the project performance, phase II and III maybe implemented, requiring the installation of two more flares. In the project expansion scenario, the project monitoring will follow all requirements from ACM0001 and referred tools. This clarification was included in the PDD.				
Documentation provided by project participant				
Revised PDD				
DOE assessment				**Date:** 13/08/2015
PDD was revised accordingly.This CAR is closed.				

CAR ID	22	**Section no.**	D.8.6	**Date:** 27/07/2015
Description of CAR				
The price of the NG presented in the investment analysis for the northeast region are not according to the Monthly Reports of the Mines and Energy Ministry				
Project participant response				**Date:** 10/08/2015// 03/09/2015
The NG prices are according to the MME Reports. Values considered in the investment analysis of the project are the price "with discount", since NG price is subsidized by Petrobrás to become more competitive in relation to other types of fuels and the international market. As can be seen in the MME Reports, a discount of approximately 31% is applied in the NG price for the Northeastern and Southeastern region of Brazil, excluding GASMIG. PP second response: The IRR spreadsheets (investment decision and expansion scenario) were revised to include a column "reference month" for proper indication of MME NG prices.				
Documentation provided by project participant				
Revised PDD, finalcial spreadsheet, MME reports				
DOE assessment				**Date:** 13/08/2015//14/09/2015
In the monthly reports published by MME, the price presented refers always to the previous month, so the prices in the investment analysis are not consistent with the appropriate month of the reports. This CAR remains open. Natural Gas prices were revised and are according to the MME Reports.This CAR is closed.				

CAR ID	23	Section no.	D.8.6	Date: 27/07/2015

Description of CAR

The unit for the NG price presented in the sensitivity analysis when considering an increase in the NG price of 12.1% to NPV zero is not correct, moreover, the table 7- Projection of NG price in Brazil presents the values in different units of the investment analysis.

Project participant response	Date: 10/08/2015// 03/09/2015

The unit of the NG price was corrected in the PDD. Regarding table 7, the PP clarifies that data presented in the PDD is according to PDE 2021 and, therefore, units were not changed from the source.

"MMBtu" or "MBtu" is often used to represent one million BTUs.

From the Roman numeral system, "M" stands for one thousand ($x10^3$) and "MM" for million ($x10^6$). In the S.I., mega (M) prefix denotes multiplication by a factor of one million ($\times 10^6$).

The, PDE 2021 considered "MBtu" as one million in the S.I. This can be evidenced while analysing the previous government plan (PDE 2020) where it states: "US$/MBtu (dólares por milhão de Btu)". Please refer to the following link:

http://www.epe.gov.br/PDEE/20120302_1.pdf

In order to avoid misunderstandings, table 7 of the PDD was revised for MMBtu unit considered in the investment analysis.

Regarding additionality, two more references can be mentioned in order to demonstrate the tendency of a reduction of the NG price.

The Economic Research Institute Foundation ("FIPE" from the Portuguese Fundação Instituto de Pesquisas Econômicas) presented the "NG Strategic Project – NG Economical Potential in Brazil based on International Experience", Oct 2012. The methodology considered in this study considered the tendencies of NG in Brazil and worldwide regarding offer and demand and industrial policies, sensitivity in the NG consumption in relation to other sources of energy (as electric and fuel oil) and its influence in costs, critical levels of NG prices and their impact on taxes, income and employment, etc. The study presented a NG price scenario considering US$7/MMBtu up to 2025 year.

http://www.estadao.com.br/brasilcompetitivo/Apresentacoes/20121017/fernando.pdf

Another study that it is worth mention is the one published in June 2012 by the National Forum of State Secretaries for Energy Matters (from the Portuguese Fórum Nacional de Secretários de Estado para Assuntos de Energia). This study considered a competitive NG price scenario for 2020 year in a range of US$5.50-7.50MBtu ("MBtu" as one million Btu).

http://www.forumdeenergia.com.br/nukleo/pub/cepe_ago2012.pdf

Considering studies mentioned above, it can be demonstrated that, at the time of the investment decision, the NG price was not expected to increase in a short-medium term period.

PP second response:
The PDE 2021 study was withdrawal from the PDD in order to avoid misunderstandings. Other sources of information were included in the PDD.

Documentation provided by project participant

Revised PDD and support evidences

DOE assessment	Date: 13/08/2015//14/09/2015

RINA refers to the point that the table 7 presents the price tendency in U$/MBTU however the financial analysis uses the unit in U$/m3, which needs conversion to be comparative.This CAR remains open

PPs presented other sources of information that were included in the revised PDD.This CAR is closed.

CAR ID	24	Section no.	D.8.6	Date: 27/07/2015

Description of CAR

The value presented for the investment in 17.6km of pipeline from the landfill to the NG network in the investment analysis could not be found in the evidence presented (LANDTEC_Feasibility study ASMOC).

Project participant response	Date: 10/08/2015// 03/09/2015

The NG pipeline was not included in the assessment made by Landtec (but the LFG collection and purification system only). Then, the investment required for the NG pipeline construction considered in the financial analysis is from the Study published by FERREIRA FILHO, V. J. M "Economical Costs and Benefits of NG Transportation Technologies in Brazil" from the Federal University of Rio de Janeiro and presented in the 4th PDPEDRO – R&D Brazilian Congress for Petroleum and Gas (from the Portuguese Congresso Brasileiro em P&D em Petróleo e Gás). The study considered US$500,000 investment per km pipeline. This study and presentation of the pipeline distance is attached to this response.

PP second response:
At the time of the investment decision, operational costs for NG transportation were not included in the financial analysis, since these costs were expected to be transferred/paid by consumers. In reality if these costs were included in the financial analysis, Opex would be higher than the ones considered in the IRR spreadsheet. Therefore, no changes were made in the financial analysis in order to be conservative.

Documentation provided by project participant

Revised PDD and support evidences

DOE assessment	**Date:** 13/08/2015//14/09/2015

The study provided by PPs presents the investment per km of pipeline, which is consistent to the total capex for pipeline included in the investment analysis.However, the study also presents estimative for the pipeline OPEX ($0,90/MMBTU), PPs are requested to explain why this estimative of operational cost for pipeline was not considered in the investment analysis.This CAR remains open.

RINA agrees that OPEX would be higher in case operational costs for NG transportation was considered, and therefore the value considered for the pipeline in the financial analysis is conservative.This CAR is closed.

CAR ID	25	**Section no.**	D.8.6	**Date:** 27/07/2015

Description of CAR

The annual operating costs for the project activity as 6,932,500 (US$/yr) was estimated based on values available for a similar project that has been developed from the same shareholders of the proposed project activity. PPs shall further justify how the O&M costs for the similar project are representative for the project activity under consideration. In particular, the PPs shall explain how the O&M costs of the CDM similar project have been validated, as the similar project is under validation. In doing so, the PPs shall provide a breakdown of the O&M costs and clarify how the value of O&M costs used in the NPV calculations has been checked with actual values since the similar CDM project is not operational. Please refer to VVS paragraph 154 (b).

Project participant response	**Date:** 10/08/2015// 03/09/2015

As discussed in the baseline scenario and the common practice analysis, there are no similar projects that upgrade the LFG for off-site consumers in Brazil. All projects which involve LFG include electricity generation to the grid, or flaring only. The only project which involves LFG upgrading is Gramacho project which no CDM verification occurred up today.

The LFG upgrading is new in the country, for which legislation, licensing, technology, know-how, personnel, etc, are not established yet. Therefore, the unique reference for O&M costs for this type of project is the one considered for another project from the same project developer (Dois Arcos project). For this reason, detailed operational costs (including O&M costs) of Dois Arcos project considered at the time of investment decision were considered in spite of this project was not operational.

PP second response:
Opex costs considered for the project activity is based on a third-party entity contracted by the project developer in order to assess technical and investment feasibility for LFG upgrading. Thus, SCS Assessment Report 06212012.00 dated August 2012 was considered since it presents detailed values of annual Opex for biogas upgrading. This document was prepared and made available at the time of the investment decision of the project in order to proceed with its implementation (which is the same date of the project starting date, i.e. 25/10/2013, the first capital increase by the Board representing almost 80% of the project capex).

Documentation provided by project participant

Revised PDD and support evidences

DOE assessment	**Date:** 13/08/2015//14/09/2015

Despite the fact that there are no other similar projects in Brazil to compare the O&M costs, Dois Arcos project is not operational and is a under validation project, and therefore the values used from Dois Arcos could not be considered as a reference as it is not validated.This CAR remains open. RINA verified that Opex costs considered for the project activity are based on a third-party entity contracted by the project developer in order to assess technical and investment feasibility for LFG upgrading. This CAR is closed.

Table 3. FAR from this validation

FAR ID	XX	**Section no.**		**Date:** DD/MM/YYYY
Description of FAR				
Project participant response				**Date:** DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				**Date:** DD/MM/YYYY

RINA Tables:

TABLE 1 MANDATORY REQUIREMENTS

Requirement	Reference	Conclusion
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reductions commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non Annex I Parties contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved	Kyoto Protocol Art.12.5a CDM Modalities and Procedures §40a	~~Pending~~ OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art.12.2 CDM Modalities and Procedure §40	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance (ODA) and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7 CDM Modalities and Procedures Appendix B §2	OK
6. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities and Procedures §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedure §31b	OK
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedure §31b	OK
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	CDM Modalities and Procedure §43	~~CAR 7 to CAR 9~~ ~~CL 4 to CL 8~~ OK
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art.12.5b	~~CAR 1~~ ~~CAR 12~~ OK
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental	CDM Modalities and Procedures §37c	OK

Requirement	Reference	Conclusion
impact assessment in accordance with procedures as required by the Host Party shall be carried out.		
13. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakech Accords and shall not be a de-bundled component of a larger project activity.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK
14. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
15. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30/45 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
16. Baseline and monitoring methodology shall be previously approved by the CDM Methodology Panel.	CDM Modalities and Procedures §37e	OK
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords, and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

