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

(Version 03.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title and UNFCCC reference number of the project activity	São João Landfill Gas to Energy Project (SJ) UNFCCC reference number 0373
Number and duration of the next crediting period	2nd crediting period , 22/05/2014 to 21/05/2021
Version number of the validation report	2.0 Aa
Completion date of the validation report	29/01/2020
Version number of PDD to which this report applies	4.0
Project participants	Biogás Energia Ambiental S.A. Prefeitura Municipal de São Paulo (Municipality of São Paulo) KfW Bakengruppe Mercuria Energy Trading SA
Host Party	Brazil
Applied methodologies and standardized baselines	ACM0001 “Flaring or use of landfill gas” version 19 of 14/06/2019
Mandatory sectoral scopes	13 – Waste handling and disposal
Conditional sectoral scopes, if applicable	1 – Energy industries (renewable / non-renewable sources)
Estimated amount of annual average GHG emission reductions or GHG removals by sinks in the next crediting period	76,429 tCO_2e/year
Name and UNFCCC reference number of the DOE	RINA Services S.p.A. (RINA), UNFCCC reference number of the DOE E-0037
Name, position and signature of the approver of the validation report	**Laura Severino** (Authorized officer signing for the DOE) Head of Certification Innovation & Sustainability Unit 

SECTION A. Executive summary

>> São João Landfill Gas-to-Energy (LFGE) is a project designed to explore the landfill gas (LFG) produced in Aterro Sanitário "Sítio São João" – São João landfill, which is in fact one of the biggest landfills in Brazil. Aiming to explore the energy potential of the landfill gas and also minimize environmental problems related to global warming, SJ was designed. The project is fully operational, composed by three enclosed flares, a power house with 25.6 MW of installed capacity (16 engines with 1,600 kW capacity each) and a transmission system composed by two transmission lines with approximately 30 km length. The project boundary encompasses sites where the LFG is flared or used, i.e. the power plant and flares. According to ACM0001, the baseline scenario for LFG destruction is LFG2 (atmospheric release) and for electricity generation is E3 (electricity generation in existing and/or new plants connected to SIN).
SJ also purchases LFG from CTL (Central de Tratamento de Resíduos Leste) – also a CDM project PA5947 – in order to comply with the electricity generation settled in its power purchase agreement. The main reason for not reaching its full performance is due to the pioneering initiative while using biogas for electricity generation. In addition, at the time of the project conception, method available to estimate methane was very shallow as can be checked on differences of methane generation in the first version of the registered PDD to this one.
As discussed in the PRC approved on 12/11/2019, all emission reduction generated from PA5947's LFG is of PA5947's right and will be claimed by them. SJ will not claim CERs from this LFG. The PRC was validated by RINA (validation report version 4.0 Aa, dated 02/10/2019).
The project activity was validated by DNV (validation report dated 10/04/2006) and it was registered on 02/07/2006 under the CDM registration reference N° 0373.

Scope of validation
The objective of the Validation is to have an independent evaluation of the update PDD's compliance with relevant UNFCCC requirements and host Party criteria to confirm that the original project baseline is still valid or has been updated taking into account of new data where applicable. In particular, the project's baseline, monitoring plan and the project's compliance with relevant UNFCCC requirements and host Party criteria are validated in order to confirm the correctness of the application of the approved baseline methodologies for the determination of the continued validity of the baseline/or its update, and estimation of the emission reductions for the applicable crediting period. The validation scope is to review the updated PDD against the UNFCCC criteria for CDM refer to Article 12 of the Kyoto Protocol, and the subsequent decisions by the CDM Executive Board.

Validation process
This report summarizes the findings from the validation of the updated PDD of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given by the CDM Validation and Verification Standard, CDM Project Cycle Procedure and CDM Project Standard and included an assessment of: (a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period at the time of requesting renewal of crediting period; (b) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions from the applicable crediting period. This validation opinion is also to be seen in conjunction with the validation report at the time of requesting registration for the first crediting period. The Validation Opinion 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 Biogás Energia Ambiental S.A., has performed the validation for renewal of the crediting period for the registered project activity São João Landfill Gas to Energy Project (SJ) in Brazil. In conclusion, it is RINA's opinion that the project meets all the relevant requirements for the renewal of the crediting period.

SECTION B. Validation team, technical reviewer and approver

B.1. Validation team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interview(s)	Validation findings
1.	Team Leader/ validator Technical Expert	IR	Carvalho	Thaís	RINA Brazil	x	x	x	x
2.	Team leader, Validator Technical Expert (after 20/11/2019)	ER	Leiroz	Andrea	RINA Brazil				x

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

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Buragohain	Champok	RINA India
2.	Approver	IR	Severino	Laura	RINA HQ

SECTION C. Means of validation

C.1. Desk/document review

>> The updated PDD version 4.0 of 24/01/2020 and previous versions /02/, in particular the applicability of the methodology, the baseline determination, the emission reduction calculations provided in the form of a spreadsheet “20191125_SÆo JoÆo_CERs.xlsx ” and previous version /10/, and the documents listed in the table 3 below, were reviewed during the validation.

C.2. On-site inspection

Duration of on-site inspection: 30/10/2018				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	-Implementation and operation of the proposed project activity; -Confirm data used in the ex-ante estimative of CERs calculation -Interviewed key personnel of the plant to confirm the operational and data collection procedures; QA QC procedures.	São João landfill	30/10/2018	Thaís Carvalho
2.	- RINA assessed the Project activity design and implementation (changes). - Assessment of choice and applicability of the baseline methodology, project boundary and emissions sources included in the project boundary. - Additionality. (parameters modified)	São João landfill	30/10/2018	Thaís Carvalho

C.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Ribeiro	Weliton	Biogás Energia Ambiental S.A.	30/10/2018	Project implementation, equipments installed, monitoring, calibration	Thaís Carvalho
2.	Zafra	Lucas	Biogás Energia Ambiental S.A.	30/10/2018	Project implementation, equipments installed, monitoring, calibration	Thaís Carvalho
3.	Nagai	Karen	EQAO	30/10/2018	CERs estimative, methodology applicability, changes	Thaís Carvalho
4.	Silva	Anderson	Biogás Energia Ambiental S.A.	30/10/2018	Project implementation, equipments installed, monitoring, environmental license, additionality; changes	Thaís Carvalho

C.4. Sampling approach

>>N/A

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

Area of validation findings	No. of CL	No. of CAR	No. of FAR
Compliance with PDD form			
Application and selection of methodologies and standardized baselines			
Validity of original baseline or its update	2		
Estimated emission reductions or net anthropogenic removals	1	3	
Validity of monitoring plan	3	2	
Crediting period			
Project participants			
Post-registration changes			
Others (please specify)			
Total	6	5	

SECTION D. Validation findings

D.1. Compliance with PDD form

Means of validation	PDD applies the applicable CDM- PDD-FORM: Project design document form version 11 /07/. RINA verified that for the renewal crediting period, information transferred to the later valid version of the PDD form is materially the same as that in the registered PDD.
Findings	N/A
Conclusion	RINA confirms that the PDD is based on the currently valid CDM-PDD-FORM template version 11 and is completed in accordance with the Attachment: Instructions for completing this form /07/.

D.2. Application and selection of methodologies and standardized baselines

Means of validation

The project was originally registered based on version 2 of the ACM0001 "Consolidated baseline and monitoring methodology for landfill gas project activities" and the PDD approved in the PRC version 4.0 Aa dated 02/10/2019 applied version 18.1 of ACM0001/09/; the PDD for the second crediting period /02/ applies ACM0001 "Flaring or use of landfill gas" version 19 of 14/06/2019 /06/.

RINA verified that the ACM0001 is still applicable to the project activity as described below:

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 (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	The methodology is applicable as the project activity consists in the installation of a new LFG capture system in a existing SWDS where no LFG capture system was installed prior to the implementation of the project activity. Verified during the onsite visit that the LFG will be captured from the São João landfill to generate electricity. The project activity has also installed enclosed flares for	**Yes**

	(ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available; (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; v) Supplying the LFG to consumers through a dedicated pipeline; (d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.	emergency purposes. The implementation of the proposed CDM project activity does not reduce the amount of organic waste that would be recycled in the absence of the project activity as there was no recycling system in the region during the landfill lifetime. Currently, São João landfill is closed and, since 2009 year, it did not receive waste as verified during the site visit and confirmed with public available information /35/.	
	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	The baseline scenario is release the LFG to atmosphere from the SWDS, and the electricity would be generated in the grid connected power plants.	**Yes**

	heat would be generated using fossil fuels in equipment located within the project boundary.		
	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 São João landfill will not be changed to increase the methane generation, confirmed through interview during the onsite visit.	Yes

The following tools are also described in the applied methodologies:
TOOL06 “Project emissions from flaring”, version 03.0 dated 28/03/2019 /14/
TOOL05 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”, Version 03 of 22/09/2017/18/
TOOL07 “Tool to calculate the emission factor for an electricity system”, Version 07.0 of 31/08/2018 /22/
TOOL04 “Emissions from solid waste disposal sites”, version 08.0 of 04/05/2017 /12/
TOOL08 “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”, Version 03.0 of 27/11/2016 /15/
TOOL11 “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 of 02/03/2012 /08/
TOOL02 “Combined tool to identify the baseline scenario and demonstrate additionality”, Version 07.0 of 22/09/2017 /19/, not used in the renewal crediting period
TOOL09 “Determining the baseline efficiency of thermal or electric energy generation systems”, Version 02.0 of 27/11/2015 /16/, not used in the project activity
TOOL10 “Tool to determine the remaining lifetime of equipment”, version 01 of 16/10/2009 /17/, not applicable to the project activity as it is a greenfield project.
TOOL12 “Project and leakage emissions from transportation of freight”, version 01.1.0 of 23/11/2012 /21/, not applicable to the project activity.

RINA verified that the previously approved deviation M-DEV-493 (applicable to methodology ACM0001 version 12) is not applicable as the methodology ACM0001 version 19 of 14/06/2019 used in the project activity was revised and states*: if the LFG is used for multiple purposes (e.g. flaring or energy generation), and all methane destruction devices are verified to be operational (e.g. by means of flame detectors records, energy generated), a single flow meter may be used to record the flow into multiple destruction devices”*.

Findings	N/A
Conclusion	RINA confirms that the selected baseline and monitoring methodologies have been previously approved by the CDM Executive Board and are applicable to the project, which complies with all the applicability conditions therein the selected versions are valid at the time of submission of the renewal of crediting period. It is also confirmed that the methodologies are correctly applied by comparing them with the

	actual text of the applicable versions.

