# Validation report form for post-registration changes for CDM project activities (Version 02.0)

*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 )Reference number 0373 |
| **Process track** | ☒ Prior approval<br>☐ Issuance<br>☐ Renewal of crediting period |
| **Version number of the validation report on PRCs** | 4.0 Aa |
| **Completion date of the validation report on PRCs** | 02/10/2019 |
| **Type(s) of PRCs** | ☒ Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines<br>☒ Corrections<br>☐ Changes to the start date of the crediting period<br>☐ Inclusion of a monitoring plan<br>☒ Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools<br>☒ Changes to the project design<br>☐ Changes specific to afforestation and reforestation project activities |
| **Version number of PDD to which this report applies** | 5.2 |
| **Project participants** | Biogás Energia Ambiental S.A.<br>Prefeitura Municipal de São Paulo (Municipality of São Paulo)<br>KfW Bakengruppe<br>Mercuria Energy Trading SA |
| **Host Party** | Brazil |
| **Applied methodologies and standardized baselines** | ACM0001 “Flaring or use of landfill gas” version 18.1 of 29/11/2018 |
| **Mandatory sectoral scopes linked to the applied methodology** | 13 - Waste handling and disposal |
| **Conditional sectoral scopes linked to the applied methodologies** | 1 - Energy industries (renewable - / non-renewable sources) |
| **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 on PRCs** | **Laura Severino** (Authorized officer signing for the DOE)<br>  <br>Head of Certification Innovation & Sustainability Unit |

## SECTION A. Executive summary

>> **General description and purpose of the project activity**

**Purpose and general description**

São João Landfill Gas-to-Energy (LFGE) is a project designed to explore the landfill gas 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 a flaring system, a power house with 25.6 MW of installed capacity (16 engines with 1.6 MW 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 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 biogas (landfill gas) 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 a post registration changes is requested. 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°0 373.

In the revised PDD, project will apply the methodology ACM0001 "Flaring or use of landfill gas" version 18.1 of 29/11/2018.

Due to the update in CDM project cycle procedure for project activities, version 2.0, the validation opinion on the post registration changes is submitted before the renewal crediting period.

### Validation process

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

The verification consisted of the following three phases:

- Desk review;
- On-site assessment:
- The resolution of outstanding issues and the issuance of the final validation report Validation is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

### Conclusion

It is RINA's opinion, the changes, as outlined in the revised PDD version 5.2 of 01/10/2019, from the project activity as described in the registered PDD ensure that the level of accuracy and completeness in the monitoring and verification process is not reduces as a result of the revision; the revisions are in accordance with the applied monitoring methodology and the changes to the project activity comply with the requirements established in the CDM Project Standard.

Hence RINA requests that the validation opinion on changes from the project activity as described in the revised PDD for the project activity "São João Landfill Gas to Energy Project (SJ )" in Brazil may be considered by the Board

Due to the clarification received on 22/07/2019, the validation report was updated to version 2.0 and PDD updated to version 5.0 of 29/07/2019

**1) The DOE is requested to further substantiate the validation of the revised IRR calculations; in particular:**

a) **the significant drop of EBIT (earnings before interest and taxes) and total earnings from 2013 to 2014, these are the same years that additional investment was required to install the 'biogas' interconnection. In doing so, please provide details of the formulae or links (e.g.: GCx!CT39) used in column 'K' of PDD sheet of the financial analysis spreadsheet (373 Enclosure 1-Rev.xls). Please refer to paragraph 8 of the Guidelines on the assessment of Investment Analysis v5.**

**b) depreciation and amortization considered from year 2 to year 15 of the IRR calculation. In doing so, please refer to paragraphs 9 and 10 of the Guidelines on the assessment of Investment Analysis v5.**

**RINA response**: a) Difference on EBIT values of 2013 and 2014 refers to the investment made due to connection with CTL landfill and operation/maintenance cost for the LFG's supply. As SJEA did not reach the performance as expected at the time of the investment decision, a LFG supply was necessary to comply with the power purchase agreement signed for electricity generation to the grid. In fact, the project activity is one of the pioneering projects in this field in the country.
However, investment in 2017 year was erroneous included, since the BRL 50,272.20 (0.5MM) investment occurred in 2014 year /40/. Also, from 2014 onwards, costs were increased due to the purchase of the CTL's LFG. Please refer to the revised version of the cash flow (20190729_Enclosure 1_Rev3-original.xls ; 20190729_Enclosure 1_Rev3.xlsx) /39/ (sheet "Sens", cell CX197 and DA197) and PDD in order to reflect changes in the cash flow.

b) According to changes in the project design referred in §243 of the CDM Project Standard for Project Activities:
"If the proposed or actual changes affect the additionality of the registered CDM project activity as referred to in paragraph 242(d) above, the demonstration of the impacts of the changes on the additionality shall be based on all original input data. In addition:
(a) If investment analysis was used, the project participants shall only modify the key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity"
Therefore, in the first version of the spreadsheet submitted (Enclosure 1_Rev2.xls,) only key parameters were changed in the original cash flow of the project considered at the time of the investment decision.
In the case of the project activity, the project IRR is considered for the investment analysis. Therefore, the Guidance 9 of the Guidelines on the Assessment of Investment Analysis (replaced by TOOL27, §13) should be applied:
"The cost of financing expenditures (i.e. loan repayments and interest) shall not be included in the calculation of project IRR".
Although the project participants' understanding is that the original cash flow considered at the time of the investment decision should be used as required by the CDM PS, the cash flow was revised in order to exclude financing expenditures and interests according to TOOL27. Please refer to the revised version of the cash flow presented in the spreadsheet 20190729_Enclosure 1_Rev3.xlsx /39/. The PDD was also revised to reflect changes in the cash flow.

**2) The DOE shall confirm whether the 'biogas' term used in the documents submitted refer to landfill gas.**

Yes. Biogas means landfill gas (LFG).

**3) In pages 35-36 of the PRC Validation report the DOE states that an agreement with CTL landfill was signed on 31/07/2015 while pages 28 and 37 of the same document state that the actual supply ("when the change actually became effective") started on 03-Apr-2014, i.e., 48 days before the end of the first crediting period. The DOE is requested to explain how the agreement with CTL was signed after the actual supply of biogas started.**

There are two different contracts signed between SJEA and Ecourbis: LFG purchase/supply and CERs ownership.

The LFG's supply was signed on 30/09/2013 /43/. "When the change actually became effective" means the start of LFG supply occurred on 03/04/2014. The term of agreement signed on 31/07/2015 refers to the CERs ownership required during the post-registration change of CTL project (# 5947). This term confirms that no CERs from CTL will be claimed by SJEA.

Considering the response above, the timeline presented in appendix 7 of the updated PDD was revised.

Due to the finding during completeness check, the validation report was updated to version 1.1:

With reference to the request for post registration changes to the CDM project activity "0373 São João Landfill Gas to Energy Project (SJ)" (0373), kindly note the following issues to be raised during the

completeness check stage:

**1. Sheets FinIPCA, Fin and PMACRO of the ER spreadsheet (Appendix 2 - Enclosure 1_Rev2.xls) is in a protected format. Kindly submit an unprotected version.**
RINA: An unprotected spreadsheet is sent with the revised report.

**2. There is an inconsistency of the VVS version. The validation report for post-registration changes refers to both VVS 1 and VVS 2 (page 44). Kindly clarify.**
RINA: Both versions are described in the reference list, because when the PRC validation started, version 1 was applicable. But, due to the timeline, version 2 became effective and submission was made in the current version 2. A note was included in the reference list in the validation report for post-registration changes in page 44.

Due to the clarification received on 16/08/2019, the validation report was updated to version 3.0 and PDD updated to version 5.1 of 20/08/2018

**On behalf of the CDM Executive Board, we would like to inform you that clarifications have been requested for the request for approval of changes to the CDM project activity "São Joăo Landfill Gas to Energy Project (SJ)". The deadline for submitting the clarifications is 30 Aug 19. The details of clarifications are as below:**

**1) The DOE is requested to further substantiate how the scope and applicability conditions (paragraphs 2, 3.b and 5.b) of ACM0001 v.18.1 methodology are applicable to project activity design change to use LFG from another landfill to generate electricity**.
RINA: According to ACM0001, the methodology is applicable to “project activities that include the destruction of methane emissions and displacement of a more-GHG-intensive service by capturing landfill gas from the landfill site and/or flaring and/or using to produce energy (i.e. electricity, thermal energy); and/or using to supply consumers through natural gas distribution network, dedicated pipeline or trucks”. Then ACM0001 is applicable to the project activity as it destructs methane by capturing landfill gas from the landfill site to produce electricity and eventually flaring. The inclusion of CTL’s LFG does not change the project scope. The LFG from CTL project (CDM ref. 5947) is used only to comply with the power purchase agreement as the project activity is not generating the electricity settled in the contract. It is our understanding that the item 3b of the methodology (*Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that: (i)The captured LFG was vented or flared and not used prior to the implementation of the project activity; and (ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available)* is only applicable if SJEA claimed CERs from the CTL landfill which does not occur.

In accordance with ACM0001 paragraph 5.b) *This methodology is not applicable: (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 ACM0001 is applicable to the proposed CDM Project Activity since the São João Landfill Gas to Energy Project does not use other CDM approved methodology. SJEA also is not claiming emission reductions from CTL’s LFG neither is implementing energy efficiency measures. Only LFG from SJEA landfill will be used for emission reductions accounting and a conservative approach for ER calculation is considered while applying discounts factors as described in the monitoring plan and in appendix 7 of the revised PDD and also described in the sections below of the validation report. In addition, the management of the landfill in the project activity is not changed in order to increase methane generation compared to the situation prior to the implementation of the project activity (e.g. other to meet a technical or regulatory requirement). There is neither the addition of liquids to the SWDS and pre-treating waste to seed it with bacteria for the purpose of increasing the anaerobic degradation environment of the SWDS nor changing the shape of the SWDS to increase the Methane Correction Factor.