TABLE 2 REQUIREMENTS CHECKLIST

Checklist Question		Reference	MoV[1]	Comments	Conclusion
A Description of Project Activity					
A.1 Title of the project activity					
A.1.1.	Does the used project title clearly enable the reader to identify the unique CDM activity? Is there an indication of a revision number and the date of the revision.	/1/	DR/CC	Yes, the title of the project is Oeste de Caucaia Landfill Project Activity version 01 of 25/06/2014 /01/	**OK**
A.1.2	Does the project comply with the applicable requirements for completing the PDDs (latest version available)?	/1/ /23/	DR/CC	Yes, the project complies with Project design document form for CDM project activities and its Attachment: Instructions for filling out the project design document form for CDM project activities, version 5 of 25/06/2014 /23/	**OK**
A.1.3	Does the PDD comply with the template available (latest version)?	/1/ /23/	DR/CC	Yes.	**OK**
A.2 Description of the proposed project activity					
A.2.1	Does the PDD contain an accurate description of the project activity and provide the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation? How was the design of the project assessed?	/01/ /32/	DR/CC	Yes, the proposed CDM Project Activity consists of capturing the landfill gas (LFG) generated by the landfill using an active LFG capture system and injecting it into a natural gas distribution network (after a purification process), displacing the use of natural gas. Any LFG excess will be flared. PDD version 1, describes that the project expects to inject an average of 4,096 Nm^3/h of upgraded biogas to the distribution grid. However, it is not clear how this value was estimated. Moreover, PDD does not describe the installed capacity of the project equipments. During the on site visit it was provided an updated study from Landtec /38/ considers the operation of the landfill until	**OK** ~~CL1~~

[1] MoV: DR document review, I interview, CC cross checking

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				2031, impacting in a new estimative of waste collected, biogas generated. PP is requested to clarify how it affects the project description, CERs estimative and additionality of the project activity, considering the estimative of upgraded biogas that will be delivered to the grid, updating the documents accordingly.	~~CAR 1~~
A.2.2	Does the project activity involve alteration of existing installations? If yes, have the differences between pre-project and post-project activity been clearly described in the PDD?	/01/	DR/CC	Not applicable.	**OK**
A.2.3	Is all information provided consistent and in compliance with the actual situation or planning?	/01/	DR/CC	Yes, verified during the on site visit that the project activity was being implemented and under operation tests.	**OK**
A.3 Project participants					
A.3.1	Have the Parties and project participants participating in the project been listed in tabular form in Section A.3 and are they consistent with the information detailed in Annex 1 of the PDD?	/01/	DR/CC	Yes, project participants are Ecopart Assessoria em Negócios Empresariais Ltda. And GNR Fortaleza Valorização de Biogás Ltda.. Both PP are private entities from Brazil and are correctly listed in Annex 1 of the PDD.	OK
A.3.2	Do all participating Parties fulfil the participation requirements as follows: (a) Party has ratified the Kyoto Protocol (b) Party has a Designated National Authority (c) The assigned amount has been determined	/01/ /06/	DR/CC	The project is a unilateral project and hence the host country is the only Party involved in the proposed project activity. Brazil fulfils the requirements to participate in the CDM, having ratified the Kyoto Protocol on 23 August 2002 and established as DNA "Ministério da Ciência, Tecnologia e Inovação (MCTI) / Ministry of Science, Technology and Innovation" as per the UNFCCC website /06/	OK
A.3.3	Have the letters of approval have been issued?	/01/ /06/	DR/CC	Prior to the submission of the Project Design Document and the Validation Report to the CDM Executive Board, the Project will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation that the Project assists the country in achieving sustainable development	~~Pending~~ OK
A.3.4	Do the letters of approval meet the following requirements? (a) LoA(s) is/are issued by the DNA	/01/ /06/	DR/CC	Prior to the submission of the Project Design Document and the Validation Report to the CDM Executive Board, the Project will have to receive the written approval of voluntary participation from the DNA of Brazil, including the	~~Pending~~ OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
	(b) LoA confirms that the Party has ratified the Kyoto Protocol; (c) LoA confirms that participation is voluntary (d) The LoA confirms that the project contributes to the sustainable development of the Host Country? (e) The LoA is valid for the proposed project activity under validation (f) The LoA was received directly by the DNA or by the PP			confirmation that the Project assists the country in achieving sustainable development.	
A.3.5	Indicate the means of validation employed to assess the authenticity	/01/ /06/	DR/CC	Prior to the submission of the Project Design Document and the Validation Report to the CDM Executive Board, the Project will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation that the Project assists the country in achieving sustainable development	~~Pending~~ OK
A.3.6	Have all private/public project participants been authorized by a Party to the Kyoto Protocol?	/01/ /06/	DR/CC	Prior to the submission of the Project Design Document and the Validation Report to the CDM Executive Board, the Project will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation that the Project assists the country in achieving sustainable development	~~Pending~~ OK
A.3.7	Are the entities included in the PDD those authorized as PPs?	/01/ /06/	DR/CC	Prior to the submission of the Project Design Document and the Validation Report to the CDM Executive Board, the Project will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation that the Project assists the country in achieving sustainable development	~~Pending~~ OK
A.3.8	Do the PP(s) listed in the PDD have a contract with RINA for the project validation?	/01/ /06/ /24/	DR/CC	Yes, RINA has a contract with GNR Fortaleza Valorização de Biogás Ltda. signed on 29/07/2014 /24/	OK
A.4 Modalities of communication					
A.4.1	Does the MoC statement comply with the latest version of the Form F-CDM-MOC available?	/01/ /04/ /07/	DR/CC	PP did not provide the MOC and support documents	OK ~~CAR 2~~
A.4.2	Does the MoC statement is correctly completed including Annex 1?	/01/ /04/ /07/	DR/CC	Please, refer to the section A.4.1 above.	OK ~~CAR 2~~
A.4.3	Does the MoC statement identify all PPs and focal points?	/01/ /04/ /07/	DR/CC	Please, refer to the section A.4.1 above.	OK ~~CAR 2~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
A.4.4	How the personal identities, the specimen signatures and the employment status is cross-checked?	/01/ /04/ /07/	DR/ CC	Please, refer to the section A.4.1 above.	OK ~~CAR 2~~
A.4.5	Is the official who submitted the MoC statement and the official who signed the written confirmation duly authorized to do so on behalf of the respective PPs?	/01/ /04/ /07/	DR/C C	Please, refer to the section A.4.1 above.	OK ~~CAR 2~~
A.5 Technical description of the project					
A.5.1	Does the information provided on the location of the project activity allow for a clear identification of the site(s)? Are the latitude and longitude of the site indicated (decimal points)?	/01/ /32/	DR/C C	The project is located in Caucaia municipality, Ceará State, Brazil, in the following geographical coordinates 3º47'20.29'' S and 38º40'24.99''W, confirmed in the SCS Energy assessment report /32/	OK
A.5.2	Is the category(ies) of the project activity correctly identified?	/01/ /05/	DR/C C	The project falls into category "Flaring or use landfill gas", scope 13- waste handling and disposal.	OK
A.5.3	Does the project design engineering reflect current good practices? Would the technology result in a significantly better performance than any commonly used technologies in the host Country? Is any transfer of technology from any Annex I Party involved?	/01/ /05/	DR/C C	During the on site visit, verified that only few wells were being installed. PP explained that most of equipment will be manufactured in Annex 1 countries.	OK
A..5.4	What is the expected operational lifetime of the project activity? Is it reasonable?	/01/ /05/	DR/C C	PDD version 1 describes the operational lifetime of 21 years and 0 months. PP did not provide the evidence for the operational lifetime of the project activity	OK ~~CL2~~
A.6 Public funding					
A.6.1	Does the information on public funding provided conform to the actual situation or planning as presente by the PPs?	/1/	DR/C C	There is no public funding in the project activity, however PP did not present the evidence	OK ~~CL3~~
A.6.2	If public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/1/	DR/C C	Not applicable. There is no public funding in the project activity	OK
B. Baseline and monitoring methodology					
B.1 Methodology applied					

Checklist Question		Reference	MoV[1]	Comments	Conclusion
B.1.1	Does the project activity apply an approved methodology and the correct version thereof?	/01/ /05/	DR/CC	Yes. The project applies the approved baseline methodology ACM0001, "Flaring or use of landfill gas", version 15.0 of 08/11/2013 /05/	OK
B.1.2	Is there any specific guidance, including the methodological tools provided by EB and has these guidance been applied?	/01/ /05/ /08/ /09/ /12/ /13/ /14/ /15/ /16/ /27/	DR/CC	The following tools are listed in the applied methodology: - "Project emissions from flaring" (version 02.0.0) /13/; - "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01) /14/; - "Tool to calculate the emission factor for an electricity system" (version 4.0) /15/; - "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (version 02) /09/; - "Emissions from solid waste disposal sites" (version 06.0.1) /16/; - "Combined tool to identify the baseline scenario and demonstrate additionality" (version 05.0.0) /08/; - "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) /12/; The version of the tool "Tool to calculate the emission factor for an electricity system" described in the PDD version 1 is not the valid version. The above tools are described in the applied methodology, however are not applicable to the project activity: - "Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01) /17/; - "Tool to determine the remaining lifetime of equipment" (version 01) /18/; - "Project and leakage emissions from transportation of freight" (version 01.1.0) /10/; - "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1) /11/.	~~CAR 3~~
B.1.3	How was it validated that the project activity complies	/01/ /05/	DR/C	The applicability criteria of methodology and tools were	

<table>
<tr><th colspan="2">Checklist Question</th><th>Reference</th><th>MoV[1]</th><th>Comments</th><th>Conclusion</th></tr>
<tr><td></td><td>with the applicability criteria?</td><td>/08/ /09/ /12/ /13/ /14/ /15/ /16/ /27/</td><td>C</td><td>assessed as follow:
<table>
<tr><th>Applicability criteria</th><th>Project activity</th><th>Criteria is met?</th></tr>
<tr><td>(a) Install a new LFG capture system in a new or existing SWDS where no LFG capture system was installed prior to the implementation of the project activity; or</td><td>Verified during the onsite visit and environmental licenses /27/ that the project consists on an installation of a new LFG capture system in an existing SWDS. Prior the project activity LFG was venting to the atmosphere.</td><td>Yes</td></tr>
<tr><td>(b) 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</td><td>Not applicable</td><td>Yes.</td></tr>
</table></td><td></td></tr>
</table>