D.3. Validity of original baseline or its update

Means of validation	The baseline was assessed according to the tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period, version 03.0.1" /08/. The following steps were assessed: ***Step 1: Assess the validity of the current baseline for the next crediting period*** ***Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies***. For the baseline scenario LFG2: Atmospheric release of the LFG or capture of LFG in an managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons, there is no current law or contractual requirements to capture/destroy/use the LFG nor enforcing the supply of natural gas. In the beginning of 2010, the Política Nacional de Resíduos Sólidos (National Solid Waste Policy), under discussion since 2000, was approved. One of the scopes of this policy is to enforce the adequate environmental final destination of the solid waste. However, the Policy does not foresee either the obligation of landfill gas destruction or the promotion of the landfill gas use such as those for the production of renewable energy and processing of organic waste /37/. For the baseline E.3, there are no new rules or legislations in Brazil that go against the previously established baseline i.e. electricity could continue to be generated by the plants feeding the grid. Concerning energetic use of the landfill gas, the project is in line with the Brazilian government initiatives to increase the renewable energy share in the electric matrix. Through Law # 10,438/2002 , the Brazilian government created PROINFA (Program for Alternative Energy Sources) for promoting the renewable electricity generation by celebrating long-term power purchase agreements (20-year period) at a guaranteed price of at least 80% of the average energy supply tariff charged to ultimate consumers. However, the public call for the first phase of the program occurred in 2004, which no biogas projects participated. Currently, there is no indication by the Brazilian government when the second phase of the program will occur or if it will occur indeed. More recently, the government has been trying to promote micro-scale renewable electricity generation, which consumers can generate its own electricity and dispatch electricity surplus to the grid. However, these initiatives are applied to household consumers. Therefore, there are no new relevant national and/or sectoral policies and/or circumstances in the waste management and energy sectors applicable to the Project Activity, in comparison to the time of the submission of the project activity for validation, which would affect the compliance of the current baseline scenario. RINA has verified that the current baseline remains the same for the next crediting period. Verified during the onsite visit that the following equipment's are installed: **Blower** 4 units, manufacturer Continental Blower LLC, with capacity 3,000-7,000 scfm each in accordance with the manufacturer /41/. **Flare** 3 flares, manufacturer Hofstetter, capacity 500 Nm3/h to 5,000 Nm3/h /30/. **Diesel generator** Manufacturer: Caterpillar, 1 unit capacity 400 KW/500 KVA, confirmed in the equipment´s plate /28/. **Electriciy generator** Manufacturer: caterpillar, 16 units of 1.6 MW each, confirmed in the equipment's plate and datasheet /28/. RINA confirmed that there was no changes in the electricity generators. *Caterpillar*

	and SOTREQ, as the local dealer, jointly determined and sold the CAT G3520C having a nominal capacity of 1.54 MW regarding the specific site and operation conditions of SJ project /42/, considered in the previous version of the PDD. Moreover, PP has provided the environmental license number 30007689, 30007689 and the renewal protocol /31/. For the project boundary, ACM0001 establishes that "LFG shall include the LFG is captured", however LFG from PA5947 (CTL landfill) is not used for emission reductions purposes and, therefore, the SWDS of PA5947 is not included in the project boundary. As explained in the PDD and in the approved PRC on 12/11/2019, PA5947 LFG is fully monitored and is used to comply with the power purchase agreement. No emission reductions from the purchased PA5947's LFG are or will be claimed. The amount of LFG and methane from PA5947 will be discounted in the calculation of São João baseline emissions. No emission reductions will be claimed from this LFG since emission reductions are already accounted by CTL project. Leakage from gas transportation is also accounted by CTL project. **Step 1.2: Assess the impact of circumstances** There are no new relevant national and/or sectoral policies and/or circumstances in the waste management sector applicable to the project activity, in comparison to the time of the submission of the project activity for validation, which could impact the validity of the current baseline for the next crediting period. Therefore, the current baseline scenario does not need to be updated for this crediting period. **Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which the renewal is requested** The project activity consists of the implementation of a forced extraction system to collect the landfill, which is used to generate electricity, where neither a similar system nor electricity was generated prior to its implementation. In the absence of the proposed CDM project activity, the project participants would not have constructed the project's infrastructure. Therefore, the landfill gas would continue to be emitted to the atmosphere and electricity would have been generated by other power plants connected to the grid. In this context, this sub-step is not applicable since the identified baseline scenario at the validation of the project activity did not correspond to the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology. **Step 1.4: Assessment of the validity of the data and parameters** The baseline emissions of the project activity were updated considering the last version of the methodologies, related applicable tools and IPCC values. **Step 2: Update the current baseline and the data and parameters** **Step 2.1: Update the current baseline** The baseline emissions for the second crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology ACM0001. **Step 2.2: Update the data and parameters** The data and/or parameter(s) for the second crediting period were updated. The assessment is described in the sections below.
Findings	**CL 1**: PP is requested to provide the evidence of the capacity of the blower. **CL 2**: the installed capacity of the electricity generators are not in accordance with equipment's' technical specification. To close CL 1 and CL 2, data were revised in accordance with equipments'

	specification from manufacturers.
Conclusion	RINA verified that the baseline was assessed according to the tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period, version 03.0.1" /08/. The current project baseline is still valid at the renewal crediting period.

D.4. Estimated emission reductions or net anthropogenic removals

Means of validation

The approved baseline and monitoring ACM0001 "Flaring or use of landfill gas" version 19 of 14/06/2019 /06/ has been applied.

The following parameters are presented in the updated PDD:

Data/parameter	Unit	Value applied	Assessment
OX_{top_layer} (Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline)	Dimensionless	0.1	Consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal sites" /12/.
$F_{CH4,BL,y}$ (Amount of methane in the LFG that would be flared in the baseline in year y)	t_{CH4}/yr	Average value for the monitoring period, calculated in accordance with case 3	RINA verified that PP considered the default value of 20% in accordance with the methodology, for case 3.
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 /13/.
- η_{PJ}: Efficiency of the LFG capture system that will be installed in the project activity.	Dimensionless	50%.	In accordance with the default value in the methodology /06/.
$\varphi_{default}$: Default value for	-	0.75	Value applied considering MAT >20 ºC

	the model correction factor to account for model uncertainties.			and MAP> 1.000 mm, considering data for São Paulo. /24/ In accordance with "Emissions from solid waste disposal sites" /12/. This parameter is used to determine the baseline emissions following the procedures related to Application A.
	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*).
	OX: Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)	-	0	For ex-ante calculations this effect was accounted when determining emission reductions as per ACM0001 formulae, taking into account AM_CLA_0259. Although clarification refers to ACM0001 (version 15.0) and tool *Emissions from solid waste disposal sites* (version 6.0.1), it is also applied to the project since

				equations do not change in the updated version of methodology and tool**.**
	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"/12/.
	$DOC_{f,default}$**:** Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS.	Weight fraction	0.5	The proposed project activity corresponds to *Application A* described in the applicable methodological tool *"Emissions from solid waste disposal sites" /12/*. Therefore, in accordance with the requirements set out by tool, the default value was chosen.
	$MCF_{default}$: 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" /12/*. Therefore, in accordance with the requirements set out by tool, the default value was chosen. The São João 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.
	DOC_j: Fraction of degradable organic carbon in the waste type *j*	weight fraction	***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	Value applied in accordance with the tool "Emissions from solid waste disposal sites"/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	Value applied considering MAT >20ºC and MAP>1.000 mm, considering data for São Paulo /24/. In accordance with "Emissions from solid waste disposal sites" /16/.- Tropical /23/.

			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
	Wx (total amount of waste disposed in a SWDS in year x)	t	Several data presented in the CERs spreadsheet.		Historical data of total amount of waste disposed in São João landfill. Historical data of the PDD was used and updated data from 2006-2009 was considered /01/ /29/.
	$SPEC_{flare}$: Manufacturer's flare specifications for temperature, flow rate and maintenance schedule	Temperature - °C Flow rate - Nm³/h Maintenance schedule - number of days	Flare model	Holfstetter,	RINA verified that the information is in accordance with the manufacturer specification /30/.
			Minimum flare temperature	1000 ºC	
			Maximum flare temperature	1200 ºC	
			Minimum and maximum inlet flow rate	Minimum flow: 500 Nm3/h Maximum flow: 5000 Nm3/h	
			Maximum duration in days between maintenance events	365 days	
	$\mathbf{R_u}$: Universal ideal gas constant	$Pa.m^3/kmol.K$	8,314		PP applied the default value in accordance with the Methodological tool "Project emissions from flaring" /14/.
	P_n: Atmospheric pressure at normal	Pa	101,325		PP applied the default value in accordance with the

conditions			Methodological tool "Project emissions from flaring" /14/.
Tn: Temperature at normal conditions	K	273.15	PP applied the default value in accordance with the Methodological tool "Project emissions from flaring" /14/.
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" /15/.
$EF_{grid,BM,y}$ Build margin CO2 emission factor in year y	tCO_2/MWh	0.1370	Value appliedin accordance with Brazilian DNA, latest data available from 2018 /33/.
$EF_{EL,y,i}$ (Emission factor for electricity generation for source j in year)	tCO_2/MWh	1.3	Conservative default value provided by Option B2 of the tool "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

Baseline emissions:
Baseline emissions is calculated in accordance with the methodology ACM0001 ACM0001 "Flaring or use of landfill gas" version 19 of 14/06/2019:

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

Where:

BE_y= Baseline emissions in year y (t CO_{2e}/yr)

$BE_{CH4,y}$= Baseline emissions of methane from the SWDS in year y (t CO_{2e}/yr)

$BE_{EC,y}$ = Baseline emissions associated with electricity generation in year y (t CO_2/yr).

$BE_{HG,y}$= Baseline emissions associated with heat generation in year y (t CO_2/yr). Not applicable to this project activity.

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

Not applicable to this project activity.

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 $F_{CH4,PJ,y}$**

During the crediting period, the **$F_{CH4,PJ,y}$** will be determined as follows:
$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y}$
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). Not applicable to the project activity
$F_{CH4,NG,y}$= Amount of methane in the LFG which is sent to the natural gas distribution network and/or dedicated pipeline and/or to the trucks in year *y* (tCH_4/yr). Not applicable to the project activity
As the project flares LFG, generate electricity, the $F_{CH4,NG,y}$= 0 and $F_{CH4,HG,y}$ = *0*.

In the case of the project activity, *FCH4,HG,y* and *FCH4,NG,y* are zero since the proposed project activity neither produces heat nor distributes natural gas through a network, Therefore: $F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y}$.

RINA verified that the revised PDD describes the meters that are applicable to each component ($F_{CH4,flared,y}$ and $F_{CH4,EL,y}$.)