**2) The DOE is requested to provide a validation opinion when the decrease of the production of the LFG were known which resulted in less generation of electricity and the change in the supply of LFG as per the VVS for PA paragraph 309(b)**.

RINA: It is RINA's opinion that the decrease of the production of the LFG were and consequently less generation of electricity were not known prior to the registration of the CDM project activity. In order to demonstrate it, PP has made a comparison between the methane/ electricity forecast x actual operation of the project activity (also considering the update of the applied methodology) /44/

The CDM project activity was registered on 02/07/2006 – before its operation startup – and under ACM0001 version 2. Since its registration, ACM0001 has been constantly revised and currently is in its 19.0 version[1].

In the registered PDD, the estimated methane generation was based on the quantity of waste deposited in the landfill up to 2006 year. In reality, the amount of waste did not change from this version of the PDD – except from 2005 up to the 2009, the closing date of the landfill, as the project was registered in the middle of 2006. In spite of that, calculation method to estimate methane generated has been changed. ACM0001 (version 2) did not present method to calculation methane generation and, therefore, according to the registered PDD, IPCC methods were considered and a simplified equation was used to estimate quantity of methane:

$$Q_{T,x} = kR_x L_0 e^{-k(T-x)}$$

Where:

$Q_{T,x}$ = the amount of methane generated in current year (T) by the waste Rx;

k = methane generation rate constant (1/yr), which 0.105 was considered;

Rx = the amount of waste disposed in year x (t);

$L_0$ = methane generation potential (t/t of refuse) – which 0.065 was considered;

X = the year of waste input;

T = current year.

On 29/09/2006, the first version of TOOL04 was published and, currently, the methane generation calculation considers factors based on the quantity and type of waste, temperature and humid conditions from the SWDS, methane correction factors based on the SWDS conditions, model correction factor to account for model uncertainties, fraction of degradable organic carbon and other parameters not considered at the time of the project conception and registration of the PDD. As the project activity was a pioneering project, no similar projects were operational at that time to compare estimative and performances. This had influence in the expected methane generation and electricity generation as can be seen in the following figures.

[1] ACM0001 version 19 was published on 14/06/2019. This PDD was prepared based on version 18.1. however, projects using version 18.1 can be submitted for registration up to 08/02/2020.

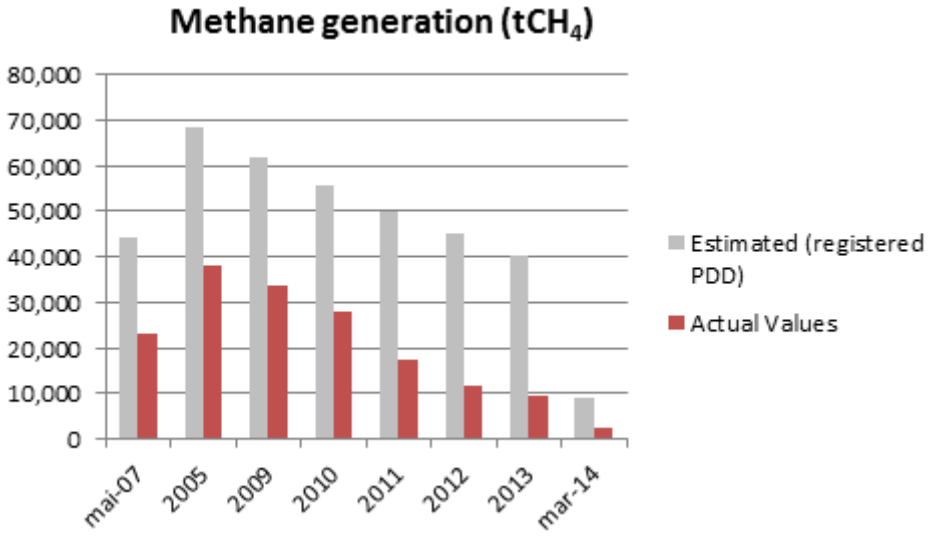


**Figure 1 – Methane generation from the landfill – estimated Vs. performed**

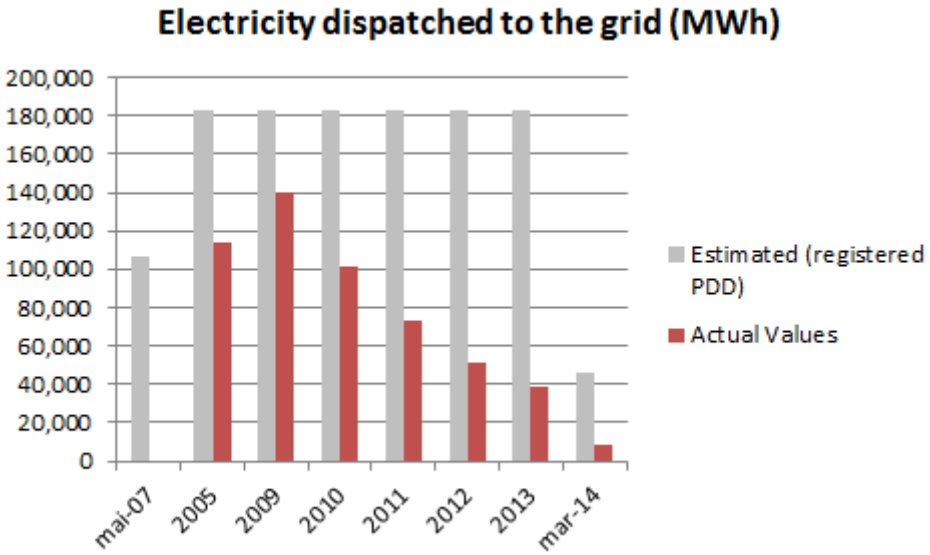


**Figure 2 – Electricity dispatched to the grid – estimated Vs. performed**[2]

As can be seen in the figures above, the project generated methane 56.3% lower than estimated in the registered PDD during the crediting period; regarding electricity generation, it generated 57.9% lower than estimated for the crediting period. Therefore, in 2013, the Project Participants decided to purchase LFG from CTL in order comply with the power purchase agreement and in April 2014 CTL started to provide LFG to SJEA. This change also impacted the CTL CDM project activity for which request for revision of PDD was approved by the Board in September 2018[3].

In order to demonstrate that methods for methane estimation and assumed factors have strong influence on the difference occurred to the project activity, methane estimation for the first crediting period of the project was calculated based on current method available (ACM0001, version 18.1 and TOOL04).

[2] Estimative of electricity generation was based on the generation capacity of the plant, and not on the methane collection.

[3] Available at: https://cdm.unfccc.int/Projects/DB/LRQA_Ltd1332768548.38/view

| Year | Total Methane Generated in landfill ($tCH_4$) | |
|---|---|---|
| | Data from the registered PDD, considering ACM0001 (version 2) | Estimative based on considering ACM0001 (version 18.1) and TOOL04 |
| 22/05/2007 | 44,324 | 26,276 |
| 2008 | 68,410 | 49,313 |
| 2009 | 61,591 | 39,438 |
| 2010 | 55,452 | 30,041 |
| 2011 | 49,925 | 23,503 |
| 2012 | 44,949 | 18,898 |
| 2013 | 40,468 | 15,602 |
| 31/03/2014 | 9,109 | 3,300 |
| **TOTAL** | **374,228** | **206,371** |

As can be seen in the table above, if current version of ACM0001 and TOOL04 was considered at the time of the project registration, amount of methane would be 206,371$tCH_4$ during the first crediting period of the project, and not 374,228 $tCH_4$ as estimated in the registered PDD (- 44.9% difference).

In summary, there are two reasons that lead to less methane and, consequently, emission reductions generation than estimated in the registered PDD:

- Simplified methods and factors available at the time of the project registration;

Pioneering of this type of project, since this type of technology was not established in the Host Country at that time.

**3) The DOE is requested to provide a validation opinion of the revised IRR calculations; in particular, to determine whether the results of the revised IRR submitted responding to the clarifications (spreadsheet 20190729_Enclosure 1_Rev3.xlsx) demonstrate that the project activity remains additional considering that the revised project IRR increased from 11.3% to 22% with the benchmark 23.29% (section B.5 of the revised PDD). In doing so, please provide a summary and justification of the sensitivity analysis of the IRR calculations. Please refer to paragraphs 20-21 of the Guidelines on the assessment of Investment Analysis v5**.

RINA: Following §28 the Tool of "Investment Analysis" version 9 /46/, a sensitivity analysis was conducted covering a range of at least +10 per cent and -10 per cent. The revision previously required by the CDM Secretariat in order to exclude financial expenditures from the project cash flow – even when this cash flow was considered in the decision making-context – resulted in an IRR (22.0%) clearly below but not too far from the benchmark (23.29%) and, therefore, the IRR surpasses the benchmark under 10% variations in costs and revenues.

Following §28 of the Investment Analysis Tool version 9, in cases where a scenario results in a financial indicator higher than the benchmark, an assessment of the probability of the occurrence of this scenario is required. As the project is already implemented and operational, a reasonable approach was to analyse actual incurred revenues, as well as actual incurred costs to the project, ruling out uncertainties regarding additionality. The resulted IRR was negative and the net present value (NPV) is –R$43.8MM as can be seen in the spreadsheet (Appendix 3 - Enclosure 2 – actual_v.2.xls) /39/.

All figures considered in the analysis were based on financial statements published in the Sao Paulo State Official Gazette (from the Portuguese Diário Oficial do Estado – D.O.E.) /45/ as required by the Brazilian legislation to incorporated companies (from the Portuguese "Sociedade Anônima – S.A."). According to Brazilian legislation, S.A. companies must publish their financial statements of the year.