Checklist Question		Reference	MoV[1]	Comments			Conclusion
				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;			
				(c) 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; and/or (iii) Supplying the LFG to consumers through a natural gas distribution network; (iv) Supplying compressed/liquefied LFG to consumers using trucks;	Verified during the on site visit and project design /32/ that the project activity will apply option: (iii) Supplying the LFG to consumers through a natural gas distribution network; Moreover, as a emergency procedure, the LFG also can be flared.	OK	
				(d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.	Verified during the on site visit that the LFG will be captured from the Oeste de Caucaia landfill.	OK	
				4. The methodology is only applicable if the	The baseline scenario is the partial or total	OK	

Checklist Question		Reference	MoV[1]	Comments			Conclusion
				application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is: (a) Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and (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	atmospheric release of the gas (usual practice of the Oeste Landfill Project Activity management) /32/		

Checklist Question		Reference	MoV[1]	Comments			Conclusion
				within the project boundary.			
				5. This methodology is not applicable: (a) 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; (b) 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.	The project applies only the approved methodology ACM0001. Moreover the management of the Oeste de Caucaia Landfill landfill will not be changed to increase the methane generation, confirmed through interview during the on site visit.	Yes	
				The applicability of the tools are also described: * The “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” /12/, is applicable because the flow and composition of residual or flared gases or exhaust			