$F_{CH4,EL,y,}$ *is* determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" and monitoring the working hours of the power plant, so that no emission reduction are claimed, for methane destruction during non-working hours. This is taken into account by monitoring the hours that the equipment utilizing the LFG is operating in year y ($Op_{j,h,y}$). The following requirements apply:

- As per the gaseous stream tool, if the LFG is used for multiple purposes (e.g. flaring or energy generation), and all methane destruction devices are verified to be operational (e.g. by means of flame detectors records, energy generated), a single flow meter may be used to record the flow into multiple destruction devices. The destruction efficiency of the least efficient among the destruction devices shall be used as the destruction efficiency for all destruction devices monitored by this flow meter. If there are any periods for which one or more destruction devices are not operational, paragraph 5 (a) and (b) of the Appendix of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" tool shall be followed;
- CH_4 is the greenhouse gases for which the mass flow should be determined;
- 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 should be calculated on an hourly basis for each hour h in year *y*;

The mass flow calculated for hour h is 0 if the equipment is not working in hour *h* ($O_{pj,h}$=not working), the hourly values are then summed to a yearly unit basis.

For calculating $F_{CH4,EL,y,}$ it will be used the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /15/ . the following options may be applied:

Option A

Flow measurement on a dry basis is not doable for a wet gaseous stream. Therefore, it is necessary to demonstrate that the gaseous stream is dry to use this option. The demonstration will be made as following:

- Demonstrate that the temperature of the gaseous stream (T_t) is less than 60ºC (333.15 K) at the flow measurement point.

The mass flow of greenhouse gas i (Fi,t) is determined as follows:
$F_{i,t} = V_{t,db} * v_{i,t,db} * \rho_{i,t}$ and $\rho_{i,t} = (P_t * MM_i) / (R_u * T_t)$
Where:
$F_{i,t}$= Mass flow of greenhouse gas i in the gaseous stream 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);
$v_{i,t,db}$ = Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a dry basis (m^3 gas i /m^3 wet gas);
$\rho_{i,t}$ = Density of greenhouse gas i 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)
MM_i= Molecular mass of greenhouse gas i (kg/kmol);
R_u = Universal ideal gases constant (8,314 Pa.m3/kmol.K);
T_t = Temperature of the gaseous stream in time interval *t* (K);

The flow meters installed convert automatically the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure.

The amount of methane destroyed by flaring ($F_{CH4,flared,y}$)
The amount of methane destroyed by flaring ($F_{CH4,flared,y}$) will be determined as follows:

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

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 $F_{CH4,sent\_flare,y}$, it will be used the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /15/ , considering the option A of the tool, as described for the parameter $F_{CH4,EL,y}$.

Project emissions from flaring
$PE_{flare,y}$ shall be determined using the methodological tool "Project emissions from flaring" /14/. If LFG is flared through more than one flare, then $PE_{flare,y}$ is the sum of the 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 procedures set out by the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /15/ and the following requirements shall apply:

- The gaseous stream tool shall be applied to the residual gas;

- The flow of the gaseous stream shall be measured continuously;

- CH4 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.

Step 2: Determination of flare efficiency

The São João Landfill Gas to Energy Project (SJ) has low height enclosed flares and as a conservative approach it is requested to subtract 0.1 from the efficiency. /30/

The Option A: Default value has been chosen:

The flare efficiency for the minute *m* (n*flare,m*) is 90% when the following two conditions are met to demonstrate that the flare is operating:
(1) The temperature of the flare ($T_{EG.m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute *m*; and

(2) The flame is detected in minute *m* ($Flame_m$).

Otherwise n*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*

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

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

$F_{CH4,PJ,y}$= 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 in the applied 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) ;

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).

For the waste received PP has used historical data. RINA verified that since the landfill was closed in 2009, the value considered in the registered PDD was considered and the years 2006-2009 was updated /29/.

The waste type, RINA verified that the revised PDD and spreadsheet were revised in accordance with data from Ecourbis for the year 2009 */36/.*

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

In accordance with the methodology /03/ 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:

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

Baseline emissions associated with electricity generation ($BE_{EC,y}$)

In accordance with the methodology, the baseline emissions associated with electricity generation in year y ($BE_{EC,y}$) shall be calculated using the "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" /15/ as follow:

$$BE_{EC,y} = \sum_{k} EC_{BL,k,y} \times EF_{EL,k,y} \times (1 + TDL_{k,y})$$

$BE_{EC,y}$= Baseline emissions from electricity generation in year *y* (tCO2/yr);
$EC_{BL,k,y}$= $EG_{PJ,y}$= Net amount of electricity generated using LFG in year y(MWh/yr);
$EF_{EL,k,y}$= Emission factor for electricity generation for source k in year y

(tCO2/MWh);
$TDL_{k,y}$= Average technical transmission and distribution losses for providing electricity to source k in year y;
k= Sources of electricity generated in the baseline.

Project participant choose Option A.1 of the "*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*" for determining $EF_{EL,k,y}$. thus according to the option chosen :
"Calculate the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the Tool to calculate the emission factor for an electricity system ($EF_{EL,j/k/l,y} = EF_{grid,CM,y}$)".
RINA verified that the generator efficiency to estimate the energy generation used in the CERs spreadsheet is in accordance with technical data sheet /28/.

RINA verified that the TDL is from a study from Eletropaulo, for 2016 /32/.

RINA verified that the emission factor data is provided by the Brazilian DNA /33/.

STEP 1: Identify the relevant electricity system

The Brazilian DNA published a Resolution #08, issued on 26th May, 2008, defines the Brazilian Interconnected Grid as a single system that covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest) /25/.

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

The Brazilian DNA is responsible for calculating the emission factors and it did not include off-grid power plants in the calculation, therefore Option I is used:Only grid power plants are included in the calculation.

STEP 3: Select a method to determine the operating margin (OM)

The $EF_{grid,OM,y}$ is given by the Brazilian DNA and calculated under the method: *Simple adjusted OM.* The Brazilian DNA made available the operating margin emission factor calculated following the "Tool to calculate the emission factor for an electricity system", approved by the CDM Executive Board. For the second crediting period PP has chosen the ex-post data vintage.
Therefore, this parameter will be annually updated applying the numbers provided by the Brazilian DNA.

Step 4: Calculate the operating margin emission factor according to the selected method

RINA verified that data from 2018 is used, in accordance with data latest data published by the Brazilian DNA /33/. $EF_{grid,OM,2018}$ = 0.3932 tCO_2e/MWh.

Step 5. Calculate the build margin (BM) emission factor

For data vintage, Option 1 (ex-ante) was chosen for the proposed project in accordance with data vintage chosen in the first crediting period. Thus, $EF_{grid,BM,2018}$ = 0.1370 tCO2/MWh /33/.

Step 6: Calculate the Combined Margin emission factor

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

According with the Tool, values adopted for w_{OM} and w_{BM} in the second crediting period is equal w_{OM}= 0.25 and w_{BM}=0.75. While using the applicable w_{OM} and w_{BM}, the CO_2 combined margin emission factor is 0.2011 tCO_2e/MWh.

Baseline emissions associated with heat generation ($BE_{HG,y}$) and Baseline

emissions associated with natural gas use ($BE_{NG,y}$) are not applicable to the project activity.

Project emissions

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

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

$PE_{EC,y}$= 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)- Not applicable to the project activity;

$PE_{DT,y}$= Emissions from the distribution of compressed/liquefied LFG using trucks, in year y (tCO_2/yr) –Not applicable to the project activity;

PE_{spy}= Emissions from the supply of LFG to consumers through a dedicated pipeline, in year y (tCO_2/yr) –Not applicable to the project activity;

Calculation of $PE_{EC,y}$ – project emission from consumption of electricity

The project emission from consumption of electricity will be from diesel generator.
As electricity will be consumed from diesel generators (off-grid captive power plant), PP has chosen to use the default value (option B2 of the scenario B) considering: "The electricity consumption source is a project or leakage electricity consumption source". Therefore, the value used will be 1.3 tCO_2/MWh for project emission from diesel generator(s).

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

Where:

$EC_{PJ,y}$ = 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);
TDLj,y = Average technical transmission and distribution losses for providing electricity to source j in year y;
j= Sources of electricity consumption in the project.

RINA verified that the generator are next to the biogas plant, therefore transmission losses is not accounted (TDL= 0).

Electricity sources *j* corresponds to all the sources of electricity consumed for the operation of the LFG capture system and transportation of the LFG to the flares. For the *ex-ante* estimation of electricity consumed, amount of electricity consumed from the diesel generator during the last monitored period is considered, confirmed during the onsite visit.

Leakage:

Leakage is not applicable in accordance with the methodology /03/.

Emission Reduction

Emission reductions are calculated as follows:
$ER_y = BE_y – PE_y$,

Where:
ER_y = Emission reductions in year y (tCO_2e/yr);
BE_y = Baseline emissions in year y (tCO_2e/yr);
PE_y = Project emissions in year y (tCO_2e/yr);

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)

		From 22/05/2014	68,660	2,299	0	66,361
		2015	97,281	3,245	0	94,036
		2016	85,595	2,861	0	82,734
		2017	76,416	2,560	0	73,856
		2018	69,007	2,317	0	66,691
		2019	69,504	2,110	0	67,394
		2020	63,746	1,939	0	61,807
		Up to 21/05/2021	22,823	696	0	22,128
		Total	553,033	**18,027**	**0**	535,005
		Total number of crediting years	7			
		Annual average over the crediting period	79,005	2,575	0	76,429

Findings	**CAR 1:** The PDD describes: It is important mentioning that the amount of biogas and methane from CTL will be discounted from the emission reduction calculation in order to avoid double counting. However the provisions of monitoring to avoid double accounting is not described (such as the meters involved to monitor the amount of LFG and methane in the biogas from CTL and where applicable calculation involved). PP is requested to consider the provisions of the methodology, and if applicable, deviation of monitoring from the applied methodology. To close CAR 1, PDD was revised and information regarding PRC was included under Appendix 7. **CAR 2**: Monitoring plan describes: *during the crediting period, data was collected in a 5-minute interval, but since March 2018, the system was updated to consider 1-minute interval.* However, verified during the onsite visit that 5 minute interval was not modified in accordance with the requirements of the applied tool. To close CAR 2, a temporary deviation is requested. **CAR 3**: Data used in the updated PDD for the operating margin (simple adjusted OM) is not in accordance with Brazilian DNA. To close CAR 3 a revised PDD was provided. **CL 3**: The generator efficiency used to estimate the energy generation in the CERs spreadsheet is not in accordance with technical data sheet /28/. To close CL 3, data was revised in accordance with the evidence.
Conclusion	The assessment team confirms that: • All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources; • All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD; • All values used in the PDD are considered reasonable in the context of the proposed CDM project activity; • The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions; • All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