It is RINA's opinion that at the time of the investment decision, the project IRR (13.8%) was lower than the benchmark (23.29%). Considering the actual expenditures and revenues, it is confirmed that the IRR is lower

than the benchmark, even when corrections in the financial calculation are made in the project cash flow in favour to the project changing the IRR from 13.8% to 22.0%. In fact, current values demonstrate that projects with LFG energetic use are additional in a country where LFG burnt is more than enough. Based on the results of the investment analysis, the project remains additional.
Due to the clarification received on 20/09/2019, the validation report was updated to version 4.0 and PDD updated to version 5.2 of 01/10/2019

**1. Considering that the power plant (25.6 MW) of the project activity (PA 373) is not located in the site of PA 5947, the DOE is required to further validate that the project boundary of project activity (PA 373) is in line with the paragraph 16.a of ACM0001 v18.1 which states that "The project boundary of the project activity shall include the site where the LFG is captured and, as applicable: (a) Sites where the LFG is flared or used (e.g. flare, power plant, boiler, air heater, glass melting furnace, kiln, natural gas distribution network, dedicated pipeline or biogas processing facility)". In doing so, please also provide the exact geo-coordinates for the project activity**.
Geographical coordinates presented in the PDD of PA5947 and PA0373 are based on the power plant location of both projects.


**Figure 1 – Geographical coordinates of PA5947 and PA0373 according to PDD**

Source: adapted from Google Earth.

As can be seen in figure 2, PA5947 is next to PA0373; in the left side is CTL's SWDS (PA5947) and in the right side is SJEA's SWDS (PA0373). São João landfill is closed since 2009 and CTL landfill started operation in November 2010 considering a new SWDS area. According to PA5947's PDD, CTL's landfill is expected to resume operation in 2021, considering the current filling rate. Figure 1 is included in the PDD (section A.2).

It is worth mentioning that both landfills - PA0373 and PA5947, are independent and materially separated projects and operate fully segregated cells.

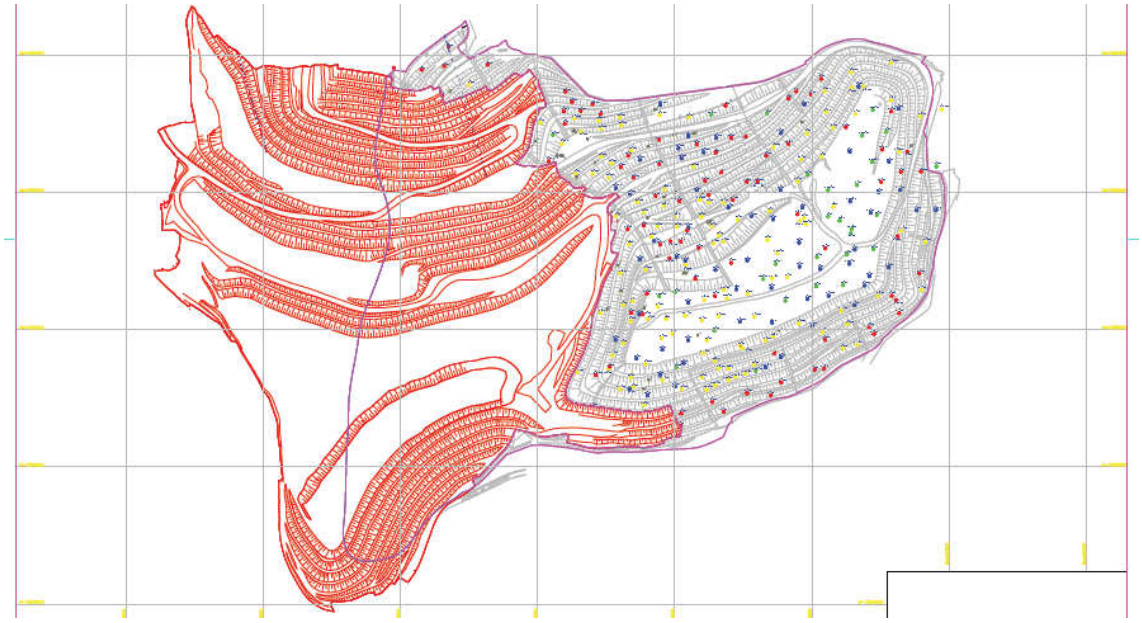

**Figure 2 – Boundaries of PA5947 (left) and PA0373 (right)**

Figure 4 of the PDD presents the diagram of the project boundary, which does not include the LFG from CTL landfill (PA5947). In fact, ACM0001 v18.1 establishes that "LFG shall include the LFG is captured", however LFG from PA5947 is not used for emission reductions purposes and, therefore, the SWDS of PA5947 is not included in PA0373 project boundary.

As explained in section B.2, B.5 and appendix 7 of the PDD, 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.

**2. The revised PDD of PA 373 (page 2-3) states that "CTL is a CDM project (# 5947) and, as described in its registered PDD and Validation Report, all emission reductions generated from the biogas produced by CTL project is of CTL's right and will be claimed by them. SJ will not claim CERs from this biogas." The DOE is requested to clarify how it validates all emission reduction generated from the biogas produced by PA 5947 is not claimed by the project activity (PA 0373) as:**

- **the monitoring plan (PA373) does not clearly show the monitoring of LFG supply from PA 5947 used for electricity generation and/or flaring; and**
- **emission reductions from electricity generated using LFG supply from PA 5947 is accounted in the emission reductions calculations as the revised PDD (PA373), validation report for the PRC and the spreadsheet (Baseline emissions sheet – cell D48 corresponding to data up to 21/05/14) do not separate the emission reductions obtained from the electricity generated due to the LFG supplied by PA 5947**.

**Ex-ante calculation**

As required by ACM0001 and TOOL04, ex-ante calculation of methane in the LFG generation from the SWDS ($BE_{CH4,y}$) shall be based on the type and amount of waste deposited in the PA's SWDS.

As presented in the ER spreadsheet, calculation of baseline emissions from electricity generation ($BE_{EC,y}$) and flaring is also based on methane from the SWDS of PA0373 alone, i.e. waste deposited in SAO JOAO LANDFILL. Therefore, estimated ERs presented in the PDD and ER spreadsheet do not account emission reductions from PA5947. No change is required in the calculation of emission reductions.

However, section B.6.3 of the PDD was revised to make it clear that $BE_{CH4,y}$ and $BE_{EC,y}$ do not include PA5947 LFG in ex-ante estimation.

**Ex-post calculation and monitoring**

LFG production at PA5947 is not controlled by PA0373, but LFG purchased from PA5947 is fully monitored, and is not accounted in PA0373's CERs calculation. As described in the PDD (sections B.2, B.6.1, B.7.3 and appendix 7.), PA0373 emission reductions will be calculated by applying discounts on readings proportionally to $CH_4$ mass balance from LFG purchased from CTL. Follows an example calculation:

| | PA5947 | PA0373 |
|---|---|---|
| Methane fraction | 0.55 | 0.45 |

| **Parameters** | Data monitored | Considered for PA0373 emission reductions |
|---|---|---|
| $F_{CH4,flared,y}$ ($tCH_4$) | 10,000 | 4,500 (10,000 x 0.45) |
| $F_{CH4,EL,y}$ ($tCH_4$) | 30,000 | 13,500 (30,000 x 0.45) |
| TOTAL | 40,000 | 18,000 (40,000 x 0.45) |
| $EG_{PJ,y}$ (MWh/yr) | 90,000 | 40,500 (90,000 x 0.45) |

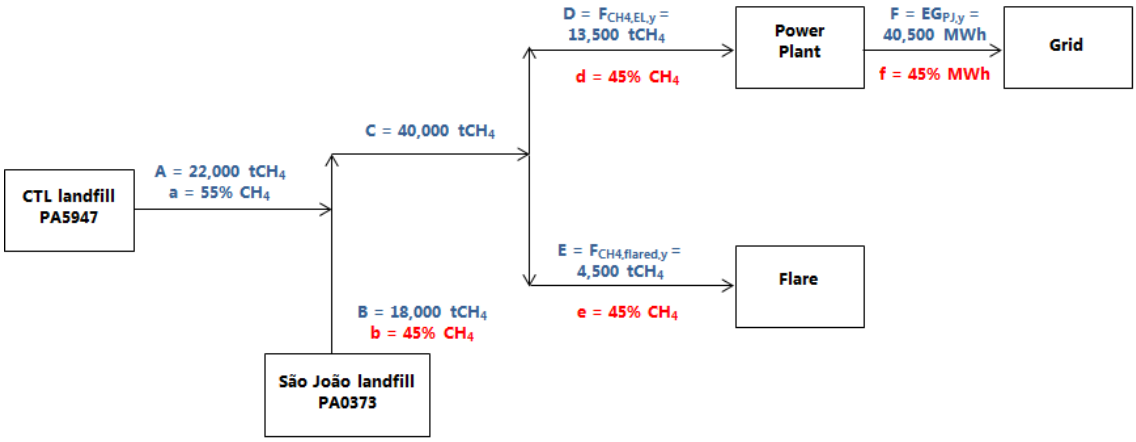


**Figure 3 – Example of mass balance**

PDD section B.6.1 and B.7.1 was revised to make it clear that PA0373 baseline emissions due to $CH_4$ and electricity generation will only be accounted for the mass proportion of SJ's methane from total emissions.

It is important mentioning that Project Participants conservatively included emission factor discounts due to CTL's LFG inclusion in the project boundary, as explained in section B.7.1, B.7.3, Appendix 7 of the PDD, following procedures for post-registration change (PRC).