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				gases are measured for the determination of baseline or project emissions. * The methodological tool ¨Emissions from solid waste disposal sites" /16/ is applicable as it is used under 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. 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 (e.g. measuring the amount of methane captured from the SWDS). * The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /14/ is applicable since the project activity consumes electricity from the grid (a source of project emissions) * The "Tool to calculate the emission factor for an electricity system" /15/ is applicable as off-grid power plants are not considered. Hence, the requirements of Annex 2 of the tool, referring to the applicability conditions that shall be met when this kind of plants are considered, are not applicable. Besides, the Brazilian Electric System is neither partially nor totally located in any Annex-I country. *The methodological tool "Project emissions from flaring" /13/ is applicable to the flaring of flammable greenhouse gases where: - Methane is the component with the highest concentration in the flammable residual gas; - The source of the residual gas is coal mine or gas from biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				The flammable residual gas is LFG (gas from biogenic source), which is composed by CH_4, H_2S, CO_2 and N_2, among other components. By default, the methodology adopts that the default fraction of methane in the LFG is 50%. Therefore, it can be assumed that methane is the component with the highest concentration in the LFG. In this sense, both applicability conditions of the tool are met. * The "Tool to calculate project or leakage CO_2 emissions from fossil fuel" /09/ combustion is applicable for calculating the project CO_2 emissions from the combustion of fossil fuels - i.e. diesel generator used for emergency purposes - which are determined based on the quantity of fuel used. * The "Combined tool to identify the baseline scenario and demonstrate additionality" is used to demonstrate additionality of the project activity as required by the applied methodology ACM0001 /05/	
B.1.4	Is the selected baseline one of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/01/ /05/ /27/ /32/	DR/CC	Yes, the baseline scenario is the partial or total atmospheric release of the gas (usual practice of the Oeste de Caucaia Landfill Project Activity management /27/ /32/	OK
B.2 Project boundary					
B.2.1	Is the project boundary are clearly defined and in accordance with the applied methodology?	/01/ /25/	DR/CC	In accordance with the applied methodology, the project boundary of the project activity shall include the site where the LFG is captured and, as applicable: *(a) Sites where the LFG is flared or used (e.g. flare, power plant, boiler, air heater, glass melting furnace, kiln, natural gas distribution network or biogas processing facility);* -In the case of the proposed CDM Project Activity, the sites where the LFG is flared/used consists of the collection system, biogas upgrading facility, pipeline, gas station facilities (including flaring); *(b) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity to the project activity*;	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				- the national grid is included in the boundary in accordance with the Brazilian DNA resolution nº 8 of 26/05/2008 /25/.	
B.2.2	What are the project's system boundaries (components and facilities used to mitigate GHGs)?	/01/ /23/	DR/ CC	In accordance with the guidance, PDD has to include in the section B.3 a flow diagram all the equipment, systems and flows of mass and energy described in that section. In particular, indicate in the diagram the emissions sources and GHGs included in the project boundary and the data and parameters to be monitored.	OK ~~CAR 4~~
B.2.3	Which sources are identified for the project? Does the identified project boundary cover all possible sources linked to the project activity?	/01/ /05/	DR/ CC	In the baseline scenario, there are CH_4 emissions from decomposition of waste at the SWDS site and from the use of natural gas. In the project scenario, there CO_2 emissions from fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity; CO_2 emissions from electricity consumption due to the project activity and CH_4 emissions from flaring	OK
B.2.4	In case of grid connected electricity project: is the relevant grid correctly identified in accordance with the latest version of tool to calculate emission factor of electricity system and the underlying methodology?	/01/ /05/ /25/	DR/ CC	The project will consume electricity from the grid. The grid was defined in accordance with the definition of the tool and Brazilian DNA Resolution nº 8 /25/	OK
B.2.5	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute by more than 1% to the estimated emission reductions of the project?	/01/ /05/ /32/	DR/ CC	During the on site visit and in the assessment report /32/ it was not identified other emissions sources not foreseen by the methodology and tools.	OK
B.3 Identification of the Baseline Scenario					
B.3.1	Which baseline scenarios have been identified? Is the list of the baseline scenarios complete? Does the PDD follow the steps to determine the baseline scenario required by the methodology/tool?	/01/ /05/ /08/ /31/	DR/C C	The project activity applies the Combined tool to identify the baseline scenario and demonstrate additionality /08/ as required by the methodology ACM0001 /05/. ***Step 0: Demonstration that the proposed project activity is the fist-of-its-kind*** Not applicable **STEP 1: identification of alternative scenarios**	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				Step 1a: Identification of alternative scenarios: In accordance with the applied methodology, the following alternatives were identified for the destruction of the LFG in the absence of the project activity: *a) LFG1*: Project Activity undertaken without being registered as a CDM Project Activity (capture, flare and use of LFG), b) *LFG2*: Continuation of the landfill operation, continuation of atmospheric release of the landfill gas (Business as Usual – BAU scenario) or partial capture of landfill gas and destruction trough flaring to comply with regulations or contractual requirements, or to address safety and odour concerns; c) *LFG3*: LFG is partially not generated because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS; d) *LFG4*: LFG is partially not generated because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS; e) *LFG5*: LFG is partially not generated because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS. In addition to the scenarios presented above, as described in the ACM0001, for the supply of LFG to a natural gas distribution network, the baseline is assumed to be the supply with natural gas. ***Step 1b: Consistency with mandatory laws and regulations*** Verified that all alternatives comply with local laws and none of them are mandatory. The Política Nacional de Resíduos Sólidos (National Solid Waste Policy) was approved in 2010, and it does not foreseen the obligation of landfill gas destruction or landfill gas use /31/.	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
B.3.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/01/ /05/ /08/	DR/CC	PP applied the Combined tool to identify the baseline scenario and demonstrate additionality /08/ as required by the methodology ACM0001 /05/. The barrier analysis and investment analysis were done.	OK
B.3.3	What is the baseline scenario? Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/01/ /05/ /08/	DR/CC	Yes, the baseline scenario is the partial or total atmospheric release of the gas (usual practice of the Oeste de Caucaia Landfill Project Activity management	OK
B.3.4	Has the baseline scenario been determined using conservative assumptions? Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies (E+ / E-), macro-economic trends and political aspirations?	/01/ /05/ /08/	DR/CC	Yes. All applicable CDM requirements been taken into account in the identification of the baseline scenario for the proposed CDM project activity.	OK
B.4 Additionality					
B.4.1	What tool does the project use to assess additionality? Is this in line with the methodology?	/01/ /05/ /08/	DR/CC	The Combined tool to identify the baseline scenario and demonstrate additionality, version 5.0.0, dated 23/11/2012 /08/ was used as required by the applied methodology.	OK
B.4.2	What is the project additionality mainly based on?	/01/ /05/ /08/	DR/CC	– PP applied the barrier analysis and financial analysis in accordance with the Combined tool to identify the baseline scenario and demonstrate additionality /08/	OK
B.4.3 Prior consideration of CDM					
B.4.3.1	What is the starting date of the proposed project activity? Is it in accordance with the CDM Glossary of Terms?	/01/ /27/ /36/	DR/CC	The start date of the project activity described in the published PDD is 21/12/2012 and represents the signature of the contract between Ecometano (project implementer) and Ecofor (owner of the landfill). PP did not provide a timeline of the project activity to demonstrate that the starting date described in published PDD is in accordance with CDM Glossary. Moreover, it is not clear if the contract corresponds to the earliest date at which either the implementation or construction or real action of a CDM project activity or CPA begins. Evidence was not provided	OK ~~CAR 5~~
B.4.3.2	Is the project activity a new project activity or existing	/01/ /27/	DR/C	The project activity is a new project.	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
	project?	/36/	C		
B.4.3.3	For an existing project activity with a start date is prior the date of the PDD publication for GSC, what is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/01/ /27/ /36/	DR/CC	Not applicable.	OK
B.4.3.4	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status? Please specify the gap between the documented evidences.	/01/ /21/ /37/	DR/CC	The notification of prior consideration dated 19/06/2013 was sent to UNFCCC and Brazilian DNA on 19/06/2013 /37/. The date of notification (prior consideration) described in the PDD is not in accordance with the evidences provided	OK ~~CAR 6~~
B.4.4 Investment analysis					
B.4.4.1	What is the analysis method used to determine whether the proposed project activity is not (a) the most economically or financially attractive; or (b) economically or financially feasible, without the revenue from the sale of certified emission reductions?	/01/ /05/ /08/ /33/	DR/ CC	The analysis method used is the benchmark analysis. According to ACM0001 version 15.0, if the project activity consists on the supply of LFG to natural gas distribution network, the baseline is assumed to be the supply with natural gas, which is the one adopted by the PP in PDD version 1 (the project activity does not consider power generation or heat generation). The financial analysis also was based on " Guidelines on the Assessment of Investment Analysis, version 05 of 15/07/2011" /33/	OK
B.4.4.2	What the financial indicator is used?	/01/ /08/ /33/ /34/ /35/	DR/ CC	Project participants applied the project IRR as financial indicator, which was confronted will WAAC, as per spreadsheeds "WACC WasteSector 2012.xlxs" and "Ecofor cash flow.xls" Project participants are requested to clarify why the fair value was not considered in the calculation of IRR.	OK ~~CL 4~~
B.4.4.3	If a benchmark is used, is it ensured that it is selected in accordance with the requirements of the EB guidelines and it represents standard returns in the market? Is the benchmark suitable for the type of financial indicator presented? Is it ensured the any risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity?	/01/ /08/ /33/ /34/ /35/	DR/ CC	WACC was applied as benchmark. Its parcel of cost of Debt (Kd) was calculate based on Brazilian financial data available at Brazilian Development Bank. Project participants are requested to clarify how the project activity is qualified on financial programs available at the Brazilian Development Bank	OK ~~CL 5~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
B.4.4.4	Is the investment analysis carried out in accordance with specific guidance from EB? Is the investment analysis complete and accurate? Is the investment analysis provided in a spreadsheet version? Are all the formulas used readable and all relevant cell be viewable and unprotected?	/01/ /08/ /33/ /34/ /35/	DR/ CC	The investment spreadsheet "Ecofor cash flow.xls" /34/ as well as the benchmark spreadsheet " WACC WasteSector 2012.xlsx" /35/ presents all formulas clearly indicated.	OK
B.4.4.5	Cross-check the parameters used in the financial analysis against third party or publicly available sources (all parameters used as input values shall be cross-checked and assessed).	/01/ /08/ /33/ /34/ /35/ /38/	DR/ CC	During the on site visit it was provided an updated study from Landtec /38/ considers the operation of the landfill until 2031, impacting in a new estimative of waste collected, biogas generated. PP is requested to clarify how it affects the project description, CERs estimative and additionality of the project activity, considering the estimative of upgraded biogas that will be delivered to the grid, updating the documents accordingly. Project participants are requested to provide the evidences, taking in consideration the period of investment decision, of all input parameters applied on the investment analysis, as per VVS: Price of biogas; The yearly amount of biogas produced; The investment values; Electric energy; Operation and Maintenance; Civil works; Insurance; Administrative costs; others	OK ~~CAR 1~~ ~~CL 6~~
B.4.4.6	Are the input values used in the investment analysis valid and applicable at the time of the investment decision taken by the PP?	/01/ /08/ /33/ /34/ /35/ /38/	DR/ CC	See B 4.4.5	OK ~~CL 6~~
B.4.4.7	Where applicable, the PFL has been defined ex-ante according to the applicable EB guideline?	/01/ /08/ /33/ /34/	DR/ CC	See B 4.4.5	OK ~~CL 6~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
		/35/ /38/			
B.4.4.8	Does the time period of the investment analysis reflect the expected operation of the underlying project activity (technical lifetime)?	/01/ /08/ /33/ /34/ /35/ /38/	DR/ CC	The period of 20 years applied on investment analysis is in accordance with guidelines of investment analysis, version 05.	OK
B.4.4.9	Does the fair value of the project activity assets is included at the end of the assessment period as a cashflow in the final year? Is the fair value calculated in accordance with local accounting regulations where available or international best practice?	/01/ /08/ /33/ /34/ /35/ /38/	DR/ CC	See B 4.4.2	OK ~~Cl 4~~
B.4.4.10	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the Host Country	/01/ /08/ /33/ /34/ /35/ /38/	DR/ CC	The income tax are in line with Brazilian laws. Project participant are requested to clarify why the depreciation was not included in the investment spreadsheet.	OK ~~CL 7~~
B.4.4.11	Sensitivity analysis: have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified?	/01/ /08/ /33/ /34/ /35/ /38/	DR/CC	The investment spreadsheet allows the calculation of the sensitivity analysis (+/- 10%) of main input parameters and the impacts on IRR is clearly identified	OK
B.4.4.11	Sensitivity analysis: is the range of variations is reasonable in the project activity? The main parameters can be changed for the different project category.	/01/ /08/ /33/ /34/ /35/ /38/	DR/CC	See B 4.4.11	OK
B.4.4.12	Have the key parameters been varied to reach the benchmark and the likelihood of this happening been justified to be small?	/01/ /08/ /33/ /34/ /35/ /38/	DR/CC	Project participants are requested to include in PDD the values each parameter on the sensitivity analysis that allows to the project activity the achievement of benchmark	OK ~~CAR 7~~
B.4.5 Barrier analysis					
B.4.5.1	Are the barriers identified complimentary to a potential investment analysis?	/01/ /08/	DR/CC	The project applies the Combined tool to identify the baseline scenario and demonstrate additionality, to demonstrate the additionality of the project activity. The barrier due prevalence practice is presented in the PDD.	OK
B.4.5.2	How were the investment barriers assessed to be real?	/01/ /08/	DR/CC	Not applicable.	OK
	How were the technological barriers assessed to be real?	/01/ /08/	DR/ CC	Not applicable.	OK
B.4.5.3	How were the other barriers assessed to be real?	/01/ /08/	DR/ CC	Not applicable.	OK
B.4.5.4	Barriers due to prevailing practice (First of its kind):	/01/ /08/		For the prevailing practice barrier, PDD has presented data	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
	does the project apply measures currently covered in the framework (fuel and feedstock switch, switch of technology with or without change of energy source, methane destruction, methane formation avoidance)?			from the Pesquisa Nacional de Saneamento Básico of 2008, however it is not possible to confirm that data remained the same at the time of project implementation.	~~CL 8~~
B.4.5.5	Barriers due to prevailing practice (First of its kind): do the technologies deliver the same output and differ by at least of energy source/fuel, feed stock, size of installation?	/01/ /08/	DR/ CC	See section B.4.5.4 above	OK ~~CL 8~~
B.4.5.6	Barriers due to prevailing practice (First of its kind): does the applicable geographical area is in compliance with the definition as per the EB guideline?	/01/ /08/	DR/ CC	See section B.4.5.4 above	OK ~~CL 8~~
B.4.5.7	Is the project activity prevented by the identified barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/01/ /08/	DR/ CC	See section B.4.5.4 above	OK ~~CL 8~~
B.4.5.8	How the CDM can alleviate the identified barriers?	/01/ /08/	DR/ CC	See section B.4.5.4 above	OK ~~CL 8~~
B.4.6 Common practice analysis					
B.4.6.1	Does the project apply measures currently covered in the framework (fuel and feedstock switch, switch of technology with or without change of energy source, methane destruction, methane formation avoidance)?	/01/ /08/	DR/ CC	For the common practice analysis, the project activity corresponds to the measure (c) methane destruction, listed in the combined tool.	OK
B.4.6.2	Do the technologies deliver the same output and differ by at least of energy source/fuel, feed stock, size of installation, investment climate in the date of the investment decision, other features?	/01/ /08/	DR/ CC	**Step 4a: The proposed CDM project activity(s) applies measure(s) that are listed in the definitions section above** **Sub-step 4a(1): Calculate the applicable output range as +/-50% of the design output or capacity of the proposed project activity.** Output is defined by the "Combined tool to identify the baseline scenario and demonstrate additionality" as goods or services with comparable quality, properties and application areas (e.g. clinker, lighting, residential cooking). The proposed CDM Project Activity aims at supplying methane from the LFG displacing the use of natural gas. Therefore, the output is the total LFG collected and sent to the distribution network implemented as a result of the project.	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				For the common practice analysis PDD version 1 is not considering the installed capacity of the project plant. **Sub-step 4a(2): In the applicable geographical area, identify all plants that deliver the same output or capacity within the applicable output range, calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number Nall. Registered CDM project activities and projects activities undergoing validation shall not be included in this step.** For the common practice analysis PP has presented a study from 2008, however it is not possible to confirm that the situation remained the same at the time of project starting date.	~~CAR 8~~ ~~CAR 9~~
B.4.6.3	Does the applicable geographical area is in compliance with the definition as per the EB guideline?	/01/ /08/	DR/ CC	Yes, the geographical area is Brazil.	OK
B.4.6.4	How many similar non-CDM-projects exist in the region within the scope?	/01/ /08/	DR/ CC	Please, refer to the section B.4.6.2	OK ~~CAR 7~~ ~~CAR 8~~
B.4.6.5	What is the data source(s) used for the common practice analysis?	/01/ /08/	DR/ CC	Please, refer to the section B.4.6.2	OK ~~CAR 7~~ ~~CAR 8~~
B.4.7 Conclusion					
B.4.7.1	What is the conclusion with regard to the additionality of the project activity?	/01/ /08/	DR/C C	Additional information is need to confirm the additionality of the project activity.	OK ~~CL 4 CL 5~~ ~~CL 6 CL 8~~ ~~CAR 7~~ ~~CAR 8~~ ~~CAR 9~~
B.5 Algorithms and/or formulae used to determine emission reductions					
B.5.1 Baseline emissions					
B.5.1.1	Are the steps and equations applied to calculate the baseline emissions in compliance with the	/1/ /05/ /09/ /12/ /16/	DR/C C	In accordance with the applied methodology the baseline emissions is calculated as follow:	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