D.5. Validity of monitoring plan

Means of validation	The approved baseline and monitoring ACM0001 “Flaring or use of landfill gas” version 19 of 14/06/2019 /06/ has been applied. Parameters monitored ex-post The assessment of the ex-post parameters are described in the table below:

Parameter	Description/Assessment

	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.	
	$Op_{j,h}$ (-).Operation of the equipment that consumes the LFG.	Value applied: not applicable. For each equipment unit j using the LFG monitor that the plant is operating in hour h <u>*For the electricity generation facility*</u>: Products generated. Monitor the generation of electricity which is dispatched to the grid. <u>*For the flaring system*</u> Temperature: according to the manufacturer's technical record, the combustion temperature varies from 1000 to 1200°C. Temperature shall varies between this ranges. Opj,h=0 when: - Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); - No products are generated in the hour h. Otherwise, Opj,h=1	
	$EG_{PJ,y}$ = (MWh) net amount of electricity generated using LFG by the project activity in year y	Value applied: 22,416 (average during the crediting period). Parameter will be monitored continuously and daily recorded. Data is cross check with AES Eletropaulo. Calibration will be conducted in ONS requirements . In order to determine the SJ's electricity generation and dispatch to the grid, AES Eletropaulo readings will be proportionally accounted based on the CH4 mass balance from CTL and SJ. No emission reductions will be claimed (neither in flaring nor in power generation) from the use of LFG purchase from CTL.	
	$V_{t,db}$ (m^3 dry gas/h). Volumetric flow of the gaseous stream in time interval *t* on a dry basis.	Value applied: Not used for ex-ante calculation. Data is measured continuously by a flow meter and hourly aggregated. *-FIT 524 (Endress+Hauser): Flow flare F520, accuracy 1.5%, calibration frequescy 5 years* *- FIT 544 (Endress+Hauser): Flow flare F540, accuracy 1.5%, calibration frequescy 5 years* *- FIT 564 (Endress+Hauser): Flow flare*	

		F560, accuracy 1.5%, calibration frequescy 5 years *- FIT 500 (Incontrol): Total gas to flares – cross check, accuracy 1.0%, calibration frequescy 5 years* *- FIR 800 (Incontrol): Total gas to engines, accuracy 1.0%, calibration frequescy 5 years* *- FIR 600 (Incontrol): Total gas to engines, accuracy 1.0%, calibration frequescy 5 years* *- FIT 910 (Incontrol): CTL flow – principal, accuracy 1.0%, calibration frequescy 5 years* *-- FIT 901 (Incontrol): CTL flow – backup accuracy 1.0%, calibration frequescy 5 years* Periodic calibration provided by an independent accredited laboratory and according to manufacturers' recommendations. In order to determine the amount of LFG generated, CTL's landfill gas will be discounted from the total LFG based on meter flow measurements. No emission reductions will be claimed (neither in flaring nor in power generation) from the use of LFG purchase from CTL. Also, discount factors will be adopted as determined in Appendix 7. Invoices can be used for cross checking purposes, if applicable.	
	$V_{i,t,db}$= (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 flow meter and hourly aggregated (Continuous for CTL and CTL+SJ methane analyzers and Sampling for cross-checking SJ methane analyzer). The gas analyzers are correctly described in the revised PDD: There are three methane analyzers: CTL, SJ and CTL+SJ. CTL's methane analyzer is under CTL's responsibility, including its maintenance and calibration as established in its monitoring plan. Methane measurement equipment of SJ (GEM2000) and CTL+SJ (A100) are under SJ's responsibility as well as their calibration. GEM2000 is not a fixed meter and, therefore, SJ's methane is measured by sampling: conducted 3 times a day and daily average is considered for cross-checking purposes. Also, uncertainty of GEM2000 is higher (+/- 3.0%) when	

		compared to A100 analyzer (1.0%). Therefore, GEM2000 will be used for cross-checking purposes only and A100 will be used for emission reductions calculation. Both A100 from SJ and CTL's analyzer measurements are continuous and integrated once per minute. In order to determine baseline emissions from the SWDS, only SJEA's methane will be accounted based on the flow and concentration measurements (mass balance). No emission reductions will be claimed (neither in flaring nor in power generation) from the use of LFG purchase from CTL. Additionally, discount factors will be adopted as determined in the approved PRC /43/ and described in Appendix 7 of the revised PDD /2/. *-GEM2000 (Landtec): Gas recipit (SJ), accuracy 3.0%, calibration- Weekly by the project developer and Yearly by a third party company.* *-A100 (Rosemount – NUK): Gas recipit (SJ +CTL), accuracy 1.0%, calibration- Weekly by the project developer and Yearly by a third party company.* *-FAU – TDL (Landtec): Gas recipit (CTL), accuracy 1.0%, calibration- Yearly by CTL.*	
	Tt (K): Temperature of the gaseous stream in time interval t.	Value applied: not applicable. Temperature will be measured continuously Provided all parameters are converted to normal conditions during the monitoring process, this parameter may not be needed except for moisture content determination and therefore it should be metered only when performing such measurements (with same frequency). However, if the applicability condition related to the gaseous stream flow temperature being below 60ºC is adopted, this parameter must be monitored continuously to assure the applicability condition.	
	Status of LFG biogas destruction device (-) Operational status of LFG biogas destruction devices	Monitoring and documenting is undertaken by recording the energy production from methane captured or the operation of the flare by means of a flame detector and thermocouples to demonstrate the actual destruction of methane. Emission reductions will not accrue for periods in which the destruction device is not operational.	
	$T_{EG,m}$ (ºC): Temperature in the exhaust gas of the enclosed flare in minute m	Data is measured by thermocouples installed in each flare and the reading frequency is continuously. Measurements of the temperature of the exhaust gas are recorded electronically by PLC at least	

	each minute. Temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule.
***Flame**$_m$* (Flame on or Flame off). Flame detection of flare in the minute *m*.	According to the operating manual from the flare manufacturer, there is a UV sensor and a burner control unit for automatic ignition and flame monitoring. The UV-sensor detects the flame and gives a signal to the automatic control burner. As soon as the flame has been burning for a given retention time, the automatic burner control opens the main gas valve. Then, valve that controls the flow of gas sent to flare enclosure automatically closes whenever no flame is detected by sensors. Monitoring frequency: Once per minute. Detection of flame recorder as a minute that the flame was on, otherwise recorded as a minute that the flame was off depending on the flow of gas inside the flare enclosure.
Maintenance$_y$ (calendar dates). Maintenance events completed in year y	Record the date that maintenance events were completed in year y. Records of maintenance logs must include all aspects of the maintenance including the details of the person(s) undertaking the work, parts replaced, or needing to be replaced, source of replacement parts, serial numbers and calibration certificates. Monitoring frequency is annual.
***EF**$_{grid,OM,y}$* (tCO2/MWh) Simple adjusted operating margin CO2 emission factor in year *y*	Value applied: 0.3932 in accordance with the latest data available from 2018 by the Brazilian DNA (official data) /33/.
TDL$_{k,y}$ (%)Average technical transmission and distribution losses for providing electricity to source k in year y	Value applied: 5.2% in accordance with data from Eletropaulo for the year 2016 /32/. Monitoring frequency: Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.
EC$_{PJ,y}$ (MWh): Quantity of electricity consumed by the project electricity consumption source j in year y	Value applied: 35.34 based on the last monitoring period. The electricity consumed by the plant is monitored through hours of operation from generator while applying the maximum output capacity of the generator 400kW, as a volume meter is not usual given the little consumption and capacity of generator. While adopting the maximum oil consumption capacity (110.6l/h) from manufacturer's specification, and applying diesel oil NCV and EF, it results in lower project emissions than when considering the installed capacity. Therefore, the approach considered by the PP is very conservative.

Management system and quality assurance

An onsite inspection has been performed on 30/10/2018 in order to confirm that the monitoring arrangements in the monitoring plan are feasible within the project design. The updated PDD /02/ describes that All monitored data and required for verification and issuance be kept and archived electronically for two years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

RINA verified that the calibration follows the requirements of the Project Standard: If neither the applied methodologies and, where applicable, the applied standardized baselines, nor the Board's guidance specify any requirements for calibration frequency for measuring equipment, the project participants shall ensure that the equipment is calibrated either in accordance with the local/national standards or the manufacturer's specifications. If local/national standards or the manufacturer's specifications are not available, international standards may be used.

As explained above, from 03/04/2014 onwards, SJ also purchases biogas (landfill gas) from CTL (Central de Tratamento de Resíduos Leste) which is used for electricity generation, occasionally for flaring in emergency cases. CTL is a CDM project (# 5947) and, as described in is registered PDD and Validation Report /27/, all emission reduction generated from the LFG produced by CTL project is of CTL's right and will be claimed by them. SJ cannot claim CERs from this biogas (landfill gas) /27/, therefore, the following measures are taken for the permit deviation of the monitoring plan:

For the methane, there will be three measurements from CTL, SJ and CTL+SJ. CTL's methane analyser is under CTL's responsibility, including its maintenance and calibration as established in its revised monitoring plan. Methane measurement equipment of SJ (GEM2000) and CTL+SJ (A100) are under SJ's responsibility as well as their calibration. In spite of GEM2000 measures SJ's methane only, the analyser to be considered for emission reduction calculation is A100. GEM2000 is not a fixed meter and, therefore, SJ's methane is measured by sampling: conducted 3 times a day and daily average is considered for cross-checking purposes. Also, uncertainty of GEM2000 is higher (+/- 3.0%) when compared to A100 analyzer (1.0%). Therefore, GEM2000 will be used for cross-checking purposes only and A100 will be used for emission reductions calculation. Both A100 from SJ and CTL's recipit measurements are continuous and integrated once per minute. As we have methane measurement from the CTL+SJ and from CTL, it is possible unequivocally determine the quantity of methane generated in SJ, which is sent to flares . If any loss occurs in the flow from SJ, it will be accounted to São João (because CTL is measured and SJ + CTL is measured). Then, methane from SJ will never be overestimated, but may be conservatively underestimated.

In the case of project emissions from flaring, LFG flow will be measured by FIT524, FIT544 and FIT564 and will be considered for emission reduction purposes if flares operate under adequate operational conditions of temperature and flow as established by the manufacturer, i.e. 1,000ºC – 1,200ºC temperature and 500Nm3/h – 5,000Nm3/h flow rate. Readings from FIT500 is not used for emission reduction calculations but for cross-checking purposes only. All measurement will be discounted proportionally to the measurement of methane collected by CTL.