## 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. | Financial Expert | EI | Rocha | Mayra | RINA Brazil | x | | | x |

### B.2. Technical reviewer and approver of the validation report on PRCs

| 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 | Liu | Hui Feng | RINA CHINA |
| 2. | Approver | IR | Severino | Laura | RINA HO |

## SECTION C. Means of validation

### C.1. Desk/document review

>> The updated PDD version 5.2 of 01/10/2019 /02/, in particular the applicability of the methodology, the baseline determination, the emission reduction calculations provided in the form of a spreadsheet "20190606_São João_CERs_v.4.xlsx" version 4 of 06/06/2019 /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;<br>- interviewed key personnel of the plant to confirm the operational and data collection procedures; QA QC procedures<br>- Ex-ante parameters, baseline, project and leakage emissions calculation.<br>- Monitoring Plan | São João landfill | 30/10/2018 | Thaís Carvalho |
| 2. | - RINA assessed the Project activity design and implementation (changes).<br>- Assessment of choice and applicability of the baseline methodology, project boundary and emissions sources included in the project boundary.<br>- 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, | Thaís Carvalho |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | additionality; changes | |

## C.4. Sampling approach

>>N/A

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

| Areas of validation findings | No. of CL | No. of CAR | No. of FAR |
|---|---|---|---|
| Compliance with PDD form | 1 | | |
| Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines | | 1 | |
| Corrections | 3 | | |
| Changes to the start date of the crediting period | | | |
| Inclusion of a monitoring plan | | | |
| Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools | 3 | 4 | |
| Changes to the project design | | 2 | |
| Changes specific to afforestation and reforestation project activities | | | |
| Others (please specify) | | | |
| **Total** | 7 | 7 | |

# 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 10.1. /07/. RINA verified that the information due to the Post registration changes is provided in track change. |
| **Findings** | **CL 1**: *In accordance with the project cycle section 9.6. Submission of request for post-registration changes together with request for renewal of crediting period* "a new version of the PDD including both the updates for the purpose of renewal of crediting period and the post-registration change (in both clean and track-change versions)". To close CL 1, PDD with track change was provided. (During the validation process, the CDM project cycle procedure for project activities was updated and the PRC will be submitted before the renewal crediting period process). |
| **Conclusion** | RINA verified that the PDD was completed in accordance with the CDM-PDD-FORM: PDD-FORM: Project design document form version 10.1, including its Attachment: Instructions for completing this form. |

## D.2. Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines

| | |
|---|---|
| **Means of validation** | Due to the post registration change in the project design, PP has updated the version of the methodology and tools. In the revised PDD the option chosen to calculate the flare emissions is ***Option A: Default value has been chosen:***<br>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:<br>(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<br>(2) The flame is detected in minute *m* ($Flame_m$). |

| | |
|---|---|
| | Otherwise n*flare,m* is 0%.<br><br>PP is requesting a temporary deviation for the period between 16/05/2012 until 21/05/2014 (period applicable to the first crediting period), where the parameter related to the calculation of project emissions from the flares, is not in accordance with the updated tool "Project emissions from flaring" regarding the monitoring frequency. Project participants will apply conservative assumptions or discount factors to the calculations to ensure that GHG emission reductions will not be over-estimated as a result of the deviation.<br><br>During the period between 16/05/2012 until 21/05/2014 (period applicable to the first crediting period), PP does not have the registers in a minute basis, therefore the deviation is requested. RINA verified during the onsite visit that data is registered every 5 minutes (not minute basis as requested by the tool) and PP confirmed that the system is updated to follow the tool requirements from 06/11/2018 (applicable to the second crediting period). For the period from 22/05/2014 until 05/11/2018 a temporary deviation will be submitted with the renewal crediting period, in accordance with paragraph 289 of CDM PCP for PA ver.2.<br>Therefore, for the monitoring period between 16/05/2012 until 21/05/2014 (period applicable to the first crediting period), the parameters temperature of the flare ($T_{EG.m}$), flow rate of the residual gas to the flare ($F_{RG,m}$) and parameter flame detected ($Flame_m$) were registered every five minutes instead on a minute basis as required by Methodological tool Project emissions from flaring (Version 02.0.0). Thus, a temporary deviation has been requested.<br><br>According to *CDM Project Standard for Project Activities (version 2.0), paragraph 231, PP may propose alternative monitoring arrangements for the non-conforming monitoring period while applying conservative assumptions or discount factors to the calculations to ensure that GHG emission reductions or net anthropogenic GHG removals will not be overestimated as a result of the deviation (option a).*<br><br>For the temporary deviation period, the following conservative approach will be adopted by the Project Participants:<br><br>As data (including temperature and flow) is recorded every 5-minutes in the PLC system in the temporary deviation, a -10 per cent discount will applied in the baseline emission and +10 per cent in project emissions. This is a conservative approach considering the equipments' error (1% for methane analyzer and 1.5% for gas flow). Also, the main purpose of the LFG is generate electricity; if LFG is sent to flare, it means that the project is not efficient and no revenue from electricity is expect to be received from this burned LFG.<br><br>Rina verified that the proposed deviation is not reducing the accuracy of the calculation of emission reductions, as project participants will apply conservative assumptions to ensure that emission reductions will not be overestimated as a result of the deviation. |
| **Findings** | **CAR 1:** *Monitoring plan describes: during the crediting period, data was collected in a 5-minute interval, but since November 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 1 a temporary deviation is requested in accordance with the requirements of project standard.* |
| **Conclusion** | It is RINA's opinion that the proposed deviation to be applied in the period between 16/05/2012 until 21/05/2014 (period applicable to the first crediting period) is not reducing the accuracy of the calculation of emission reductions, as project participants apply conservative assumptions to ensure that emission reductions will not be overestimated as a result of the deviation. |

| | |
|---|---|
| | (Note: For the period 22/05/2014 until 05/11/2018 a temporary deviation will be submitted with the renewal crediting period, in accordance with paragraph 289 of CDM PCP for PA ver.2.) |

## D.3. Corrections

| | |
|---|---|
| **Means of validation** | PDD was revised to consider the installed capacity of electricity generator´s in accordance with equipment's plate and datasheet /28/. RINA verified that the manufacturer is caterpillar and there are 16 units of 1.6 MW each, resulting in 25.60MW installed capacity. 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.<br><br>For transparency, revised PDD presents the description of the following equipment's installed, confirmed during the onsite visit:<br><br>**Blower**<br>4 units, manufacturer Continental Blower LLC, with capacity 3,000-7,000 scfm each in accordance with the manufacturer /41/<br><br>**Flare**<br>3 flares, manufacturer Hofstetter, capacity 500 Nm3/h to 5,000 Nm3/h /30/<br><br>**Diesel generator**<br>Manufacturer: Caterpillar, 1 unit capacity 400 KW/500 KVA, confirmed in the equipment´s plate /28/.<br><br>**Electriciy generator**<br>Manufacturer: caterpillar, 16 units of 1.6 MW each, confirmed in the equipment's plate and datasheet /28/.<br><br>Moreover, PP has provided the environmental license number 30007689, 30007689 and the renewal protocol /31/ |
| **Findings** | **CL 2:** PP is requested to provide the evidence of the capacity of the blower. To close CL 2, the evidences were provided.<br><br>**CL 3:** The installed capacity of the electricity generators are not in accordance with equipment's' technical specification. To close 3, PP has revised the PDD in accordance with data sheet from the blower manufacturer.<br><br>**CL 4**: The generator efficiency used to estimate the energy generation in the CERs spreadsheet is not in accordance with technical data sheet /28/. To close CL4, revised PDD presents the installed capacity in accordance with equipment's plate and datasheet /28/ |
| **Conclusion** | It is RINA's opinion that the corrected information presented in revised PDD is an accurate reflection of actual project information. There were no changes in projects' equipment's, and the information revised is in accordance with manufacturer specifications. |

## D.4. Changes to the start date of the crediting period

| | |
|---|---|
| **Means of validation** | N/A |
| **Findings** | N/A |
| **Conclusion** | N/A |

## D.5. Inclusion of a monitoring plan

| | |
|---|---|
| **Means of validation** | N/A |
| **Findings** | N/A |
| **Conclusion** | N/A |

## D.6. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

**Means of validation**

Due to the changes to a project design (please, refer to the section D.7 below), PP has updated the monitoring plan in accordance with the latest versions of the applied methodology /06/ and tools.
In accordance with the CDM project standard for project activities, paragraph 241 the changes of a registered CDM project activity may include:
(j) 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.

RINA verified that under the changes described in paragraph 241 the following applies to the project activity and are described in the section D.7 below:
(e) 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" in paragraph 44(b) above;

RINA has assessed the revised PDD to confirm that Explanation of methodological choices, monitoring plan and emission reductions are in accordance with the updated methodology and tools as described below.

The approved baseline and monitoring ACM0001 "Flaring or use of landfill gas" version 18.1 of 29/11/2018 /06/ has been applied.
The ex-ante parameters that are mentioned in the methodology are included in the PDD and are provided in compliance with the methodology:

| Data/parameter | Unit | Value applied | Assessment |
|---|---|---|---|
| $OX_{top\_layer}$ (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/ |
| | - $\eta_{PJ}$: 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 the model correction factor to account for model uncertainties. | - | 0.75 | Value applied considering MAT >20 ºC 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;<br>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***<br>43% — Wood and wood products<br>40% — Pulp, paper and cardboard<br>15% — Food, food waste, beverages and tobacco<br>24% — Textiles<br>20% — Garden, yard and park waste<br>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*** / ***$k_j$***<br>**Slowly degrading** — Pulp, paper, cardboard (other than sludge), textiles — 0.07<br>**Slowly degrading** — Wood, wood products and straw — 0.035<br>**Moderately degrading** — Other (non-food) organic putrescible garden and park waste — 0.17<br>**Rapidly degrading** — Food, food waste, sewage sludge, beverages and tobacco — 0.40 | 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/ |
| | ***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 - ℃<br>Flow rate - $Nm^3/h$<br>Maintenance schedule - number of days | Flare model: Holfstetter,<br>Minimum flare temperature: 1000 ºC<br>Maximum flare temperature: 1200 ºC<br>Minimum and maximum inlet flow rate: Minimum flow: 500 Nm3/h Maximum flow: 5000 Nm3/h<br>Maximum duration in days between maintenance events: 365 days | RINA verified that the information is in accordance with the manufacturer specification /30/ |
| | $R_u$: 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 conditions | Pa | 101,325 | PP applied the default value in accordance with the 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* | $tCO_2/MWh$ | 0.0814 | According to Tool to calculate the emission factor for an electricity system /22/, PP has chosen ex-ante data vintage RINA verified that data from 2006 is used (starting of the |

| | | | |
|---|---|---|---|
| | | | crediting period) in accordance with data provided by the Brazilian DNA /33/ |
| ***EF*$_{grid,OM,y}$:** *Simple adjusted operating margin CO2 emission factor in year y* | $tCO_2$/MWh | 0.3335 | According to Tool to calculate the emission factor for an electricity system /22/, PP has chosen ex-ante data vintage RINA verified that data from 2006 is used (starting of the crediting period) in accordance with data provided by the Brazilian DNA /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 "Flaring or use of landfill gas" version 18.1 of 29/11/2018:

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

Where:

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

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

$BE_{EC,y}$ = Baseline emissions associated with electricity generation in year y (t CO2/yr).