	requirements of selected baseline and monitoring methodology?	/28/ /29/ /32/		$BE_y = BE_{CH4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y}$ Where: = Baseline emissions in year y (t CO2e/yr) = Baseline emissions of methane from the SWDS in year y (t CO2e/yr) = Baseline emissions associated with electricity generation in year y (t CO2/yr). Not applicable to this project activity. = Baseline emissions associated with heat generation in year y (t CO2/yr). Not applicable to this project activity. = Baseline emissions associated with natural gas use in year y (t CO2/yr). **Baseline emissions of methane from the SWDS ($BE_{CH4,y}$)** $BE_{CH4} = \left((1 - OX_{top_{layer}}) \times F_{CH4,PJ,y} - F_{CH,BL,y}\right) \times GWP_{CH4}$ Where: $BE_{CH4,y}$ = Baseline emissions of methane from the SWDS in year *y* (t CO_2e/yr) $OX_{top_{layer}}$ = Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless) $F_{CH4,PJ,y}$ = Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (t CH_4/yr) $F_{CH4,BL,y}$ = Amount of methane in the LFG that would be flared in the baseline in year *y* (t CH_4/yr) GWP_{CH4} = Global warming potential of CH_4 (t CO_2e/t CH_4) **Ex post determination of $F_{CH4,PJ,y}$** $F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y}$ Where: $F_{CH4,PJ,y}$ = Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (t CH_4/yr) $F_{CH4,flared,y}$ = Amount of methane in the LFG which is destroyed by flaring in year *y* (t CH_4/yr)	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				$F_{CH4,EL,y}$ = Amount of methane in the LFG which is used for electricity generation in year *y* (t CH_4/yr). Not applicable to this project activity (0) $F_{CH4,HG,y}$ = Amount of methane in the LFG which is used for heat generation in year *y* (t CH_4/yr). Not applicable to this project activity (0) $F_{CH4,NG,y}$ = Amount of methane in the LFG which is sent to the natural gas distribution network and/or to the trucks in year *y* (t CH_4/yr). The parameter $F_{CH4,NG,y}$ is done using the *"Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/*, Additionally, in the context of the proposed project activity, the following requirements listed in the methodology apply: - The gaseous stream the tool shall be applied to is the LFG delivery pipeline to the natural gas distribution system; - CH_4 is the greenhouse gases for which the mass flow should be determined; - The flow of the gaseous stream should be measured on continuous basis; - The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 or 17 in the tool); and - The mass flow will be summed to a yearly unit basis (tCH_4/yr). PP has described in the PDD version 1 that option A of the *"Tool to determine the mass flow of a greenhouse gas in a gaseous stream"* was chosen to determine the parameter $F_{CH4,NG,y}$ however it is not possible to confirm during the on site visit that the monitoring of the requirements of option A will be monitored (the temperature of the gaseous stream (Tt) is less than 60ºC (333.15 K) at the flow measurement point).	~~CAR 10~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				The mass flow of greenhouse gas *i* ($F_{i,t}$) is determined as follows: $F_{i,t}= V_{t,db} * v_{i,t,db} * \rho_{i,t}$ With $\rho_{i,t} = (P_t * MM_i) / (R_u * T_t)$ Where: $F_{i,t}$ = Mass flow of *CH4* in the gaseous stream (gas sent to electricity generation facility) in time interval *t* (kg gas/h) $V_{t,db}$ = Volumetric flow of the gaseous stream in time interval *t* on a dry basis (m^3 dry gas/h) – of the gas sent to electricity generation facility $v_{i,t,db}$ = Volumetric fraction of CH_4 in the gaseous stream in time interval *t* on a dry basis (m^3 gas *i*/m3 dry gas) $\rho_{i,n}$ = Density of CH_4 in the gaseous stream in time interval t (kg gas *i*/m^3 gas *i*) P_t = Absolute pressure of the gaseous stream in time interval t (Pa) T_t = Temperature of the gaseous stream in time interval t (K) MM_i = Molecular mass of CH_4 (kg/kmol) R_u = Universal ideal gases constant (Pa.m^3/kmol.K) PDD version 1 describes that the flow meter will convert automatically the volumetric flow to normal conditions, considering the temperature and pressure, however, the evidences were not presented. ***Amount of methane destroyed by flaring ($F_{CH4,flared,y}$)*** $$F_{CH4,flared,y} = F_{CH4,sent\_flare,y} - \frac{PE_{flare,y}}{GWP_{CH4}}$$ Where, $F_{CH4,flared,y}$= Amount of methane in the LFG which is destroyed by flaring in year *y* (t CH_4/yr) $F_{CH4,sent\_flare,y}$ = Amount of methane in the LFG which is sent	~~CL9~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				to the flare in year *y* (t CH_4/yr) $PE_{flare,y}$ = Project emissions from flaring of the residual gas stream in year *y* (t CO_2e/yr) GWP_{CH4} = Global warming potential of CH_4 (t CO_2e/t CH_4) The $F_{CH4,flared,y}$ is determined based on the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", using option A /12/. In accordance with the methodology, the calculation of FCH4,flared,y will be performed separately for each flare and the sum will be used for the emission reductions calculation. Following the simplification approach provided by the tool, which is also allowed by ACM0001 methodology, the volumetric fraction of only the gases k that are greenhouse gases and are considered in the emission reduction calculation in the underlying methodology are to be monitored. In the context of the proposed project activity, the only gas that is to be monitored is the methane (CH4). The difference to 100% will be considered as pure nitrogen. ***Project Emissions from flaring ($PE_{flare,y}$)***: Project emissions are related to the amount of methane not destroyed in the flare and will be calculated following the procedures of the methodological tool "Project emissions from flaring". The project will install two open flares and will adopt the default flare efficiency. It is described the $PE_{flare,y}$ is the sum of emissions for each flare determined separately. The calculation of flare efficiency will be made by the following steps: STEP 1: Determination of the methane mass flow of the residual gas; The mass flow of methane in the residual gaseous stream in the minute m ($F_{CH4,m}$) will be determined using the	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				procedures set out by the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/ and the following requirements apply: -The gaseous stream tool shall be applied to the residual gas; - The flow of the gaseous stream shall be measured continuously; - CH_4 is the greenhouse gas i for which the mass flow should be determined; - The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 and 17 in the tool); and - The time interval t for which mass flow should be calculated is every minute m. $F_{CH4,m,}$ which is measured as the mass flow during minute m, shall then be used to determine the mass of methane in kilograms fed to the flare in minute m ($F_{CH4,RG,m}$). $F_{CH4,m}$ shall be determined on a dry basis. Please note that this parameter corresponds to $F_{CH4,sent\_flare,y}$. Please, refer to CAR 10 above *STEP 2: Determination of flare efficiency* The Project will install two open flares. Therefore, in accordance with the methodological tool, the flare efficiency in the minute *m* (*ηflare,m*) is 50% when the flame is detected in minute *m* (Flamem), otherwise *ηflare,m* is 0%. *STEP 3: Calculation of project emissions from flaring* Project emissions from flaring are calculated as the sum of emissions from each minute *m* in year *y*, based on the methane flow rate in the residual gas ($F_{CH4,RG,m}$) and the flare efficiency ($\eta_{flare,m}$), as follows: $$PE_{flare,y} = GWP_{CH_4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \cdot \left(1-\eta_{flare,m}\right) \times 10^{-3}$$	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				Where, $PE_{flare,\ y}$ = Project emissions from flaring of the residual gas stream in year *y* (tCO_2e) GWP_{CH4}= Global Warming Potential (tCO_2e/tCH_4) valid for the commitment period $F_{CH4,RG,m}$ = Mass flow of methane in the residual gas in the minute *m* (kg) $\eta_{flare,m}$ = Flare efficiency in the minute *m* **Step A.1.1: Ex ante estimation of $F_{CH4,PJ,y}$** $$F_{CH4,PJ,y} = \eta_{PJ} \cdot BE_{CH4,SWDS,y}/GWP_{CH4}$$ $F_{CH4,PJ,y}$= Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH_4/yr) $BE_{CH4,SWDS,y}$= Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year y (t CO_2e/yr) η_{PJ}= Efficiency of the LFG capture system that will be installed in the project activity, this is considered as 50% considering the default value provide in the methodology. GWP_{CH4}= Global warming potential of CH_4 (t CO_2e/t CH_4) $BE_{CH4,SWDS,y}$ is determined using the methodological tool *"Emissions from solid waste disposal sites"* /16/ PDD applies the "Application A" of the tool: The CDM project activity mitigates methane emissions from a specific existing SWDS. The amount of methane that would in the absence of the project activity be generated from disposal of waste at the	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				solid waste disposal site ($BE_{CH4,SWDS,y}$) is calculated with a multi-phase model. The calculation is based on a first order decay (FOD) model. $BE_{CH4,SWDS,y}$= φyx $(1-f_y)$* GWP_{CH4}*(1-OX)*16/12*F*$DOC_{f,y}$*MCFy*∑∑ $W_{j,x}$* $DOC_j x e^{-k(y-x)}$*$(1-e^{-kj})$ $BE_{CH4,SWSD,\ y}$= Baseline methane emissions occurring in year y generated from waste disposal at the solid waste disposal site (SWDS) during a period ending in year y (tCO_2e/y) φ= Model correction factor to account for model uncertainties (default value of 0.75), Option 1 in the Tool has been selected, value as per Table 3 of the Tool (Application A and humid wet conditions). f= Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y. As this is already accounted for in $F_{CH4,BL,y}$, "f" in the Tool shall be assigned a value of 0. GWP_{CH4}= Global Warming Potential (GWP) of methane, valid for the relevant commitment period OX= Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) (default Tool value 0.1) F= Fraction of methane in the SWDS gas (volume fraction) (0.5) $DOC_{f,y}$= Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWSD for year y (weight fraction). Default value of 0.5 used as per page 65 of the Tool. MCF_y= Methane correction factor for year y (1.0)	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				$W_{j,x}$= Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year *x* (t) DOC= Fraction of degradable organic carbon (by weight fraction) in the waste type *j* k_j= Decay rate for the waste type *j (1/yr)* j= Type of residual waste or types of waste in the MSW x= Years in the time period in which waste is disposed at the SWSD, extending from the first year in the time period (x=1) to year (x = y) y= Year for which methane emissions are calculated (considering a consecutive period of 12 months) RINA verified that PP has used the historical amount of waste is presented in the assessment report, based on data provided by Ecofor. from 1998 to 2012 and a forecast of increase 2% per year from 2013 on /32/ During the on site visit it was provided an updated study from Landtec /38/ considers the operation of the landfill until 2031, impacting in a new estimative of waste collected, biogas generated. PP is requested to clarify how it affects the project description, CERs estimative and additionality of the project activity, considering the estimative of upgraded biogas that will be delivered to the grid, updating the documents accordingly. Determination of $F_{CH4,BL,y}$ PP is requested to clarify how the methane collected in the passive system was considered in the determination of the $\mathbf{F_{CH4,BL,y}}$ Baseline emissions associated with natural gas use ($BE_{NG,y}$) $BE_{NG,y}$ is estimated as follows: $BE_{NG,y} = 0.0504 \times F_{CH4,NG,y} \times EF_{CO2,NG,y}$ Where,	~~CAR 1~~ ~~CL10~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				$BE_{NG,y}$ = Baseline emissions associated with natural gas use in year y (t CO_2/yr) $EF_{CO2,NG,y}$ = Average CO_2 emission factor of natural gas in the natural gas network or in trucks in year y (tCO_2/TJ) $F_{CH4,NG,y}$ = Amount of methane in the LFG which is sent to the natural gas distribution network or in trucks in year y (t_{CH4}/yr) $EF_{CO2,NG,y}$ is determined using the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /09/. For the ex ante estimative it is applied the IPCC default value /28/	
B.5.1.2	Have conservative assumptions been used when calculating the baseline emissions and are the uncertainty estimates properly addressed? Are all the values used in the PDD considered reasonable in the context of the proposed project activity?	/1/ /05/ /09/ /12/ /16/ /22/ /28/ /29/ /32/	DR/CC	Please, refer to the section B.5.1.1	OK ~~CL 9~~ ~~CL 10~~ ~~CAR 1~~ ~~CAR 10~~
B.5.1.3	Baseline Emissions estimated	/1/ /05/ /09/ /12/ /16/ /22/ /28/ /29/ /32/	DR/CC	The baseline emissions will to be revised.	OK ~~CL 9~~ ~~CL 10~~ ~~CAR 1~~ ~~CAR 10~~
B.5.2 Project emissions					
B.5.2.1	Are the steps and equations applied to calculate the project emissions in compliance with the requirements of selected baseline and monitoring methodology? Are all the values used in the PDD considered reasonable in the context of the proposed project activity?	/1/ /5/ /14/ /15/ /22/ /25/ /28/ /32/	DR/CC	In accordance with ACM0001, emissions are electricity and fossil fuel consumption: $PEy = PE_{EC,y} + PE_{FC,y} + PE_{DT,y}$ $PE_{EC,y}$= Emissions from consumption of electricity due to the project activity in year y (t CO_2/yr). $PE_{FC,y}$= Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (t CO_2/yr). $PE_{DT,y}$= Emissions from the distribution of compressed/liquefied LFG using trucks, in year y (tCO_2/yr) During the on site visit it was not clear if the project activity	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				will consider the distribution of compressed/liquefied LFG using trucks. The project emissions from electricity consumption ($PE_{EC.y}$) will be calculated following the procedures set out by the "Tool to estimate the baseline, project and/or leakage emissions from electricity consumption". During the crediting period, electricity from the grid will be consumed for the operation of the active LFG collection system and LFG upgrading facility. In addition, it will also be considered the emissions of the potential diesel generator for emergency purposes. The project will consume electricity from the grid. Therefore, Option A.1 of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" is used. Under this option, project emissions from consumption of electricity from the grid are calculated based on the power consumed by the project activity and the emission factor of the grid, adjusted for transmission losses, using the following formula: $PE_{EC,grid,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$ $PE_{EC,grid,y}$= Project emissions from electricity consumption from the grid by the project activity during the year y (tCO_2/year); $EC_{PJ,y}$= Quantity of electricity consumed by the project electricity consumption source j in year y (MWh) $EF_{EL,j,,y}$= Emission factor for electricity generation for source j in year (tCO_2/MWh) $TDL_{j,y}$= Average technical transmission and distribution losses for providing electricity to source j in year y j= Sources of electricity consumption in the project For the ex-ante estimative for the energy consumption PP is considering data estimated in the SCS assessment report /32/ and the transmission losses default value provided in the tool 20% /14/. (For the emission factor, please, see below)	~~CL11~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				The Emission Factor is calculated according with the "Tool for calculation of emission factor for electricity systems"./15/ **STEP 1** - Identify the relevant electricity systems The grid considered by PP was defined by Brazilian DNA and correspond to the Brazilian Interconnected Grid as a single system. /25/ **STEP 2** – Choose whether to include off-grid power plants in the project electricity system (optional). Option I of the tool is chosen, which is to include only grid power plants in the calculation. **STEP 3 -** Select a method to determine the operating margin (OM) ($EF_{grid,OM,y}$). For the calculation of the operating margin, in the PDD version 1 PP has chosen the option (b) Simple adjusted OM, using the *ex-ante* option, considering data available for 2010, 2011 and 2012, however, it is not clear why data from 2013 was not used.	~~CL12~~
				STEP 4 - Calculate the operating margin emission factor according to the selected method $EF_{grid,OM-adj,y} = (1-\lambda_y) \cdot \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \cdot \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}}$ $EF_{grid,OM-adj,y}$= Simple adjusted operating margin CO_2 emission factor in year y (tCO_2/MWh) λ_y= Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year y $EG_{m,y}$= Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh) $EG_{k,y}$= Net quantity of electricity generated and delivered to the grid by power unit k in year y (MWh)	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				$EF_{EL,m,y}$= CO_2 emission factor of power unit m in year y (tCO_2/MWh) $EF_{EL,k,y}$= CO_2 emission factor of power unit k in year y (tCO_2/MWh) m= All grid power units serving the grid in year y except low-cost/must-run power units k= All low-cost/must run grid power units serving the grid in year y y= The relevant year as per the data vintage chosen in Step 3 **Determination of $EF_{EL,m,y}$** $$EF_{EL,m,y} = \cdot \frac{EF_{CO2,m,i,y} \cdot 3.6}{\eta_{m,y}}$$ $EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh) $EF_{CO2,m,i,y}$= Average CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ) $\eta_{m,y}$ = Average net energy conversion efficiency of power unit m in year y (ratio) m= All power units serving the grid in year y except low-cost/must-run power units y= The relevant year as per the data vintage chosen in Step 3 RINA verified that the emission factor values of the fuels are from IPCC /28/ RINA verified that the values for the Average net energy conversion efficiency of power unit used are the ones recommended by the Board in Appendix 1 of the Tool to calculate the emission factor for an electricity system. /15/ **Determination of $EG_{m,y}$** PP did not provide the raw data from ONS used to calculate the emission factor. Please, see also CL12 **STEP 5** - Calculate the build margin (BM) emission factor	~~CL13~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				For the operation margin, PDD version 1 describes that option 1 was chosen, using data from 2012. However, it is not clear why data from 2013 was not considered. **STEP 6 –** Calculate the combined margin (CM) emissions factor $EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM}$ $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year y (tCO_2/MWh); $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (tCO_2/MWh); w_{OM}= Weighting of operating margin emissions factor (%) w_{BM}= Weighting of build margin emissions factor (%). According with the Tool, values adopted for W_{OM} and W_{BM} were equal to 0.50 and 0.50, respectively. The final value of the emission factor is pending. In order to calculate project emissions resulting from combustion of fossil fuels (diesel will be used for emergency purposes in a backup generator), the ¨Tool to calculate project or leakage emissions from fossil fuel combustion¨ will be used. Project emissions related to this source are estimated using the following formulae $PE_{FC,j,y}$ = SUM(FCi,j,y * COEFi,y) $PE_{FC,j,y}$ = Are the CO2 emissions from fossil fuel combustion in process j during the year y (tCO2/yr); FCi,j,y = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr); COEFi,y= Is the CO2 emission coefficient of fuel type i in year y (tCO2/mass or volume unit) i= Are the fuel types combusted in process j during the year y The proposed project activity will consume diesel oil only for emergency purposes. The CO2 emission coefficient COEFi,y will be calculated using Option B of the Tool since	~~CL14~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				the necessary data for Option A is not available. As per Option B, the CO2 emission coefficient COEFi,y is calculated based on net calorific value and CO2 emission factor of the fuel type i, as follows: $COEF_{i,y} = NCV_{i,y} * EF_{CO2,i,y}$ $COEF_{i,y}$ = Is the CO2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit) $NCV_{i,y}$ = Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit) $EF_{CO2,i,y}$= Is the weighted average CO2 emission factor of fuel type i in year y (tCO2/GJ) i= Are the fuel types combusted in process j during the year y In the PDD version 1, ex ante estimative described on section B.6.3 it is not possible to confirm the fossil fuel that will be used in the project activity (diesel x LPG or both)	~~CAR 11~~
B.5.2.2	Have conservative assumptions been used when calculating the project emissions and are the uncertainty estimates properly addressed?	/1/ /5/ /14/ /15/ /22/ /25/ /28/ /32/	DR/CC	Please, refer to the section B.5.2.2 above	OK ~~CAR 11 CL 11 CL 12 CL 13~~
B.5.2.3	Project emissions estimated	/1/ /5/ /14/ /15/ /22/ /25/ /28/ /32/	DR/CC	The estimative will be revised to the assessment above.	OK ~~CAR 11 CL 11 CL 12 CL 13~~
B.5.3 Leakage					
B.5.3.1	Are the steps and equations applied to calculate the leakage in compliance with the requirements of selected baseline and monitoring methodology? Are all the values used in the PDD considered reasonable in the context of the proposed project activity?	/1/ /5/	DR/CC	Leakage does not need to be considered, as defined by the applied baseline methodology.	OK
B.5.3.2	Have conservative assumptions been used when calculating the leakage and are the uncertainty estimates properly addressed?	/1/ /5/	DR/CC	Leakage does not need to be considered, as defined by the applied baseline methodology.	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
B.5.3.3	Leakage estimated	/01/ /05/	DR/CC	Leakage does not need to be considered, as defined by the applied baseline methodology.	OK
B.5.4 Emission reductions					
B.5.4.1	Has the methodology been correctly applied to calculate the emission reductions and can this be replicated by the data provided in the PDD and supporting files to be submitted for registration?	/01/ /05/ /22/	DR/CC	The emission reduction is calculated in accordance with ACM0001. $ER_y = BE_y – PE_y$ ER_y =Emission reductions during the year y (tCO_2e) BE_y= Baseline emissions in year y (tCO_2e) PE_y= Project emissions in year y (tCO_2e)	OK
B.5.4.2	Are all the assumptions and data used by the project participants listed in the PDD including their references and sources?	/01/ /05/ /22/	DR/CC	The CERs estimated in the PDD version 1 does not take into consideration the installed capacity of the purification plant and flare capacity. Moreover, please, refer to CAR 1	OK ~~CAR 12~~
B.5.4.3	Is all the documentation used by the project participants as the basis for assumptions and source of data quoted and interpreted in the PDD?	/01/ /05/ /22/	DR/CC	Please, see section B.5.4.2	OK ~~CAR 12~~
B.5.4.4	Emission Reductions estimated	/01/ /05/ /22/	DR/CC	The emissions reductions have to be revised.	OK ~~CAR 12~~
B.6 Monitoring plan					
B.6.1 Parameters ex-ante					
B.6.1.1	Does the monitoring plan contain the list of all parameters required by the approved methodology and by the applicable methodological tool?	/01/ /05/ /12/ /14/ /15/ /16/ /19/ /22/ /28/ /29/ /30/ /32/	DR/CC	The following parameters were determined ex ante in accordance with the methodology and tools, as described bellow: **ACM0001:** - OX_{top_layer} (Dimensionless): Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline. Value applied: 0.1. Consistent with how oxidation is accounted for in the methodological tool “Emissions from solid waste disposal sites” /16/. - $F_{CH4,BL,x-1}$ (t CH_4/yr): Historical amount of methane in the LFG which is captured and destroyed in the year prior to the implementation of the project activity. Value applied:0	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				PP is requested to clarify how the methane collected in the passive system was considered in the determination of the $F_{CH4,BL,y}$ - GWP_{CH4} (tCO_2e/tCH_4): Global Warming Potential of CH_4. Value applied: 25, in accordance with Standard for application of the global warning potentials to clean development mechanism project activities and programmes of activities for the second commitment period of the Kyoto protocol /19/ -NCV_{CH4} (TJ/t_{CH4}). Net calorific value of methane at reference conditions. Value applied: 0.0504. PP applied the value in accordance with the methodology /05/ -η_{PJ} (Dimensionless). Efficiency of the LFG capture system that will be installed in the project activity. Value applied: 50%. PP applied the default value provided by the methodology /05/ **"Tool Emissions from solid waste disposal sites" /16/** - $\varphi_{default}$ (-).Default value for the model correction factor to account for model uncertainties. Value applied: 0.75, considering MAT = 26.6ºC and MAP= 1.643 mm. PP has considered data from 1973-1990 to determine the MAT and MAP/PET values . PP is requested to clarify why most recent data from was not used. - f_y (-). Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year *y*. Value applied: 0, in accordance with ACM0001. As per the applicable methodological tool *"Emissions from solid waste disposal sites"*, for application A, this parameter is determined once for the crediting period ($f_y = f$). /16/	~~CL10~~ ~~CAR 13~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				- ***OX*** (-).Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste). Value applied: 0.1, in accordance with the tool./16/ - ***F*** (-).Fraction of methane in the SWDS gas (volume fraction). Value applied: 0.5, in accordance with the tool. /16/ - $DOC_{f,default}$ (Weight fraction). Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS. Value applied: 0.5. The proposed project activity corresponds to *Application A* described in the applicable methodological tool *"Emissions from solid waste disposal sites" /16/*. Therefore, in accordance with the requirements set out by tool, the default value was chosen. - $MCF_{default}$ (-).Methane correction factor. Value applied: 1.0. The proposed project activity matches *Application A* described in the tool *"Emissions from solid waste disposal sites"/16/*. The Oeste de Caucaia Landfill meets the criteria of managed SWDS. Hence, the value corresponding to anaerobic managed solid waste disposal sites is chosen. The choice chosen by PP was confirmed during the on site visit. - DOC_j (-).Fraction of degradable organic carbon in the waste type *j* (weight fraction). Value applied, in accordance with the tool /16/:	