In the case of baseline emissions of methane from SWDS, LFG flow will be measured by FIT524, FIT544 and FIT564 (flares), as well as FIR800, which is allowed to use a single flow meter (and not one for each equipment which consumes LFG) as established by ACM0001. All measurement will be discounted proportionally to the measurement of LFG collected by CTL.

In the case of baseline emissions from electricity generation, exported electricity from energy meters – provided by the power utility (AES Eletropaulo) – will be also discounted proportionally to the measurement of LFG collected by CTL.

	Following paragraph 239 of the CDM Project Standard (v.2.0), in order to apply the permanent changes, the following discount factor and conservative approach will be adopted by the Project Participants: • Apply discount factor based on the equipment accuracy as established in manufacturer's specification. Then, discount will be applied twice (methane and flow measurement): 1% discount will be applied on methane measurement (A100) and gas flow sent to generators (FIR 800), and 1.5% discount on gas flow sent to flares (FIT524, FIT544 and FIT564); • Adopting a conservative approach by using values rounded down (truncated) for data instantaneously generated and registered in the PLC system, then no decimal places of gas flow, for example, will be considered while calculating emission reductions. In spite of the discounts, baseline emissions generated by the project activity will be calculated according to equations 1, 2 and 3, and project emissions from flaring according to equation 6. Please refer to section B.7 of the PDD /2/ for details of the monitoring plan. RINA verified that the revised monitoring plan refer to a later version of the applied methodology in the registered PDD (changed from ACM0001 version 2 to ACM0001 version 19). It is RINA's opinion that all the requirements in the later version of the methodology have been met and that the application of the later version of the applied methodology does not impact the conservativeness of the monitoring and verification process, including the related emission reduction or removal calculations Moreover, it is RINA's opinion, that PP followed the provisions described in the project standard, applying conservative assumptions or discount factors to the calculations in the proposed alternative monitoring to the extent required to ensure that GHG emission reductions or net anthropogenic GHG removals will not be overestimated as a result of the permanent change or deviation.
Findings	**CL 4**: PP is requested to clarify if calibration of the flow meter will be conducted by an independent accredited laboratory in accordance with the requirements of the tool. Moreover, PP is requested to clarify if the frequency of calibration is according to manufacturer's specifications. To close CL 4, the PDD was revised according to the tool requirements. **CL 5:** In accordance with the tool "Project emissions from flaring" for the parameter $\mathbf{T_{EG,m}}$: Temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule. To close CL 5, the PDD was revised according to the tool requirements. **CL 6**: PP is requested to clarify if the specification for calibrations are in accordance with the requirement of the paragraph 76 of the project standard: If neither the applied methodologies and, where applicable, the applied standardized baselines, nor the Board's guidance specify any requirements for calibration frequency for measuring equipment, the project participants shall ensure that the equipment is calibrated either in accordance with the local/national standards or the manufacturer's specifications. If local/national standards or the manufacturer's specifications are not available, international standards may be used. To close CL 6, the PDD was revised and a description of the accuracy class of the meters and calibration frequency was included. **CAR 4**: Monitoring plan, does not include the monitoring of the parameter **Status of biogas destruction device and Tt (K):** Temperature of the gaseous stream in time interval t in accordance with the requirements of the Tool to determine the mass flow of a greenhouse gas in a gaseous stream (if the applicability condition related to the gaseous stream flow temperature being below 60ºC is adopted, this parameter must be monitored continuously to assure the applicability condition is

	met). To close CAR 4, a revised PDD was provided and the parameters were included under section B.7.1. **CAR 5**: Data of the diesel generator presented in the $EC_{PJ,y}$ is not in accordance with the technical data sheet (generator capacity, maximum oil consumption capacity). To close CAR 5, PDD was revised in accordance with technical data sheet.
Conclusion	It is RINA's opinion, that the project participants are able to implement the monitoring plan.

D.6. Crediting period

Means of validation	The last day of the 1st crediting period is 21/05/2014. At the time of the renewal crediting period, the intention to renewal the crediting period of the project was sent to UNFCCC in 11/11/2013 /34/. The receipt confirmation from UNFCCC is confirmed the renewal date 13/11/2013 /38/. The notification of the intention to request a renewal of the crediting period was sent 180 days before the expiration of the second crediting period, as requested by the procedure available in 2013.
Findings	N/A
Conclusion	RINA confirmed that the second crediting period of the registered CDM project activity commences on the day immediately after the expiration of the current crediting period.

D.7. Project participants

Means of validation	The project participants are: Biogás Energia Ambiental S.A.; Prefeitura Municipal de São Paulo (Municipality of São Paulo); KfW Bakengruppe and Mercuria Energy Trading AS.
Findings	N/A
Conclusion	RINA verified that the project participant included in the updated PDD is consistent with the name of the project participant in the project view page.

D.8. Post-registration changes

Type of post-registration changes (PRCs)	Confirmation (Y/N)	Validation report for PRCs	
		Version	Completion date
Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents[1]	N	N.A.	N.A.
Corrections	N	N.A.	N.A.
Change to the start date of the crediting period	N	N.A.	N.A.
Inclusion of a monitoring plan	N	N.A.	N.A.
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents	N	N.A.	N.A.
Changes to the project design	N	N.A.	N.A.
Changes specific to afforestation and reforestation project activities	N	N.A.	N.A.

SECTION E. Internal quality control

>> The final version of the validation opinion report before being submitted to UNFCCC for request of renewal of crediting period is subjected to an independent internal technical review to confirm that all verification activities had been completed according to the pertinent RINA instructions.
The technical review is performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for CDM validation and verification.

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

SECTION F. Validation opinion

>>RINA Service Spa (RINA) has performed a validation of the updated PDD for the project activity “São João Landfill Gas to Energy Project (SJ)” in Brazil, CDM Registration Reference N° 0373. The validation of the updated PDD has performed for the second renewal crediting period (from 22/05/2014 to 21/05/2021) and is based on the information made available to us.

RINA has performed this validation in accordance with CDM validation and verification standard for project activities version 02.0 of 29/11/2018 and included an assessment of:

- An impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period at the time of requesting renewal of crediting period:
- The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

The review of the PDD version 4.0 of 24/01/2020 and the subsequent follow-up interviews have provided RINA with sufficient evidence to determine the validity of the original baseline scenario. The project correctly applies the baseline and monitoring methodology ACM0001 “Flaring or use of landfill gas” version 19 of 14/06/2019. The total emission reductions from the São João Landfill Gas to Energy Project (SJ) are estimated to be on an average 76,429 tCO2e/year 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.
It is RINA’s opinion that the project “São João Landfill Gas to Energy Project (SJ)” in Brazil meets all the relevant requirements for the renewal of the crediting period. Hence RINA requests the renewal of the crediting period of the project activity.

Appendix 1. Abbreviations

Abbreviations	Full texts
BE	Baseline Emissions
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM M&P	Modalities and Procedures CDM
CER(s)	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification Request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ER	Emission Reductions
FAR	Forward Action Request
GHG(s)	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LFG	Landfill gas
LoA	Letter of Approval
MoV	Means of Verification
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)
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers

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 ITRP, REG-EXP[2]
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 SETTORIALE *SECTORAL SCOPE*
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 Unità Certification Innovation and Sustainability.
in accordance with the instructions of the Certification Innovation and Sustainability Unit

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	19-08-2009	-
13	31-03-2017	Added qualification as ITRP
14	20-07-2018	Added qualification as REG-EXP
15	15/11/2019	Update qualification with "Sampling and surveys for CDM PAs and PoAs"

Il Resp. CEINS
Head of CEINS

[1] Legend:
VAL: Validator
VER: Verifier
TEC: Technical Expert
TL: Team Leader
FIN-EXP: Financial Expert
DET: Determiner
CDM: Clean Development Mechanism
VCS : Verified Carbon Standard:
GS: Gold Standard
SCS: SocialCarbon Standard
JI: Joint Implementation

[2] Argentina, Mexico, Panama, Colombia, Dominican Republic, Honduras, Ecuador, Chile, Cape Verde

RINA Services S.p.A. è accreditato da UNFCCC, quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM, da VCSA per condurre la Validazione e la Verifica di Progetti VCS, da GS Foundation, per condurre la Validazione e la Verifica di Progetti GS, da Ecologica Institute per condurre la Validazione e la Verifica di rapporti SCS

RINA Services S.p.A. is accredited by the UNFCCC, as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects, by the VCSA, to carry out Validation and Verification of VCS Projects, by the GS Foundation, to carry out Validation and Verification of GS Projects and by the Ecologica Institute, to carry out Validation and Verification of SCS Reports

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CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: **TEIXEIRA LEIROZ ANDREA**
We declare that Mr/Mrs/Ms:

è qualificato come[1]: **TL, VAL, VER and TEC**
is qualified as:

per le seguenti aree tecniche: **1.1, 1.2, 5.1, 13.1, 13.2**
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA *TECHNICAL AREA DESCRIPTION*	SCOPO SETTORIALE *SECTORAL SCOPE*
1.1	Thermal Energy Generation	1
1.2	Renewables	1
5.1	Chemical industry	5
13.1	Solid waste and wastewater	13
13.2	Manure	13

in accordo alle istruzioni della Unità Certification Innovation and Sustainability.
in accordance with the instructions of the Certification Innovation and Sustainability Unit.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	17/09/2019	First Issue
1	15/11/2019	Update qualification with "Sampling and surveys for CDM PAs and PoAs"

Il Resp. CEINS
Head of CEINS

[1] Legend:

VAL:	Validator	CDM: Clean Development Mechanism	
VER:	Verifier	VCS : Verified Carbon Standard:	
TEC:	Technical Expert	GS4GG: Gold Standard For Global Goals	
TL:	Team Leader	SCS: SocialCarbon Standard	
FIN-EXP:	Financial Expert	JI: Joint Implementation	
DET:	Determiner		

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: / *We declare that Mr/Mrs/Ms:* — **Champok BURAGOHAIN**

è qualificato come[1]: / *is qualified as:* — **CDM –TEC, -VAL, -VER, -TL ITRP, REG-EXP[2]**

per le seguenti aree tecniche: / for the following technical areas: — **1.1, 1.2, 2.1, 13.1, 13.2**

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

in accordo alle istruzioni della Unità Certification Innovation and Sustainability.
in accordance with the instructions of the Certification Innovation and Sustainability Unit.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	19-01-2011	-
13	10-10-2019	Update qualification as TEC in TA 1.1
14	15/11/2019	Update qualification with "Sampling and surveys for CDM PAs and PoAs"

Il Resp. CEINS
Head of CEINS

[1] Legend:
VAL: Validator
VER: Verifier
TEC: Technical Expert
TL: Team Leader
FIN-EXP: Financial Expert
DET: Determiner

CDM: Clean Development Mechanism
VCS : Verified Carbon Standard:
GS: Gold Standard
SCS: SocialCarbon Standard
JI: Joint Implementation

[2] India, Nepal, Sri Lanka, Thailand, Indonesia, Vietnam.