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

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

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 $CO_2$e/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 $CO_2$e/t $CH_4$)

As $BE_{CH4,y}$ estimation is based on waste disposed in the SWDS of São João landfill, $BE_{CH4,y}$ does not consider LFG purchased from CTL's project

***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, $F_{CH4,HG,y}$ and $F_{CH4,NG,y}$ 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:
$F_{i,t} = V_{t,db} * v_{i,t,db} * \rho_{i,t}$ with $\rho_{i,t} = (P_t * MM_i) / (R_u * T_t)$
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:

$$F_{CH4,flared,y} = F_{CH4sent\_flare,y} - \frac{PE_{flare,y}}{GWP_{CH4}}$$

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 $CO_2$e/yr)
$GWP_{CH4}$ = Global warming potential of CH4 (t $CO_2$e/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 – version 02.0.0" /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;

- $CH_4$ is the greenhouse gas *i* for which the mass flow should be determined;

-The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 and 17 in the tool); and

- The time interval *t* for which mass flow should be calculated is every minute *m*.

$F_{CH4,m}$, which is measured as the mass flow during minute *m*, shall then be used to determine the mass of methane in kilograms fed to the flare in minute *m* ($F_{CH4,RG,m}$). $F_{CH4,m}$ shall be determined on a dry basis

For the period between 16/05/2012 until 21/05/2014 a temporary deviation has been requested as during this period data was collected in a 5-minute interval and after that was updated to consider 1-minute interval in accordance with the requirements of the tool. (details in the section D.2 above)

*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 $CO_2$e/yr);

$\eta_{PJ}$= 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 $CO_2$e/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*∑∑ $W_{j,x}$* $DOC_j$x$e^{-k(y-x)}$*(1-$e^{-kj}$)

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

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

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

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

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

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/

As $BE_{EC,y}$ estimation is based on LFG generated in the SWDS of São João landfill, $BE_{EC,y}$ does not consider electricity generated with the LFG purchased from CTL.

**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. The ex-ante data vintage is considered.

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

RINA verified that data from 2006 is used, in accordance with data data published by the Brazilian DNA /33/. $EF_{grid,OM,2006}$ = 0.3355 $tCO_2e/MWh$.

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

For data vintage, Option 1 (ex-ante data vintage) was chosen for the proposed project in the first crediting period. Thus, $EF_{grid,BM,20006}$ = 0.0814 tCO2/MWh , in accordance with Brazilian DNA /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 first crediting period is equal $w_{OM}$= 0.5 and $w_{BM}$=0.5.

$EF_{grid,CM}$ = 0.2085 $tCO_2e/MWh$

**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 (tCO2/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 tCO2/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 (tCO2/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 ($tCO_2e/yr$);

The results of the emissions reduction estimative is summarized bellow:

| Year | Baseline emissions (t $CO_2e$) | Project emissions (t $CO_2e$) | Leakage (t $CO_2e$) | Emission reductions (t $CO_2e$) | Reference |
|---|---|---|---|---|---|
| From 22/05/2007 | 656,800 | 0 | 0 | 656,800 | From the registered ER spreadsheet of the 1st crediting period (ACM0001, v.2). |
| 2008 | 968,442 | 0 | 0 | 968,442 | |
| 2009 | 876,797 | 0 | 0 | 876,797 | |
| 2010 | 794,287 | 0 | 0 | 794,287 | |
| 2011 | 720,001 | 0 | 0 | 720,001 | |
| 2012 | 94,696 | 3,062 | 0 | 91,634 | PDD, |

| | | | | | |
|---|---|---|---|---|---|
| 2013 | 134,028 | 4,343 | 0 | 129,685 | appendix 7: i) Methodology update: ACM0001 (v.18.1); ii) Discount of 10 per cent in baseline emissions due to temporary deviation. |
| Up to 21/05/2014 | 16,544 | 1,455 | 0 | 15,089 | PDD, appendix 7: i) Methodology update: ACM0001 (v.18.1); ii) Discount of 10 per cent in baseline emissions due to temporary deviation; iii) Discount of 2 per cent in baseline emissions due to permanent change. |
| **Total** | **4,261,595** | **8,860** | **0** | **4,252,734** | |
| **Total number of crediting years** | 7 | | | | |
| **Annual average over the crediting period** | 608,799 | 1,266 | 0 | 607,533 | |

Due to the changes and temporary deviation the following was considered in the CERs spreadsheet:

- From 22/05/2007 to 15/05/2012: data from the registered PDD
- From 16/05/2012 to 21/05/2014: discount from the temporary deviation (10%);
- From 01/01/2014 to 21/05/2014: discount from the permanent changes (2%), considered for the entire period for simplification.

## MONITORING PLAN

The monitoring plan was updated based on the approved baseline and monitoring methodology ACM0001 “Flaring or use of landfill gas” version 18.1 of 29/11/2018 /06/. The ex-post parameters that are mentioned in the methodology are included in the PDD and are provided in compliance with the methodology, and they will be monitored during the crediting period:

| Parameter | Description/Assessment |
|---|---|
| ***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.<br>For each equipment unit j using the LFG monitor that the plant is operating in hour h<br><br><u>*For the electricity generation facility*</u>:<br>Products generated. Monitor the generation of electricity which is dispatched to the grid.<br><br><u>*For the flaring system*</u><br>Temperature: according to the manufacturer's technical record, the combustion temperature varies from 1,000 to 1,200℃. Temperature shall varies between this ranges.<br><br>Opj,h=0 when:<br>- Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute);<br>- No products are generated in the hour h.<br><br>Otherwise, Opj,h=1 |
| $EG_{PJ,y}$ = (MWh) net amount of electricity generated using LFG by the project activity in year y | The generator efficiency used to estimate the energy generation in the CERs spreadsheet is in accordance with technical data sheet /28/<br>Parameter will be monitored continuously and daily recorded. AES Eletropaulo sends the registered data for the project participants. Double-check of electricity dispatched is conducted between SJ's PLC data records and AES Eletropaulo's system in order to identify major discrepancies. However, data from AES Eletropaulo is always used for invoice purposes and, therefore, it is considered for calculation of emission reductions.<br>In order to determine the SJ's gas flow to generate electricity, efficiency of generators will be considered. Calibration will be conducted in accordance ONS requirements<br>In order to determine the SJ's electricity generation and dispatch to the grid, AES Eletropaulo readings will be proportionally accounted based on the $CH_4$ mass balance from CTL and SJEA. 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.<br><br>Periodic calibration against a primary device provided by an independent accredited laboratory. The PPs decided to conservatively adopt a 5-years frequency since:<br>- In Brazil there are no requirements on how often flow-meters must be calibrated;<br>- In the Netherlands, for turbine meters of the size of used in the project, calibration is never required;<br>- In Germany, a calibration every 10-years is enforce by law;<br>The manufacturer states that it's up to the clients to determine the calibration frequency. Periodic calibration provided by an independent accredited laboratory and according to manufacturers' recommendations.<br>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.

The flow meters applicable to the project activity are correctly described in the revised PDD:

| *Meter* | *Measurement* | *Manufacturer* | *Accuracy (%)* | *Calibration freq.* |
|---|---|---|---|---|
| *FIT 524* | *Flow flare F520* | *Endress+Hauser* | *1.5* | *5 years* |
| *FIT 544* | *Flow flare F540* | *Endress+Hauser* | *1.5* | *5 years* |
| *FIT 564* | *Flow flare F560* | *Endress+Hauser* | *1.5* | *5 years* |
| *FIT 500* | *Total gas to flares – cross check* | *Incontrol* | *1.0* | *5 years* |
| *FIR 800* | *Total gas to engines* | *Incontrol* | *1.0* | *5 years* |
| *FIR 600* | *Total gas to engines* | *Incontrol* | *1.0* | *5 years* |
| *FIT 910* | *Incontrol* | *CTL flow – principal* | *1.0* | *5 years* |
| *FIT 901* | *Incontrol* | *CTL flow – backup* | *1.0* | *5 years* |

**$V_{i,t,db}$=** ($m^3$ 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. The gas analyzer is subjected to a regular maintenance and testing regime to ensure accuracy. In case of frequent failure or high discrepancy readings, it will be displaced.