DOC_j (% wet waste)	Waste type j
43%	Wood and wood products
40%	Pulp, paper and cardboard
15%	Food, food waste, beverages and tobacco
24%	Textiles
20%	Garden, yard and park waste
0%	Glass, plastic, metal, other inert waste

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				- k_j (1/yr). Decay rate for the waste type *j.* PP has considered data from 1973-1990 to determine the MAT and MAP/PET values . PP is requested to clarify why most recent data from was not used.	~~CAR 13~~
				- W_x (t). Total amount of waste disposed in a SWDS in year *x.* During the on site visit it was provided an updated study from Landtec /38/ considers the operation of the landfill until 2031, impacting in a new estimative of waste collected, biogas generated. PP is requested to clarify how it affects the project description, CERs estimative and additionality of the project activity, considering the estimative of upgraded biogas that will be delivered to the grid, updating the documents accordingly.	~~CAR 1~~
				"Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/ - ***Ru*** ($Pa.m^3/kmol.K$). Universal ideal gases constant. Value applied: 8,314 in accordance with the tool /12/. PDD version 1 do not list in the parameters available at validation the parameters ***Pn*** (Pa) Atmospheric pressure at normal conditions and ***Tn*** (K). Temperature at normal conditions in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" - ***MMi*** (kg/kmol). Molecular mass of greenhouse gas *i.* Value applied: 16.04 (for methane), in accordance with the tool /12/	~~CAR 14~~
				"Tool to calculate the emission factor for an electricity system" $EF_{CO2,m,i,y}$ (tCO_2/GJ): CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y.* IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories /28/.	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				IPCC default values are being used since this information is neither provided by fuel suppliers nor regional and/or local default values are publicly available. Value applied: several values presented in the emission factor spreadsheet /30/. RINA verified that the values used are from IPCC /28/ ***$EG_{m,y}$ and $EG_{k,y}$ (MWh)*** Net electricity generated by power plant/unit *m* or *k* in year *y*. Official publications. Data from the Electric System National Operator was used. Value applied: several values applied. PP did not provide the raw data from ONS used to calculate the emission factor. ***$\eta_{m,y}$ (-):*** Average net energy conversion efficiency of power unit *m* in year *y*. Default values provided in Annex 1 of the *"Tool to calculate the emission factor for an electricity system"* Value applied: several values./15/ ***$EF_{grid,OM\text{-}adj,y}$ (***tCO_2/MWh). Simple adjusted operating margin CO_2 emission factor in year *y.* Calculated based on Official publications (data from ONS), IPCC default values and default values provided by the *"Tool to calculate the emission factor for an electricity system" /15/.* Ex ante option chosen. For the calculation of the operating margin, in the PDD version 1 PP has chosen the option (b) Simple adjusted OM, using the *ex-ante* option, considering data available for 2010, 2011 and 2012, however, it is not clear why data from 2013 was not used. ***$EF_{BM,2012}$*** **(**tCO_2/MWh). Build Margin CO_2 emission factor in year *y*. Calculated based on Official publications (data from ONS), IPCC default values and default values provided by the *"Tool to calculate the emission factor for an electricity system" /15/* For the operation margin, PDD version 1 describes that	~~CL 13~~ ~~CL 12~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				option 1 was chosen, using data from 2012. However, it is not clear why data from 2013 was not considered. **<u>"Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /14/</u>** - $EF_{EL,j,,y}$ (tCO_2/MWh). Emission factor for electricity generation for source *j* in year. Value applied: 1.3, in accordance with default vaule provided in option B.2 of the tool /14/	~~CL14~~
B.6.1.2	How were the parameters available at validation verified?	/01/ /05/ /12/ /14/ /15/ /16/ /19/ /22/ /28/ /29/ /30/ /32/	DR/CC	Please, refer to the section B.6.1.1 above.	OK ~~CL 12~~ ~~CL 13~~ ~~CL 14~~ ~~CAR 13~~ ~~CAR 14~~
B.6.1.3	Which default data have been selected and applied?	/01/ /05/ /12/ /14/ /15/ /16/ /19/ /22/ /28/ /29/ /30/ /32/	DR/CC	Please, refer to the section B.6.1.1 above.	OK ~~CL 12~~ ~~CL 13~~ ~~CL 14~~ ~~CAR 13~~ ~~CAR 14~~
B.6.1.4	Are all the values used in the PDD considered reasonable in the context of the proposed project activity?	/01/ /05/ /12/ /14/ /15/ /16/ /19/ /22/ /28/ /29/ /30/ /32/	DR/CC	Please, refer to the section B.6.1.1 above.	OK ~~CL 12~~ ~~CL 13~~ ~~CL 14~~ ~~CAR 13~~ ~~CAR 14~~
B.6.2 Parameters ex-post					
B.6.2.1	Does the monitoring plan described in the PDD comply with the requirements of the methodology and the applicable methodological tool?	/01/ /05/ /12/ /13/ 28/ /32/	DR/CC	<u>ACM0001:</u> - ***Management of SWDS*** **(-).** Value applied: not applicable. Project participants should refer to the original design of the landfill to ensure that any practice to increase methane	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications. Monitoring frequency: annually. - $Op_{j,h}$ **(-).**Operation of the equipment that consumes the LFG. Value applied: not applicable. *For the LFG upgrading facility* • Products generated. Monitor the generation of upgraded LFG which is sold to the consumer. This information can be cross-checked with invoices; *For the flaring system* • Flame. Flame detection system is used to ensure that the equipment is in operation; $Op_{j,h}$=0 when: • No products are generated in the hour *h* • Flame is not detected continuously in hour *h* (instantaneous measurements are made at least every minute); Otherwise, $Op_{j,h}$=1 Monitoring frequency: Hourly **$EG_{EC,y}$ (MWh).** Amount of electricity consumed by the project activity in year y. Value applied: 30,674. Sources of consumption shall include, where applicable, electricity consumed for the operation of the LFG capture system, for any processing and upgrading of the LFG, for transportation of the LFG to the flare, for the compression of the LFG into the natural gas network, etc. Electricity meters will measure the electricity consumed by the LFG capture system and LFG upgrading facility. Monitoring frequency: continuous. For the ex-ante estimative for the energy consumption PP is considering data estimated in the SCS assessment report /32/ "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /12/	