RINA Services S.p.A. è accreditato da UNFCCC, quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM, da VCSA per condurre la Validazione e la Verifica di Progetti VCS, da GS Foundation, per condurre la Validazione e la Verifica di Progetti GS, da Ecologica Institute per condurre la Validazione e la Verifica di rapporti SCS

RINA Services S.p.A. is accredited by the UNFCCC, as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects, by the VCSA, to carry out Validation and Verification of VCS Projects, by the GS Foundation, to carry out Validation and Verification of GS Projects and by the Ecologica Institute, to carry out Validation and Verification of SCS Reports

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Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	Biogás Energia Ambiental S.A.	CDM-PDD for project activity "São João Landfill Gas to Energy Project (SJ)" in Brazil	Version 3 of 29/12/2009 Version 5.2 of 01/10/2019	PP
2	Biogás Energia Ambiental S.A.	CDM-PDD updated for the second crediting period "São João Landfill Gas to Energy Project (SJ)".	Version 1.0 of 12/09/2018 version 2.0 of 21/11/2018 version 3.0 of 14/11/2019 version 3.1 of 25/11/2019 version 4.0 of 24/01/2020	PP
3	CDM Executive Board	CDM project cycle procedure for project activities	version 02.0 of 29/11/2018	Other
4	CDM Executive Board	CDM project standard for project activities	version 02.0 of 29/11/2018	Other
5	CDM Executive Board	CDM validation and verification standard for project activities	version 02.0 of 29/11/2018	Other
6	CDM Executive Board	CDM Executive Board: Baseline and monitoring methodology ACM0001 "Flaring or use of landfill gas"	version 19 of 14/06/2019	Other
7	CDM Executive Board	CDM-PDD-FORM: Project design document form, including its Attachment: Instructions for completing this form	Version 11 of 31/05/2019	Other
8	CDM Executive Board	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 of 02/03/2012	Other
9	CDM Executive Board	CDM Executive Board: Baseline and monitoring methodology ACM0001 "Consolidated baseline and monitoring methodology for landfill gas project activities "	Version 2 of 30/09/2005	Other
10	Biogás Energia Ambiental S.A.	CERs spreadsheet "20180912_São João_CERs_v.1.xlsx" 20191024_S¦o Jo¦o_CERs.xlsx 20191114_Sæo JoÆo_CERs.xlsx 20191125_Sæo JoÆo_CERs	Version 1 of 12/09/2018 24/10/2019 14/11/2019 25/11/2019	PP

11	MCTI-Brazilian DNA	Resolution number 8, that defines the grid for CDM project	26/05/2017	Other
12	CDM Executive Board	Emissions from solid waste disposal sites	version 08.0 of 04/05/2017	Other
13	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 26/10/2018	Other
14	CDM Executive Board	Project emissions from flaring	version 03.0 dated 28/03/2019	Other
15	CDM Executive Board	Tool to determine the mass flow of a greenhouse gas in a gaseous stream	Version 03.0 of 27/11/2016	Other
16	CDM Executive Board	Determining the baseline efficiency of thermal or electric energy generation systems	Version 02.0 of 27/11/2015	Other
17	CDM Executive Board	Tool to determine the remaining lifetime of equipment	version 01 of 16/10/2009	Other
18	CDM Executive Board	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	Version 03 of 22/09/2017	Other
19	CDM Executive Board	Combined tool to identify the baseline scenario and demonstrate additionality	Version 07.0 of 22/09/2017	Other
20	CDM Executive Board	Tool to calculate project and/or leakage emissions from electricity consumption and monitoring of electricity generation	Version 03 of 22/09/2017	Other
21	CDM Executive Board	Project and leakage emissions from transportation of freight	version 1.1.0, dated 23/11/2012	Others
22	CDM Executive Board	Tool to calculate the emission factor for an electricity system	Version 07.0 of 31/08/2018	Other
23	CDM Executive Board	Tool to calculate project or leakage CO2 emissions from fossil fuel combustion	Version 3 of 22/09/2017	Other
24	CEPAGRI	Temperature and recipitation of São Paulo, available at http://www.cpa.unicamp.br/outras-informacoes/clima_muni_565.html.	Accessed on 26/10/2018	Other
25	MCTI (Brazilian DNA)	Brazilian Resolution # 8 of 28/05/2008 defines the Brazilian Interconnected grid for CDM project, available at http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/cimgc/Comissao_Interministerial_de_Mudanca_Global_do_Clima__CIMGC.html	Accessed on 26/10/2018	Other
26	Det Norske Veritas Certification AS	CDM Project Activity Registration and Validation Report Form 2005-0457	version 3 of 10/04/2006	Other
27	Beng and EcoUrbis Ambiental S/A	CDM-PDD for project activity “CTL Landfill Gas Project” in Brazil reference number 5947	version 17 of 11/07/2018	Other
28	Caterpillar	Gas engine technical data G3520C	-	PP

29	Ecourbis	Amount of waste disposal of the years 2006 to 2009	-	PP
30	Hofstetter	Flare datasheet specification common. Nº 9943 (page 18 for temperature and flow; page 22 for the dimensions)	-	PP
31	CETESB São João	Operational license nº 30007689 and 30007689, dated 25/05/2012 valid until 25/05/2017 Renewal protocol dated 19/01/2017 (receipt by CETESB on the same date), process number 30/00607/06	25/05/2012	PP
32	Eletropaulo	Administrative report (Eletropaulo_TDL_Relatório de Administracao 2016.pdf)	2016	PP
33	MCTI	Brazilian DNA web site, emission factor data available at: http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_ajustado.html (operating margin) http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_despacho.html (building margin- year 2017)	Accessed on 26/10/2018	PP
34	Biogás Energia Ambiental S.A.	Email with the intention to renewal the crediting period(Renewal of crediting period of the registered CDM project activity São João Landfill Gas to Energy Project (SJ) (0373.msg)	Sent to UNFCCC on 11/11/2013	PP
35	Municipality of São Paulo	Information about the closure of the São João landfill: https://www.prefeitura.sp.gov.br/cidade/secretarias/subprefeituras/amlurb/aterros_e_transbordos/index.php?p=4633	Accessed on 26/10/2018	PP
36	Ecourbis	Data for the waste type	2009	PP
37	Brazilian Goverment	Law number 12.305: “Politica Nacional de Residuos sólidos” (National Solid Waste Policy)	02/08/2010	Other
38	UNFCCC	Email confirming the renewal date 13/11/2013 (ENC Renewal of crediting period of the registered CDM project activity São João Landfill Gas to Energy Project (SJ) (0373.msg)	Email dated 13/11/2013	PP
39	Biogás Energia Ambiental S.A.	Financial analysis spreadsheet (post registration changes): Enclosure 1.xls (registered PDD) Enclosure 1_Rev.xls (revised due to changes)	11/09/2018	PP
40	Biogás Energia Ambiental S.A.	CAPEX evidences: CAPEX INVESTIMENTO INTERLIGACAO.xlsx and receipts (CAPEX _ INTERLIGAÇÃO CTL x SJEA.rar)	-	PP
41	Continental Blower LLC	Technical Data Sheet Continental Blower LLC	-	PP

		(CONTINENTAL_Blower.pdf)		
42	TÜV SÜD Industrie Service GmbH	Validation report with the validation opinion,	Revision 01 of 20/01/2010	Other
43	RINA Services S.p.A.	Validation report form for post registration changes for CDM project activity	Version 4.0Aa of 02/10/2019	Other

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

Table 1. CL from this validation

CL ID	1	**Section no.**	D.3	**Date:** 12/11/2018
Description of CL				
PP is requested to provide the evidence of the capacity of the blower.				
Project participant response				**Date:** 21/11/2018
According to Technical Data Sheet from the manufacturer (Continental Blower LLC), the inlet flow varies from 3,000 to 7,000 SCFM while considering the operational range of 400mmbar (5.8 psi) stated by the Project Participant. Therefore, PDD was revised based on the manufacturer's specifications. Please refer to the second version of the document.				
Documentation provided by project participant				
• *20181121_São João_PDD_v.2-track PDD 1stPC.docx;* • *Technical Data Sheet from Continental Blower LLC.*				
DOE assessment				**Date:** 14/01/2019
PP has revised the PDD in accordance with data sheet from the blower manufacturer. This CL is closed.				

CL ID	2	**Section no.**	D.3	**Date:** 12/11/2018
Description of CL				
The installed capacity of the electricity generators are not in accordance with equipment's' technical specification.				
Project participant response				**Date:** 21/11/2018
In reality, the effective installed capacity of each engine is 1.6MW. As described in the Validation of Changes as Described in the PDD for the CDM Project (for the 2nd crediting period): *"The Caterpillar catalog (IRL 1) indicates the CAT G3520C gas engine capacity as 1.6 MW at sea level, temperature of 25°C and specific gas LHV (low heat value). The catolog states that 'For values in excess of the altitude, temperature, inlet/exhaust restriction, or different from the conditions listed, contact your local Caterpillar dealer'. The 1.6 MW of each engine, mentioned in the 5th monitoring report made publicly available refers to the standard capacity not considering the site specifications of SJ landfill site, i.e. could be only possible if the SJ project had been implemented according to the "catalog" site conditions described by Caterpillar. Caterpillar and SOTREQ, as the local dealer, jointly determined and sold the CAT G3520C having a nominal capacity of 1.54 MW regarding the specific site and operation conditions of SJ project. The supply confirmation (IRL 2) clearly substantiates that the nominal installed capacity of SJ landfill engines is of 1.54 MW instead of 1.6 MW. Both the catalog as well as the supply confirmation have been verified by the validation team and the same can confirm that the nominal capacity of each engine at SJ landfill site consists of 1.54 MW".* *Therefore, there is no change in the project equipment nor the installed capacity of the project. In spite of the comments above, the PDD was revised to reflect the nameplate of equipment in order to determine the installed capacity of the project as required by DOE.*				

Documentation provided by project participant	
• *20181121_São João_PDD_v.2-track PDD 1stPC.docx;* • *Enclosure 1_Rev.xlsx*	
DOE assessment	**Date:** 14/01/2019
PDD was revised to consider the capacity described in the equipment's plate and datasheet /28/. RINA confirmed that there was no changes in the electricity generators equipments. *Caterpillar and SOTREQ, as the local dealer, jointly determined and sold the CAT G3520C having a nominal capacity of 1.54 MW regarding the specific site and operation conditions of SJ project* /42/, considered in the previous version of the PDD. This CL is closed.	