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 Appendix 7.

| *Meter* | *Manufacturer* | *Measurement* | *Accuracy (%)* | *Calibration freq.* |
|---|---|---|---|---|
| *GEM2000* | *Landtec* | *Gas analyzer (SJEA)* | *3.0* | *Weekly by the project developer* |
| *A100* | *Rosemount – NUK* | *Gas analyzer (SJEA + CTL)* | *1.0* | *Yearly by a third party company* |
| *FAU-TDL* | *Landtec* | *Gas analyser (CTL)* | *1.0* | *Yearly by CTL* |
| | | | | |

***Status of biogas destruction***

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

| | | |
|---|---|---|
| | ***device (-)*** Operational status of biogas destruction devices | of methane. Emission reductions will not accrue for periods in which the destruction device is not operational |
| | **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. |
| | $\mathbf{T_{EG,m}}$ (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.<br>Temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule. |
| | $\boldsymbol{Flame_m}$ (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. |
| | $\mathbf{TDL_{k,y}}$ (%)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 |
| | $\mathbf{EC_{PJ,y}}$ (MWh): Quantity of electricity consumed by the project electricity consumption source j in year y | 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

Considering the changes in the project design described in the section D.7 below, from 03/04/2014 that 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 biogas (landfill gas) 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 analyzer 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, biogas (landfill gas) 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, biogas (landfill gas) 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 (version 18.1). All measurement will be discounted proportionally to the measurement of biogas (landfill gas) 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 biogas (landfill gas) collected by CTL.<br><br>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:<br>• 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);<br>• 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.<br>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 for details of the monitoring plan.<br><br>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 18.1). 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<br>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 5:** 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.*<br><br>**CL 6:** 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.<br><br>**CL 7:** PP is requested to clarify if the specification for calibrations are in accordance with the requirement of the paragraph 76 of the project standard:<br>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<br><br>**CAR 2:** Data used in the updated PDD for the operating margin (simple adjusted OM) is not in accordance with Brazilian DNA<br><br>**CAR 3:** 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) |

| | |
|---|---|
| | **CAR 4:** 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)<br><br>**CAR 7:** 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.<br><br>To close CL 5, CL 6 and CL 7 calibration was revised in accordance with the requirements of the applied tools and PS. To Close CAR 2, emission factor was updated in accordance with the most recent data available by the Brazilian DNA. To close CAR3 parameter Tt was included in the monitoring plan. To close CAR 4, data of the diesel generator in the parameter $EC_{PJ,y}$ was correctly revised. To close CAR 7, provisions to discount biogas and methane from CTL were included in the revised PDD. |
| **Conclusion** | It is RINA's opinion that the revised monitoring plan is in accordance with the monitoring methodology; the monitoring plan will give opportunity for real measurement of achieved emission reductions. RINA has checked all the parameters presented in the monitoring plan against the requirements of the methodology and methodological tools.<br>RINA confirms that the monitoring arrangements described in the monitoring plan, including the data management and quality assurance and quality control procedures, are feasible within the project design, and the means of implementation of the monitoring plan are sufficient to ensure the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified. RINA confirms that all the requirements of the updated methodology ACM0001 version 18.1 of 29/11/2018 have been met and that the application of the updated methodology does not impact the conservativeness of the monitoring and verification process, including the related emission reduction or removal calculations (please, for the temporary deviation, refer to the section D.2 above). 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 |

## D.7. Changes to the project design

| | |
|---|---|
| **Means of validation** | Changes in the Project design<br>The registered PDD version 3 of 29/12/2009 was approved based in the monitoring methodology ACM0001 "Consolidated baseline and monitoring methodology for landfill gas project activities", version 02 of 30/09/2005.<br>PDD version 5.2 of 01/10/2019 was revised to consider the updated version of the methodology ACM0001 "Flaring or use landfill gas" version 18.1 of 29/11/2018 /06/, and the revised project design considers that SJ and Ecourbis signed a Term of Agreement to purchase biogas (landfill gas) from CTL in order to comply with the power purchase agreement. The main reason for no reaching its full performance is due to the pioneering initiative while using biogas for electricity generation (please, refer to the assessement present in response to clarification received on 16/08/2019). CTL is a CDM project (# 5947) and, as described in is registered PDD and Validation Report /27/ all emission reduction generated from the biogas produced by CTL project is of CTL's right and will be claimed by them. SJ cannot claim CERs from this biogas. Biogas supply from CTL (main reason for the PRC) was negotiated and the contract signed in the second semester of 2013. The actual supply ("when the change actually became effective") started on 03-Apr-2014, i.e., 48 days before the end of the first crediting period, therefore the PRC is requested before the renewal of the second crediting period.<br><br>RINA verified that the revised PDD has been updated to describe the changes that covers the paragraph 242 of the Project standard: |

(a) The applicability and application of the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents with which the project activity has been registered: updated the monitoring methodology and tools, assessing the applicability criteria's

(b) The compliance of the monitoring plan with the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents: updated the monitoring plan in accordance with the updated monitoring methodology and tools

(c) The level of accuracy and completeness in the monitoring of the project activity compared with the requirements contained in the registered monitoring plan: updated the monitoring plan in accordance with the updated monitoring methodology and tools

(d) The additionality of the project activity: reassessed the additionality of the project activity

(e) The scale of the project activity: the project remains large scale.

**Applicability of methodology and standardized baseline**

Due to the revision in the project design, revised PDD applies the revised version approved baseline and monitoring methodology ACM0001 "ACM0001 "Flaring or use of landfill gas" " version 18.1 of 29/11/2018 /06/ and updated tools as described below.

According to ACM0001, the methodology is applicable to "project activities that include the destruction of methane emissions and displacement of a more-GHG-intensive service by capturing landfill gas from the landfill site and/or flaring and/or using to produce energy (i.e. electricity, thermal energy); and/or using to supply consumers through natural gas distribution network, dedicated pipeline or trucks". Then ACM0001 is applicable to the project activity as it destructs methane by capturing landfill gas from the landfill site to produce electricity and eventually flaring. The inclusion of CTL's LFG does not change the project scope.

The applicability criteria of updated methodology and tools were assessed by RINA as follow:

| Applicability criteria | Project activity | Criteria is met? |
|---|---|---|
| (a) Install a new LFG capture system in a new or existing SWDS where no LFG capture system was installed prior to the implementation of the project activity; or<br>(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:<br>(i) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and<br>(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 | 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.<br><br>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 emergency purposes.<br><br>The LFG from CTL project (CDM ref. 5947 ) is used only to comply with the power purchase agreement as the project activity is not generating the electricity | **Yes** |

| | | | | |
|---|---|---|---|---|
| | system: historical data on the amount of LFG capture and flared is available;<br>(c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways:<br>(i) Generating electricity;<br>(ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or<br>(iii) Supplying the LFG to consumers through a natural gas distribution network;<br>(iv) Supplying compressed/liquefied LFG to consumers using trucks;<br>v) Supplying the LFG to consumers through a dedicated pipeline;<br>(d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity. | settled in the contract. To the Project Participants' understanding, item b) is only applicable if SJEA claimed CERs from the CTL landfill which does not occur. Although LFG increase, no emission reductions related to CTL's LFG is or will be claimed by SJEA. Conservative approach is included in the PRC.<br><br>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:<br>(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<br>(b) In the case that the LFG is used in the project activity for generating electricity and/or | 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** |

| | | | |
|---|---|---|---|
| | generating heat in a boiler, air heater, glass melting furnace or kiln;<br>(i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or<br>(ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary. | | |
| | This methodology is not applicable:<br>(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;<br>(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. SJEA also is not claiming emission reductions from CTL's LFG neither is implementing energy efficiency measures. Only LFG from SJEA landfill will be used for emission reductions accounting and a conservative approach for ER calculation is considered while applying discounts factors as described in the monitoring plan and in appendix 7 of the revised PDD. 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:
"Project emissions from flaring", version 02.0.0 dated 20/07/2012 /14/
"Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", Version 03 of 22/09/2017/18/
"Tool to calculate the emission factor for an electricity system", Version 07.0 of 31/08/2018 /22/
"Emissions from solid waste disposal sites", version 08.0 of 04/05/2017 /12/
"Tool to determine the mass flow of a greenhouse gas in a gaseous stream", Version 03.0 of 27/11/2016 /15/
"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/ (not applicable to PRC)
"Combined tool to identify the baseline scenario and demonstrate additionality", Version 07.0 of 22/09/2017 /19/, used to re-assess the additionality due to PRC
"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
"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.
"Project and leakage emissions from transportation of freight", version 01.1.0 of 23/11/2012 /21/, not applicable to the project activity.
The *"Investment Analysis" (TOOL 27, version 9.0)* is also used as this post-registration change includes reassessment of investment analysis.

RINA verified that the previously approved deviation M-DEV-493 (applicable to methodology ACM0001 version 12) is not applicable as the methodology ACM0001 version 18.1 of 29/11/2018 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".*

**Project boundary**

The project boundary was revised in the PDD to be in accordance with the methodology ACM0001 "ACM0001 "Flaring or use of landfill gas" " version 18.1 of 29/11/2018 /13/:

According to the ACM0001 methodology the project boundary includes *the site where the LFG is captured* (São João Landfill) *and*:

(a) *Sites where the LFG is flared or used (e.g. flare, power plant, boiler, air heater, glass melting furnace, kiln, natural gas distribution network, dedicated pipeline or biogas processing facility);*

(b) *Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity to the project activity;*

(c) *Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity in the baseline that is displaced by electricity generated by captured LFG in the project activity;*

(d) *Heat generation equipment or sources which are supplying heat in the baseline that is displaced by heat generated by captured LFG in the project activity; and*

(e) *The transportation of the compressed/liquefied LFG from the biogas processing facility to consumers.*

In the case of the proposed CDM Project Activity, the sites where the LFG is flared/used consists of the collection system, electricity generation plant and gas station facilities (including flaring) – item (a) above.

Regarding item (b), all the power generation sources connected to SIN is included in the project boundary, since electricity is dispatched into and also consumed from the from the grid. On May 26th, 2008, the Brazilian Designated Authority published Resolution #8[4] defining the Brazilian Interconnected Grid as a single system covering all five geographical regions of the country (North, Northeast, South, Southeast and Midwest). Hence, this is the configuration of the national grid that is to be considered. Items (c) and (d) are not applicable to the project activity.