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				PDD version 1 describes the monitoring of the parameter $V_{t,db}$ (m^3 wet gas/h). name and unit of the parameter are not coherent (dry x wet) . Moreover, in page 25, it is described that option A of the tool was chosen to monitor the parameter $F_{CH4,flared,y}$. - ***$V_{t,db}$*** **(m^3 dry gas/h).** Volumetric flow of the gaseous stream in time interval *t* on a dry basis. Value applied: not applicable. Data is monitored in an hourly basis, monthly aggregated and reported. Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. . The calibration periodicity will be in accordance with the manufacturer recommendation. Parameter used to determine the $F_{CH4,NG,y}$ and meter installed after the LFG upgrading facility. (For the accuracy, please refer to ~~CL17~~ below) - ***$v_{i,t,db}$*** **(m^3 gas *i*/m^3 dry gas).** Volumetric fraction of greenhouse gas *i* in a time interval *t* on a dry basis. Value applied: not applicable. Data is monitored in an hourly basis, monthly aggregated and reported. Calibration should include zero verification with an inert gas (e.g. N2) and at least one reading per verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period. The gas analyzers will be calibrated internally once a week, using certified samples. This parameter is used to determine the flow of methane in the LFG sent to the natural gas distribution network and to the flaring system. This equipment is installed next to the flow meter measuring the total LFG recovered from the landfill, which is before the bifurcation of the pipeline into the pipeline that sent LFG to the upgrading facility or to the enclosed flares. (For the accuracy, please refer to ~~CL17~~ below) -***T_t (K).*** Temperature of the gaseous stream in time interval t. Value applied: not applicable. Data is monitored in an hourly basis, monthly aggregated and reported. Periodic	~~**Error! Reference source not found.**~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				calibration against a primary device provided by an independent accredited laboratory is mandatory. . The calibration periodicity will be in accordance with the manufacturer recommendation. The gaseous stream corresponds to the total LFG collected by the active collecting system. This parameter is measured to assure the applicability condition of the tool is met. (For the accuracy, please refer to ~~CL17~~ below) - **P_t (Pa).** Pressure of the gaseous stream in time interval t. Data is monitored in an hourly basis. The pressure will be measured by the flow meters turbines which possesses pressure sensors. Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. . The calibration periodicity will be in accordance with the manufacturer recommendation. (For the accuracy, please refer to ~~CL17~~ below) PP has described in the PDD version 1 that option A of the *"Tool to determine the mass flow of a greenhouse gas in a gaseous stream"* was chosen to determine the parameter $F_{CH4,NG,y}$ however it is not possible to confirm during the on site visit that the monitoring of the requirements of option A will be monitored (the temperature of the gaseous stream (Tt) is less than 60ºC (333.15 K) at the flow measurement point). <u>"Project emissions from flaring" /13/</u> - ***$Flame_m$*** **(Flame on or Flame off).** Flame detection of flare in the minute *m*. Value applied: not applicable. Measure using a fixed installation optical flame detector type Ultra Violet detector. Monitoring frequency: Once per minute. Equipment shall be maintained and calibrated in accordance with manufacturer's recommendations. (For the accuracy, please refer to CL17 below) <u>"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"</u>	~~**Error! Reference source not found.**~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				- **$TDL_{project,y}$ (%).** Average technical transmission and distribution losses for providing electricity to source j in year y. Value applied: 20% default value. Tool to determine project emissions from fossil fuel combustion -***$FCi_{,j,y}$ (m^3/yr).*** Quantity of fuel type i combusted in process j during the year y (i = LPG). Value applied: 3,856. Data will be monitored monthly and aggregated yearly. PDD describes the monitoring in accordance with the tool. The consistency of metered fuel consumption quantities is to be cross-checked with available purchase invoices from the financial records. The evidence for the estimative of fossil fuel consumption was not provided. For the type of fossil fuel used, please, refer to CAR 11 **NCV,i,y (GJ/m^3).** Weighted average net calorific value of fuel type i in year y The value presented in the PDD version 1 for the NCV is not for the diesel. **$EF_{CO2,i,y}$ (tCO_2/GJ):** Weighted average CO2 emission factor of fuel type i in year y (i = LPG). Value applied: 0.0656. RINA verified that the value presented is in accordance with IPCC, upper limit of uncertainty 95% /28/. Any future revision should be taken into account. $EF_{CO2,i,y}$ (tCO_2/TJ): Weighted average CO2 emission factor of fuel type i in year y (i = natural gas) PDD version 1 describes that Weighted average CO2 emission factor of fuel type i in year y (i = natural gas) is from IPCC default values at the upper limit of the uncertainty at 95% confidence interval, however the value described is the lower limit	~~CL15~~ ~~CAR11~~ ~~CAR 16~~