CL ID	3	**Section no.**	D.4	**Date:** 12/11/2018
Description of CL				
The generator efficiency used to estimate the energy generation in the CERs spreadsheet is not in accordance with technical data sheet /28/.				
Project participant response				**Date:** 21/11/2018
Engine efficiency was revised according to Caterpillar's gas engine technical data. Please refer to the second version of the PDD and CER spreadsheet.				
Documentation provided by project participant				
• *20181121_São João_PDD_v.2-track PDD 1stPC.docx;* • *20181121_São João_CERs_v.2.xlsx.*				
DOE assessment				**Date:** 14/01/2019
PP revised the CERs spreadsheet in accordance with the efficiency described in the *Caterpillar's gas engine technical data sheet.* *This CL is closed.*				

CL ID	4	**Section no.**	D.5	**Date:** 12/11/2018
Description of CL				
PP is requested to clarify if calibration of the flow meter will be conducted by an independent accredited laboratory in accordance with the requirements of the tool. Moreover, PP is requested to clarify if the frequency of calibration is according to manufacturer's specifications as per the requirements of the *Tool to determine the mass flow of a greenhouse gas in a gaseous stream.*				
Project participant response				**Date:** 21/11/2018
Based on the DOE comments, section B.7.1 of the PDD was revised to include information following TOOL08, including calibration accuracy and frequency. Please refer to the second version of the document.				
Documentation provided by project participant				
• *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*				
DOE assessment				**Date:** 14/01/2019
Revised PDD describes that calibration of the flow meter will be conducted by an independent accredited laboratory in accordance with the requirements of the tool. This CL is closed.				

CL ID	5	**Section no.**	D.5	**Date:** 12/11/2018
Description of CL				
In accordance with the tool "Project emissions from flaring" for the parameter $\mathbf{T_{EG,m}}$: Temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule.				
Project participant response				**Date:** 21/11/2018

TOOL06 states that temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule. Information was included in section B.7.1 of the PDD. Also, according to the operating manual from the flare manufacturer, there is a UV sensor and a burner control unit for automatic ignition and flame monitoring. The UV-sensor detects the flame and gives a signal to the automatic control burner. As soon as the flame has been burning for a given retention time, the automatic burner control opens the main gas valve. Then, valve that controls the flow of gas sent to flare enclosure automatically closes whenever no flame is detected by sensors.

It is important mentioning that F520, F540 and F560 have an integrated system for pressure and temperature in real time and, therefore, equipment doesn't need Pressure and Temperature Transmitter. Please refer to the second version of the document.

Documentation provided by project participant

- *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*

DOE assessment	**Date:** 14/01/2019

PDD was revised in accordance with the requirements of the tool.
This CL is closed.

CL ID	6	**Section no.**	D.5	**Date:** 12/11/2018

Description of CL

PP is requested to clarify if the specification for calibrations are in accordance with the requirement of the paragraph 76 of the project standard:
If neither the applied methodologies and, where applicable, the applied standardized baselines, nor the Board's guidance specify any requirements for calibration frequency for measuring equipment, the project participants shall ensure that the equipment is calibrated either in accordance with the local/national standards or the manufacturer's specifications. If local/national standards or the manufacturer's specifications are not available, international standards may be used.

Project participant response	**Date:** 21/11/2018

Gas flow meters are calibrated every 5 years. The PPs decided to conservatively adopt a 5-years frequency since:

- *In Brazil there are no requirements on how often flow-meters must be calibrated;*
- *In the Netherlands, for turbine meters of the size of used in the project, calibration is never required;*
- *In Germany, a calibration every 10-years is enforce by law;*
- *The manufacturer states that it's up to the clients to determine the calibration frequency.*

Electricity meters are calibrated every 5 years following recommendations from the National Electric System Operator. Methane analyser is calibrated weekly by the project sponsor and yearly by a third party company. Description of monitoring equipment, calibration, accuracy and frequency is presented below:

Meter	*Manufacturer*	*Measurement*	*Accuracy (%)*	*Calibration freq.*
FIT 524	*Endress+Hauser*	*Flow flare F520*	*1.5*	*5 years*
FIT 544	*Endress+Hauser*	*Flow flare F540*	*1.5*	*5 years*
FIT 564	*Endress+Hauser*	*Flow flare F560*	*1.5*	*5 years*
FIR 500	*Incontrol*	*Total gas to flares*	*1.0*	*5 years*
FIR 800	*Incontrol*	*Total gas to engines*	*1.0*	*5 years*
FIR 600	*Incontrol*	*Total gas to engines*	*1.0*	*5 years*
A100	*Rosemount – NUK*	*Gas analyser (SJEA + CTL)*	*1.0*	*Weekly by the project developer Yearly by a third party company*
SE Meters	*Schneider Electric*	*Electricity at substation – principal*	*0.2*	*5 years*
SE Meters	*Schneider Electric*	*Electricity at substation – backup*	*0.2*	*5 years*
MGE 144	*ABB*	*Electricity from diesel generator*	*0.5*	*N/A*
GEM2000	*Landtec*	*Gas analyser (SJEA)*	*3.0*	*Weekly by the project developer Yearly by a third party company*
FIT 910	*Incontrol*	*CTL flow – principal*	*1.0*	*5 years*

FIT 901	*Incontrol*	*CTL flow – backup*	*1.0*	*5 years*

Regarding flow monitoring from CTL project (CDM ref. 5947), equipment is under SJ's responsibility including its calibration. Only methane analyser is under responsibility of project #5947. Then, all documentation regarding CTL monitoring is presented in #5947 project for claiming emission reductions; no emission reductions from CTL landfill can be claimed by São João.

Section B.7.1 of the PDD was revised to include information regarding monitoring equipment, calibration accuracy and frequency. Please refer to the second version of the document.

Documentation provided by project participant

- *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*
- *Endress+Hauser: Technical Information of Proline t-mass 65F, 65I - Thermal mass flowmeter (accuracy: page 1);*
- *Incontrol: There is no information regarding accuracy class on manual. The calibration certificate issued by the manufacturer indicates values lower than 1%. Then, it was considered 1% accuracy to be conservative. INCONTROL Operation and Installation Manual for VTI turbine gas flow meters and calibration records are attached.*
- *ONS Submodule 12.2, ver. 2 / INMETRO Ordinance #587/2012, available at: <http://ons.org.br/paginas/sobre-o-ons/procedimentos-de-rede/vigentes>*
- *Schneider Electric: Instruction Bulletin – PowerLogic Circuit Monitor (page 9 and 39);*
- *ABB: MGE 144 – Medidor Multigrandezas (page 2);*
- *Rosemount BINOS 100 M Operation Manual (page 133), detection limit;*
- *Landtec GEM2000 PLUS Data Sheet Specifications (page 1).*

DOE assessment	**Date:** 15/01/2019

Revised PDD describes the accuracy class of the meters and calibration frequency.

This CL is closed.

Table 2. CAR from this validation

CAR ID	1	**Section no.**	D.4	**Date:** 12/11/2018

Description of CAR

The PDD describes: It is important mentioning that the amount of biogas and methane from CTL will be discounted from the emission reduction calculation in order to avoid double counting. However the provisions of monitoring to avoid double accounting is not described (such as the meters involved to monitor the amount of LFG and methane in the biogas from CTL and where applicable calculation involved). PP is requested to consider the provisions of the methodology, and if applicable, deviation of monitoring from the applied methodology.

Project participant response	**Date:** 21/11/2018

Based on the DOE comments, the Project Participants detailed how monitoring will be conducted for the project activity:

In the case of baseline and project emissions from flaring, biogas flow will be measured by FIT524, FIT540 and FIT560 and will be considered for emission reduction purposes if flares operate under adequate operational conditions of temperature as established by the manufacturer. Readings from FIT500 is not used for emission reduction calculations but for cross-checking purposes only. All measurement will be discounted proportionally to the measurement of methane collected by CTL.

In the case of baseline emissions from electricity generation, biogas flow will be measured by FIR800, which is allowed to use a single flow meter (and not one for each equipment which consumes LFG) as established by ACM0001 (version 18.1). All measurement will be discounted proportionally to the measurement of biogas

collected by CTL and generators efficiency will be used to discount electricity generated with this gas.

For the methane, there will be three measurements: CTL, SJ and CTL+SJ. CTL's methane analyser is under CTL's responsibility, including its maintenance and calibration as established in its registered monitoring plan. Methane measurement equipment of SJ (GEM2000) and CTL+SJ (A100) are under SJ's responsibility as well as their calibration. In spite of GEM2000 measures SJ's methane only, the analyser to be considered for emission reduction calculation is A100 analyser. GEM2000 is not a fixed meter and, therefore, SJ's methane is measured by sampling: conducted 3 times a day and daily average is considered for cross-checking purposes. Also, uncertainty of GEM2000 is higher (+/- 3.0%) when compared to A100 analyser (1.0%). Therefore, GEM2000 will be used for cross-checking purposes only and A100 will be used for emission reductions calculation. Both A100 from SJ and CTL's analyser measurements are continuous and integrated once per minute.

Detailed monitoring information was included in section B.7 and Appendix 5. Appendix 7 was also revised to include the ex-post changes due to the purchase of CTL's biogas. Please refer to the second version of the document.

Project Participant response in 10/04/2019:
In reality, tag of flow meters is correct. F520, F540 and F560 refer to flares; FIT524, FIT544 and FIT564 refer to flow meters in these flares. Therefore, no revision is required in this case. In spite of flow meters' tag, the PDD was revised following the CDM Project Standard for Project Activities (v.2.0) and the CDM Project Cycle Procedure for Project Activities (v.2.0). The PDD is all tracked from the version registered at the UNFCCC for approval of the Board before the request for renewal of the crediting period. As presented in the revised PDD, the following post-registration change is applied to:

- *(a) Temporary deviations from the monitoring plan as described in the registered PDD (hereinafter referred to as the registered monitoring plan), the applied methodologies, standardized baselines or other methodological regulatory documents;*
- *(b) Permanent changes*
  - *i. Corrections;*
  - *ii. Permanent change to the registered monitoring plan;*
  - *iii. Changes to project design:*
    - *Changes to the technologies/measures that result in the same technologies/measures as in the originally registered technologies/measures as per the definition of "the same technologies";*
    - *Voluntary update of the applied methodologies or the other applied methodological regulatory documents to a later valid version of them, or voluntary change to other methodologies, provided all requirements in the updated/changed methodologies and the other applied methodological regulatory documents are met.*

Documentation provided by project participant

- *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*

DOE assessment	**Date:** 15/01/2019

Tag of the meters (*FIT540 and FIT560) are not in accordance with Figure 10 – Simplified diagram of monitoring equipment.*
Moreover, PDD does not list the changes in accordance with the Project standard (Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents; Permanent changes- corrections; Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents; Changes to project design, etc), in accordance with PS:
230. The project participants shall determine whether the actual or proposed changes are temporary deviations referred to in section 8.2 below, or permanent changes referred to in section 8.3 below, and whether they require approval by the Board. Unless otherwise stated in the respective provisions in sections 8.2 and 8.3 below, post-registration changes require approval by the Board.