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

| Source | | GHG | Included? | Justification/Explanation |
|---|---|---|---|---|
| Baseline | Emissions from decomposition of waste at the SWDS site | $CH_4$ | Yes | The major source of emissions in the baseline |
| | | $N_2O$ | No | $N_2O$ emissions are small compared to $CH_4$ emissions from SWDS. This is conservative |

[4] Comissão Interministerial de Mudança Global do Clima (CIMGC). Available at: <http://www.mct.gov.br/upd_blob/0024/24719.pdf>.

| | | | | | |
|---|---|---|---|---|---|
| | | | | $CO_2$ | No | $CO_2$ emissions from decomposition of organic waste are not accounted since the $CO_2$ is also released under the project activity |
| | | | Emissions from electricity generation | $CO_2$ | Yes | Major emission source since power generation is included in the project activity |
| | | | | $CH_4$ | No | Excluded for simplification. This is conservative |
| | | | | $N_2O$ | No | Excluded for simplification. This is conservative |
| | | | Emissions from heat generation | $CO_2$ | No | Excluded since heat generation is not included in the project activity |
| | | | | $CH_4$ | No | Excluded for simplification. This is conservative |
| | | | | $N_2O$ | No | Excluded for simplification. This is conservative |
| | | | Emissions from the use of natural gas | $CO_2$ | No | Excluded for simplification. This is conservative |
| | | | | $CH_4$ | No | Excluded since supply of LFG through a natural gas distribution network is not included in the project activity |
| | | | | $N_2O$ | No | Excluded for simplification. This is conservative |
| | | **Project activity** | Emissions from fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity | $CO_2$ | No | Not applicable to the proposed CDM Project Activity. |
| | | | | $CH_4$ | No | Excluded for simplification. This emission source is assumed to be very small |
| | | | | $N_2O$ | No | Excluded for simplification. This emission source is assumed to be very small |
| | | | Emissions from flaring | $CO_2$ | No | Emissions are considered negligible |
| | | | | $CH_4$ | Yes | May be an important emission source |
| | | | | $N_2O$ | No | Emissions are considered negligible |
| | | | Emissions from electricity consumption due to the project activity | $CO_2$ | Yes | May be an important emission source |
| | | | | $CH_4$ | No | Excluded for simplification. This emission source is assumed to be very small |
| | | | | $N_2O$ | No | Excluded for simplification. This emission source is assumed to be very small |
| | | | Emissions from distribution of LFG using trucks | $CO_2$ | No | Not applicable to the proposed CDM Project Activity. |
| | | | | $CH_4$ | No | Not applicable to the proposed CDM Project Activity. |
| | | | | $N_2O$ | No | Not applicable to the proposed CDM Project Activity. |

**Establishment and description of baseline scenario**

According to ACM0001, the following baseline alternatives shall be considered while identifying the baseline scenario: (i) destruction of LFG, (ii) electricity generation and (iii) heat generation:

- **Destruction of LFG**

LFG1: The project activity implemented without being registered as a CDM project activity (i.e. capture and flaring or use of LFG);
LFG2: Atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons;
LFG3: Atmospheric release of the LFG or capture of LFG in an unmanaged SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons;
LFG4: LFG generation is partially avoided because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS;
LFG5: LFG generation is partially avoided because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS;
LFG6: LFG generation is partially avoided because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS.

- **Electricity generation**

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

- **Heat generation**

H1: Heat generation from LFG undertaken without being registered as CDM project activity;
H2: Heat generation in existing or new fossil fuel fired cogeneration plant(s);
H3: Heat generation in existing or new renewable based cogeneration plant(s);
H4: Heat generation in existing or new fossil fuel based boiler(s), air heater(s), glass melting furnace(s) or kiln(s);
H5: Heat generation in existing or new renewable energy based boiler(s), air heater(s), glass melting furnace(s) or kiln(s);
H6: Any other source, such as district heat; and
H7: Other heat generation technologies (e.g. heat pumps or solar energy);

Before the implementation of the project activity, LFG was collected through passive venting and occasionally flaring. As there was no requirement for methane destruction, no technology was employed up to 2007, when the project activity started construction. Regarding electricity generation, in the absence of the project, it would be generated by the existing power plants connected to the grid. Heat generation is not applicable to the project activity context. Therefore, the baseline scenario identified for LFG destruction and electricity generation is **LFG2** and **E3**, respectively.

**Demonstration of additionality**

According to the CDM Project Standard for Project Activities (v.2.0), permanent changes include changes in the project design. As described above, SJ and Ecourbis signed a Term of Agreement to purchase biogas from CTL in order to comply with the power purchase agreement. The main reason for not reaching its full performance is due to the pioneering initiative while using biogas for electricity generation. CTL is also a CDM project (# 5947) and, as described in is registered PDD and Validation Report, all emission reduction generated from the biogas produced by CTL project is of CTL's right and will be claimed by them. SJ cannot claim CERs from this biogas. The amount of biogas and methane from CTL will be discounted in the calculation of São João baseline emissions. No emission reductions will be claimed from this biogas since emission reductions are already accounted by CTL. Leakage from gas transportation is also accounted by CTL.
Following paragraph 243 of the CDM Project Standard for Project Activities (v.2.0), impacts of changes shall be reported in the PDD regarding additionality assessment. Therefore, additionality assessment is as follows in accordance with Combined tool to identify the baseline scenario and demonstrate additionality" /19/.

as follows:

***STEP 0: Demonstration that a proposed project activity is the First-of-its-kind.***
This step is not applied because the proposed project activity is not the First-of-its-kind.

**Outcome of Step 0:** The proposed project activity is not the First-of-its-kind.

***Step 1: Identification of alternative scenarios***
This Step serves to identify all alternative scenarios to the proposed CDM project activity(s) which can be the baseline scenario.

the alternative scenarios to the project are:

S1: The proposed project activity undertaken without being registered as a CDM project activity;

S3: The continuation of the current situation, not requiring any investment or expenses to maintain the current situation:

- LFG2: Atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons;
- E3: Electricity generation in existing and/or new grid-connected power plants;

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

All listed alternative scenarios are according to current applicable laws and regulations. /37/

**Outcome of Step 1:**

S1 and S3 are alternative scenarios to the project activity, which follows applicable laws and regulations. Proceed to Step 2 and/or Step 3.

- **STEP 2. Barrier analysis**

Not applicable. The additionality test was conducted in the light of the investment analysis (step 3).

- **STEP 3. Investment analysis**

In the registered PDD, the Internal Rate of Return (IRR) of 13.73%p.y. was compared to the interest government bond rates paying at the time of the project development, *i.e.* 2003 year. The average government bond interest rate at that time was 23.29%. Therefore, it was demonstrated that the project implementation was not economic or financially attractive when analysing the alternative scenario.

Given the unexpected performance of the project and the necessity to comply with the electricity contract sale, the project developer signed a LFG's supply contract on 30/09/2013 to purchase biogas from CTL landfill /43/ (Term of Agreement signed by Ecourbis and São João Energia Ambiental on 31/07/2015, states that Ecourbis and São João Energia Ambiental agree that CERs from LFG produced at Ecourbis Landfill inside the expansion area will belong exclusively to Ecourbis and will be enjoyed by CTL Landfill Gas Project).. Therefore, this change resulted in an increase in project investment and operational costs to construct and maintain the biogas interconnection, besides of the cost of the biogas purchase. Therefore, this change negatively impact the project attractiveness as revenues

continued to be the same (revenues were already considered in the project cash flow).

According to paragraph 244 of the CDM Project Standard of the Project Activity (v.01.0), if changes affect additionality of the project activity, the demonstration of the impacts of the changes on the additionality shall be based on all original input data:

> *"(a) If investment analysis was used, the project participants shall only modify the key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity"*

Although it is clear that there is no increase in the project attractiveness (but the opposite), the project participants revised the project cash flow in order to demonstrate that the project is still additional following paragraph 244 of the standard above.

In addition to the inclusion of Capex and Opex costs due to interconnection, the period of assessment was also increased. In the original cash flow, the period of assessment was up to 2017. In the revision of the cash flow presented below, the assessment period was extended to consider all concession period of the landfill (up to 2023 year) /39/ /40/. Revisions mentioned above resulted in 11.3% project IRR.

However, during the post-registration change of the project, the CDM Secretariat required to exclude financing expenditures and loan interests in light of §13 of TOOL27, where it states:

> *"The cost of financing expenditures (i.e. loan repayments and interest) shall not be included in the calculation of project IRR".*

Although the project participants' understanding is that the original cash flow considered at the time of the investment decision should be used as required by the CDM PS and only key parameters should be changed, the cash flow was revised in order to exclude financing expenditures and loan interests according to TOOL27. Results are as follows:

| | SJ "energy" | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| EBIT | 0,0 | 6,8 | 12,1 | 12,7 | 12,8 | 12,4 | 13,0 | 13,0 | 12,6 | 6,7 | 4,1 | 4,0 | 5,4 | 5,4 | 5,4 | 5,4 | 5,4 | 5,4 | 5,4 |
| Depreciation and Amortization | 0,0 | 3,8 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 1,1 | 0,0 | 0,0 | 0,0 | 0,0 |
| Working Capital variation | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| Operational Cash Flow | 0,0 | 10,6 | 17,2 | 17,8 | 18,0 | 17,6 | 18,2 | 18,2 | 17,7 | 11,8 | 9,2 | 9,2 | 10,5 | 10,5 | 6,5 | 5,4 | 5,4 | 5,4 | 5,4 |
| Investments | (48,8) | (14,8) | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | (1,0) | (1,9) | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| Dividends | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| Cash Flow after Investments | (48,8) | (4,2) | 17,2 | 17,8 | 18,0 | 17,6 | 18,2 | 18,2 | 16,7 | 9,9 | 9,2 | 9,2 | 10,5 | 10,5 | 6,5 | 5,4 | 5,4 | 5,4 | 5,4 |
| Income Tax (IR) | 0,0 | (0,4) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) | (0,6) |
| Income Tax (CSLL) | 0,0 | (0,2) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) | (0,3) |
| Capital Increase | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| Capital Decrease | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| Net Cash Flow | (48,8) | (4,8) | 16,2 | 16,8 | 17,0 | 16,6 | 17,2 | 17,2 | 15,7 | 8,9 | 8,2 | 8,2 | 9,5 | 9,5 | 5,5 | 4,4 | 4,4 | 4,4 | 4,4 |

| | R$ million | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| EBIT | - | 7 | 12 | 13 | 13 | 12 | 13 | 13 | 13 | 7 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Tax | 0,0 | (0,6) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) | (1,0) |
| Depreciation and Amortization | 0 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 0 | 0 | 0 | 0 |
| CAPEX | -49 | -15 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Carbon | | | | | | | | | | | | | | | | | | | |
| Total Project Earnings | -48,81 | -4,75 | 16,24 | 16,80 | 16,96 | 16,57 | 17,16 | 17,16 | 15,68 | 8,91 | 8,23 | 8,17 | 9,54 | 9,54 | 5,47 | 4,40 | 4,40 | 4,40 | 4,40 |
| IRR | 22,0% | | | | | | | | | | | | | | | | | | |
| NPV (23,29%) | -3.952.553 | | | | | | | | | | | | | | | | | | |

The resulted IRR is 22.0%, which is below the benchmark 23.29%, demonstrating that the project continues to be unattractive to investor. No changes in the results of the sensitivity analysis are expected as the IRR reduced.