Checklist Question		Reference	MoV[1]	Comments	Conclusion
					~~CL16~~
B.6.2.2	Does the monitoring plan contain all necessary parameters and are they clearly described?	/01/ /05/ /12/ /13/ 28/ /32/	DR/CC	Please, refer to the section B.6.2.1	OK ~~CAR 15~~ ~~CAR 10~~ ~~CL 15~~ ~~CAR 11~~ ~~CAR 16~~ ~~CL 16~~
B.6.2.3	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate? Are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate?	/01/ /05/	DR/CC	PP did not provide the evidences for the description and accuracy of measurements equipment's described in the PDD version 1.	OK ~~CL17~~
B.6.2.4	Does the Monitoring Plan stated in the PDD confirm that the calibration of meters will be done by an accredited person or institution?	/01/ /05/	DR/CC	The monitoring plan do not describe that all meters will be calibrated by an accredited person or institution	OK ~~CAR 17~~
B.6.2.5	Is the monitoring and recording frequency adequate for all monitoring parameters? Is it in line with the monitoring methodology?	/01/ /05/ /12/ /13/ 28/ /32/	DR/CC	Yes, see section B.6.2.1	OK
B.6.2.6	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design? Please confirm the ability of the project participants to implement the described monitoring plant.	/01/ /05/ /12/ /13/ 28/ /32/	DR/CC	Please, refer to the section B.6.2.1	OK ~~CAR 10~~ ~~CAR 15~~ ~~CAR 16 CL 15 CL 16~~ ~~CL 17~~
B.6.3 Management/Quality Assurance/Quality Control					
B.6.3.1	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/01/ /05/	DR/CC	Yes, PDD establishes that the variables described in item B.7.1 will be automatically registered in a supervisory computer system. There will be a responsible person in charge of data checking in order to keep the process functioning. If the automatic transmission fails, the responsible person will contact an operator to register data	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				manually. If data can be retrieved subsequently, they will be reintegrated on the server.	
B.6.3.2	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/01/ /05/	DR/CC	Yes, PDD describes that the CDM aspects of the project are managed by the administrators of the biogas and purification plant, who is in charge of monitoring activities. It is the ultimate responsibility of the Director to ensure the content of the monitoring report is correct at the time of requesting issuance. The CDM Project Managers supervises the calibration and maintenance procedures. Maintenance programs are carried out on site by the Field Technician, who also makes sure the monitoring tools are operating correctly. Moreover it is described that Employees involved in the monitoring will be periodically trained internally and/or externally. Training will include: Review of equipment, Calibration requirements, Configuration of monitoring equipment, maintenance requirements	OK
B.6.3.3	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/01/	DR/CC	Yes, PDD describes that Copies of the files will be stored up to two years after the end of the crediting period or the last issuance of CERs for this project activity whichever occurs later.	OK
C.1 Crediting period					
C.1.1	What is the expected crediting starting date of the proposed project activity? Does the crediting period start eight week after the request for registration?	/1/	DR	The starting date of the crediting period is 01/02/2015, when the project is expected to be registered under the CDM. PP is requested to clarify if starting date of the crediting period is in line with project implementation chronogram	OK ~~CL 18~~
C.1.2	What is the length of the crediting period? Is it clearly defined and reasonable?	/1/	DR	Yes, 7 years- 0 months renewable	OK
D.1 Environmental impacts					
D.1.1	Has an analysis of the environment impacts of the project activity been undertaken? Is it clearly and sufficiently described in the PDD?	/1/ /27/	DR/CC	Yes, in order to obtain the environmental licenses PP has to present the environmental study to the Environmental agency.	OK
D.1.3	Is the analysis of the environmental impacts required by the legislation of the host Country? If yes, has the EIA has been approved by local Government? Does the approval contain any conditions that need monitoring?	/1/ /27/	DR/CC	The environmental aspects of the project activity were analysed by the environmental agency when it issued the licenses /27/. The following licenses were presented: **Operation of the landfill**: * SEMACE Operation license for the Oeste de Caucaia landfill, nº 352/2014 dated 08/05/2014 valid until 08/05/2015	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				Biogas plant * * SEMACE Previous License nº 100/2014 dated 24/03/2014 valid until 23/03/2016 (LP_GNR ECOFOR_31 03 2014.pdf) * SEMACE Installation License nº 172/2014 dated 02/07/2014 valid until 01/07/2016 PDD version 1 does not describe the latest environmental licenses available for the project activity and landfill.	~~CAR 18~~
D.1.4	Is it the project in line with the current environmental legislation in the host Country?	/1/ /27/	DR/CC	Yes, PP has presented the available licenses /27/ applicable to the project activity.	OK
D.1.5	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/ /27/	DR/CC	The environmental aspects of the project activity were analysed by the environmental agency when it issued the licenses /27/.	OK
D.1.6	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/ /27/	DR/CC	Not applicable.	OK
E.1 Local stakeholder consulation					
E.1.1	Are the local stakeholders be invited by the PP prior to the publication of the PDD to the UNFCCC website?	/01/ /20/ /26/	DR/CC	Yes, as per the Brazilian DNA Resolution nº 7, the local stakeholder consultation must start 15 days prior the PDD publication for the Global Stakeholder Consultation	OK
E.1.2	Area the stakeholders invited be considered as regards commenting the proposed project activity?	/01/ /20/ /26/	DR/CC	Yes, PP followed the requirements of the Brazilian DNA. Letters inviting to comment on the project dated 25/07/2014and the acknowledge receipt (AR) were provided as follows: - City Hall of Caucaia – CE dated 10/07/2014; - Environment Agency of Caucaia – CE dated 10/07/2014; - Municipal Assembly of Caucaia – CE dated 30/06/2014; - Ceará state Enviromental Agency (SEMACE) dated 30/06/2014; - State Attorney for the Public Interest of Ceará dated 30/06/2014; - Brazilian Forum of NGOs and Social Movements for the Development and Environment dated 27/06/2014; - Brazilian Association of Sanitary and Environment	OK

Checklist Question		Reference	MoV[1]	Comments	Conclusion
				Engineering/ABES- Ceará dated 02/07/2014; - Federal State Attorney for the Public Interest dated 03/07/2014.	
E.1.3	Is the summary of the comments received from the stakeholders, provided in the PDD complete?	/01/ /20/ /26/	DR/CC	No comments were received	OK
E.1.4	Has due account been taken by the project participants of any stakeholder comments received?	/01/ /20/ /26/	DR/CC	No comments were received	OK
E.1.5	If a stakeholder consultation process is required by regulations/laws in the host Country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/01/ /20/ /26/	DR/CC	Yes, the requirements from the Brazilian DNA are described in the Resolution nº7 /20/. PP has published in Portuguese the PDD and a declaration describing how the project activity contributes to the sustainable development in the following web site: <https://sites.google.com/site/dcpconsulta/home/aterro-oeste-de-caucaia>	OK

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Document information

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