This CAR remains open.

Project participant response	**Date:** 14/11/2019

In reality, tag of flow meters is correct. F520, F540 and F560 refer to flares; FIT524, FIT544 and FIT564 refer to flow meters in these flares. Therefore, no revision is required in this case. In spite of flow meters' tag, the PDD was revised following the CDM Project Standard for Project Activities (v.2.0) and the CDM Project Cycle Procedure for Project Activities (v.2.0). *Due to DOE comments, a post-registration change (PRC) was conducted to the project activity to consider temporary deviations and permanent changes (corrections, permanent change in the monitoring plan and changes in the project design). The PRC was approved by the CDM-EB on 12/11/2019.* *Therefore, the PDD and ER spreadsheet were revised to reflect the approved PRC.*
Documentation provided by project participant
• *20191114_São João_PDD_v.3.0-track.docx;* • *20191114_São João_CERs.xlsx.*

DOE assessment	**Date:** 25/11/2019
The revised PDD described a summary of the post-registration changes approved on 12/11/2019. This CAR is closed.	

CAR ID	2	**Section no.**	D.4	**Date:** 12/11/2018
Description of CAR				
Monitoring plan describes: during the crediting period, data was collected in a 5-minute interval, but since March 2018, the system was updated to consider 1-minute interval. However, verified during the onsite visit that 5 minute interval was not modified in accordance with the requirements of the applied tool.				
Project participant response				**Date:** 21/11/2018
The previous monitoring plan considered the 5-minute interval based on the TOOL06 (version 1). The system was changed to 1-minute interval on November 5th, 2018 to comply with the updated version of the tool. Provisions on how emission reductions will be calculated from 22/05/2014 to 05/11/2018 are included in Appendix 5 of the PDD. Please refer to the revised version of the document. *Project Participant response in 10/04/2019:* *Appendix 7 of the PDD was revised following the CDM Project Standard for Project Activities (v.2.0) and the CDM Project Cycle Procedure for Project Activities (v.2.0). The PDD is all tracked from the version registered at the UNFCCC for approval of the Board before the request for renewal of the crediting period. As presented in the revised PDD, the following post-registration change is applied to:* *(c) Temporary deviations from the monitoring plan as described in the registered PDD (hereinafter referred to as the registered monitoring plan), the applied methodologies, standardized baselines or other methodological regulatory documents;* *(d) Permanent changes* *iv. Corrections;* *v. Permanent change to the registered monitoring plan;* *vi. Changes to project design:* *- Changes to the technologies/measures that result in the same technologies/measures as in the originally registered technologies/measures as per the definition of "the same technologies";* *- Voluntary update of the applied methodologies or the other applied methodological regulatory documents to a later valid version of them, or voluntary change to other methodologies, provided all requirements in the updated/changed methodologies and the other applied methodological regulatory documents are met.*				
Documentation provided by project participant				
• *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*				

DOE assessment	Date: 14/01/2019
PP did not follow the provisions of the CDM project cycle procedure for project activities, version 2.0: 271. If the date when the crediting period is deemed renewed is after the expiration of the current crediting period, and due to this delay or for any other reasons, the monitoring temporarily does not comply with the monitoring plan in the updated PDD approved by the Board, the project participants shall request for approval of, or notify, a temporary deviation from the registered monitoring plan in accordance with the post-registration changes process referred to in section 6 above. The deviation is not listed in Appendix 7 of the revised PDD. Moreover, PDD describes in Appendix 5 the proposed alternative monitoring, however, PP is requested to detail the conservative assumptions or discount factors to the calculations, in accordance with para 232 (a) of the CDM project standard for project activities Version 02.0: (a) Propose alternative monitoring arrangements for the non-conforming monitoring period. In this case, the project participants shall apply conservative assumptions or discount factors to the calculations to the extent required to ensure that GHG emission reductions or net anthropogenic GHG removals will not be over-estimated as a result of the deviation; or Please note that the mandatory requirements of the tool to apply option A cannot be considered conservative assumption. This CAR remains open.	
Project participant response	**Date:** 14/11/2019
Due to DOE comments, a post-registration change (PRC) was conducted to the project activity to consider temporary deviations and permanent changes (corrections, permanent change in the monitoring plan and changes in the project design). The PRC was approved by the CDM-EB on 12/11/2019. *Therefore, the PDD and ER spreadsheet were revised to reflect the approved PRC.*	
Documentation provided by project participant	
• *20191114_São João_PDD_v.3.0-track.docx;* • *20191114_São João_CERs.xlsx.*	
DOE assessment	**Date:** 25/11/2019
The revised PDD described a summary of the post-registration changes. RINA confirmed that the PRC approved on 12/11/2019 considers the change in the monitoring interval. This CAR is closed.	

CAR ID	3	Section no.	D.4	Date: 12/11/2018
Description of CAR				
Data used in the updated PDD for the operating margin (simple adjusted OM) is not in accordance with Brazilian DNA.				
Project participant response				**Date:** 21/11/2018
The PDD and CER spreadsheet was revised to consider the correct value for the 2017 CO2 EF OM based on the simple adjusted OM method. Please refer to the revised version of the documents. *Project Participant response in 10/04/2019:* *The CER spreadsheet and the PDD presents 2017 data for the CO_2 emission factor of the grid. In the CER spreadsheet, the only data from 2016 year is the TDL, however, TDL is a monitored parameter which will updated during verification and value cannot be older than 5 year following the TOOL05. In the PDD, Figure 6 presented electricity generation by sources from 2012 to 2016. This figure was updated to considered the most recent five years following TOOL07. Please refer to the revised version of the PDD.*				
Documentation provided by project participant				
• *20181121_São João_PDD_v.2-track PDD 1stPC.docx;* • *20181121_São João_CERs_v.2.xlsx.*				

DOE assessment	Date: 14/01/2019
RINA verified that the documents were revised in accordance with data provided by the Brazilian DNA. However, The CERs spreadsheet is considering data from 2016 and PDD describes data from 2017. This CAR remains open.	
Project participant response	**Date:** 14/11/2019
The ER spreadsheet was corrected according to DOE comments. Also, the PDD and ER spreadsheet were revised to reflect the PRC approved by the CDM-EB on12/11/2019. Please refer to the revised version of the PDD.	
Documentation provided by project participant	
• *20191114_São João_PDD_v.3.0-track.docx;* • *20191114_São João_CERs.xlsx.*	
DOE assessment	**Date:** 25/11/2019
As observed in the revised PDD, PP selected under Step 3 of the Tool 07 the simple adjusted OM method applying the ex post option to determine the emission factor. As per Tool 07, if the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. However, the calculation in the PDD and ER spreadsheet applied a 3-year generation-weighted average, based on the most recent data available ath the time of submission of the CDM-PDD to the DOE for validation which corresponds to the ex ante option. This CAR remains open.	
Project participant response	**Date:** 25/11/2019
The OM emission factor was revised to consider 2018 data only (and not the weighted average of the latest 3 years). Please refer to the revised version of the ER spreadsheet and PDD.	
Documentation provided by project participant	
• *20191125_São João_PDD_v.3.1-track.docx;* • *20191125_São João_CERs.xlsx.*	
DOE assessment	**Date:** 26/11/2019
The PDD was correctly revised. This CAR is closed.	

CAR ID	4	Section no.	D.4	Date: 12/11/2018
Description of CAR				
Monitoring plan, does not include the monitoring of the parameter **Status of biogas destruction device and Tt (K):** Temperature of the gaseous stream in time interval t in accordance with the requirements of the Tool to determine the mass flow of a greenhouse gas in a gaseous stream (if the applicability condition related to the gaseous stream flow temperature being below 60ºC is adopted, this parameter must be monitored continuously to assure the applicability condition is met).				
Project participant response				**Date:** 21/11/2018
Information was included in the revised version of the PDD following TOOL08. Please refer to section B.7.1. *Project Participant response in 10/04/2019:* *Parameter Tt was included in section B.7.1 and QA/QC procedures for the "status of biogas destruction device" was revised. Please refer to the revised version of the PDD.*				
Documentation provided by project participant				
• *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*				
DOE assessment				**Date:** 14/01/2019
Parameter Tt was not included in the monitoring plan. Moreover, the QA/QC procedures of the parameter Status of biogas destruction device is not clear. This CAR remains open				
Project participant response				**Date:** 14/11/2019
Parameter Tt was included in section B.7.1 and QA/QC procedures for the "status of biogas destruction device" was revised. Please refer to the revised version of the PDD. Also, the PDD and ER spreadsheet were revised to reflect the PRC approved by the CDM-EB on12/11/2019. Please refer to the revised version of the PDD.				
Documentation provided by project participant				

• *20191114_São João_PDD_v.3.0-track.docx;* • *20191114_São João_CERs.xlsx.*
DOE assessment **Date:** 25/11/2019
The PDD was correctly revised and the parameters were included under section B.7.1. This CAR is closed.

CAR ID	5	**Section no.**	D.4	**Date:** 12/11/2018
Description of CAR				
Data of the diesel generator presented in the $EC_{PJ,y}$ is not in accordance with the technical data sheet (generator capacity, maximum oil consumption capacity).				
Project participant response				**Date:** 21/11/2018
Information related to diesel generator was revised in the PDD and ER spreadsheet according to manufacturer's specification. Please refer to the revised version of both documents.				
Documentation provided by project participant				
• *20181121_São João_PDD_v.2-track PDD 1stPC.docx;* • *20181121_São João_CERs_v.2.xlsx;* • *Caterpillar Diesel Generator Set – Technical data (page 4).*				
DOE assessment				**Date:** 14/01/2019
PDD was revised in accordance with technical data sheet. 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

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Document information

Version	*Date*	*Description*
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM validation and verification standard for project activities" (CDM-EB93-A05-STAN) and version 02.0 of the "CDM project cycle procedure for project activities" (CDM-EB93-A06-PROC); • Make editorial improvements.
02.0	31 October 2017	Revision to align with the requirements of the "CDM validation and verification standard for project activities" (version 01.0).
01.0	23 March 2015	Initial publication.

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