PP provided revised cash flow of the project /39/. The key parameters related to Capex and Opex /39/ /40/ were change due to the biogas purchase from CTL in

| | |
|---|---|
| | order to attend electricity contract sale. Also, the assessment period was extended to consider all concession period and the installed capacity was revised according to nameplate of engines. However, no equipment was change and, therefore, no change was made in the electricity generation.<br><br>RINA verified that PP has provided documents in accordance with the requirements of project standard, where only key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity were modified and all the evidences were provided.<br><br>Following §28 the Tool of "Investment Analysis" version 9 /46/, a sensitivity analysis was conducted covering a range of at least +10 per cent and -10 per cent. The revision previously required by the CDM Secretariat in order to exclude financial expenditures from the project cash flow – even when this cash flow was considered in the decision making-context – resulted in an IRR (22.0%) clearly below but not too far from the benchmark (23.29%) and, therefore, the IRR surpasses the benchmark under 10% variations in costs and revenues.<br><br>Following §28 of the Investment Analysis Tool version 9, in cases where a scenario results in a financial indicator higher than the benchmark, an assessment of the probability of the occurrence of this scenario is required. As the project is already implemented and operational, a reasonable approach was to analyse actual incurred revenues, as well as actual incurred costs to the project, ruling out uncertainties regarding additionality. The resulted IRR was negative and the net present value (NPV) is –R$43.8MM as can be seen in the spreadsheet (Appendix 3 - Enclosure 2 – actual_v.2.xls) /39/.<br><br>All figures considered in the analysis were based on financial statements published in the Sao Paulo State Official Gazette (from the Portuguese Diário Oficial do Estado – D.O.E.) /45/ as required by the Brazilian legislation to incorporated companies (from the Portuguese "Sociedade Anônima – S.A."). According to Brazilian legislation, S.A. companies must publish their financial statements of the year.<br><br>It is RINA's opinion that at the time of the investment decision, the project IRR (13.8%) was lower than the benchmark (23.29%). Considering the actual expenditures and revenues, it is confirmed that the IRR is lower than the benchmark, even when corrections in the financial calculation are made in the project cash flow in favour to the project changing the IRR from 13.8% to 22.0%. In fact, current values demonstrate that projects with LFG energetic use are additional in a country where LFG burnt is more than enough. Based on the results of the investment analysis, the project remains additional.<br><br>**Common practice analysis**<br>Changes in the project layout (CTL biogas purchase) do not change the results of the common practice analysis presented in the registered PDD, as the applicable geographical area, measure, output and technologies are the same. Installed capacity of the project activity did not change. |
| **Findings** | **CAR 5**: Appendix 7 of the revised PDD is not completed with the changes applicable to the project activity. Please, provide the evidences/justify the all the changes applicable to the project activity.<br><br>**CAR 6***: In accordance with project standard, para 244. If the proposed or actual changes affect the additionality of the registered CDM project activity as referred to in paragraph 243(d) above, the demonstration of the impacts of the changes on the additionality shall be based on all original input data. In addition: (a) If investment analysis was used, the project participants shall only modify the key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity*. PP is requested to provide the evidences of the key parameters modified in the financial analysis. |

| | |
|---|---|
| | To close CAR 5, PDD was revised and information provided in Annex 7. To close CAR 6, evidences were provided. |
| **Conclusion** | **Project design**<br>RINA verified that the changes in the project design complies with the relevant requirements in the Project standard.<br>RINA verified that the proposed changes in the revised PDD are in accordance with the actual implementation of the project activity: the revised project design considers that SJ and Ecourbis signed a Term of Agreement to purchase biogas from CTL in order to comply with the power purchase agreement. The main reason for no reaching its full performance is due to the pioneering initiative while using biogas for electricity generation. CTL is a CDM project (# 5947) and, as described in is registered PDD and Validation Report /27/ all emission reduction generated from the biogas produced by CTL project is of CTL's right and will be claimed by them. SJ cannot claim CERs from this biogas. Biogas supply from CTL (main reason for the PRC) was negotiated and the contract signed in the second semester of 2013. The actual supply ("when the change actually became effective") started on 03-Apr-2014, i.e., 48 days before the end of the first crediting period<br><br>**Applicability of methodology and standardized baseline**<br>RINA confirms that the selected baseline and monitoring methodology has been previously approved by the CDM Executive Board, and is applicable to the revised Project activity, which complies with all the applicability criteria's'.<br><br>**Project boundary**<br>RINA can confirm that all the emission sources and gases have been included in the project boundary and the description in the revised PDD is accurate and complete, and also that the selected sources and gases are justified for the proposed project activity.<br><br>**Establishment and description of baseline scenario**<br><br>The approved baseline methodology ACM0001: Flaring or use of landfill gas, version 18.1 of 29/11/2018; has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.<br><br>**Demonstration of additionality**<br>By assessing the evidences presented and cross-checking the information with references used, it is RINA's opinion that all data, rationales, assumptions, justifications and documentation provided by the project participants to support demonstration of additionality are credible and reliable.<br><br>RINA verified that the revised PDD has been updated to describe the changes that covers the paragraph 242 of the Project standard:<br><br>(a) The applicability and application of the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents with which the project activity has been registered: updated the monitoring methodology and tools, assessing the applicability criteria's<br><br>(b) The compliance of the monitoring plan with the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents: updated the monitoring plan in accordance with the updated monitoring methodology and tools (please, also refers to the temporary deviation and permanent changes from the monitoring plan described in the sections above);<br><br>(c) The level of accuracy and completeness in the monitoring of the project activity compared with the requirements contained in the registered monitoring plan: updated the monitoring plan in accordance with the updated monitoring methodology and tools(please, also refers to the temporary deviation and permanent changes from the monitoring plan described in the sections above); |

| | |
|---|---|
| | (d) The additionality of the project activity: reassessed the additionality of the project activity<br><br>(e) The scale of the project activity: the project remains large scale. |

## D.8. Changes specific to afforestation and reforestation project activities

| | |
|---|---|
| **Means of validation** | N/A |
| **Findings** | N/A |
| **Conclusion** | N/A |

## SECTION E. Internal quality control

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

## SECTION F. Validation opinion

>> RINA Services Spa (RINA) has performed a validation of post registration changes for the project activity "São João Landfill Gas to Energy Project (SJ )" in Brazil, CDM Registration Reference N° 0373. The validation has s based on the information made available to us.

RINA has performed this validation on the basis of the following documents:

- CDM Executive Board: CDM project cycle procedure for project activities; version 2.0 of 29/11/2018
- CDM Executive Board: CDM project standard for project activities, version 2.0 of 29/11/2018
- CDM Executive Board: CDM validation and verification standard for project activities, version 2.0 of 29/11/2018
- Approved baseline and monitoring methodology ACM0001 "Flaring or use of landfill gas" version 18.1 of 29/11/2018

It is RINA's opinion that the deviation complies with the relevant requirements related to the temporary deviation from the registered monitoring plan and monitoring methodology is in line with the Project standard, as conservative assumptions are used to ensure that GHG emission reductions will not be over-estimated as a result of the deviation.

It is RINA's opinion that the permanent changes from the registered monitoring plan and the applied methodology is in line with the Project standard as all the requirements in the updated methodology version 18.1 of 29/11/2018 have been met and that the application of the updated version of the applied methodology does not impact the conservativeness of the monitoring and verification process, including the related emission reduction or removal calculations, as conservative assumptions are used to ensure that GHG emission reductions will not be over-estimated as a result of the permanent changes from the registered monitoring plan.

It is RINA's opinion, the changes in the project design, as outlined in the revised PDD version 5.2 of 01/10/2019, from the project activity as described in the registered PDD ensure that the level of accuracy and completeness in the monitoring and verification process is not reduces as a result of the revision; the revisions are in accordance with the applied monitoring methodology and the changes to the project activity comply with the requirements established in the CDM Project Standard. RINA re-assessed the additionality of the project to confirm that the project remains additional. There was no impact in the scale of the project activity and the applicability of the methodology and tools were reassessed in accordance with the updated versions, including the updating in the monitoring plan. Therefore it is RINA's opinion that the post registration change would not adversely affect the conclusions of the validation report of the registered PDD.
Hence RINA requests that the post registration changes from the project activity as described in the registered PDD for the project activity "São João Landfill Gas to Energy Project (SJ )" in Brazil may be considered by the Board

# 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 |
| CRT | Coordination and Technical Control Staff |
| DCI | Certification Division of RINA Services Spa |
| 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 |
| 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 S.p.A. |
| 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:<br>*We declare that Mr/Mrs/Ms:* | Thais DE LIMA CARVALHO |
| è qualificato come[1]:<br>*is qualified as:* | CDM -TEC, -VAL, -VER, -TL<br>ITRP, REG-EXP[2] |
| per le seguenti aree tecniche:<br>for the following technical areas: | 1.1, 1.2, 2.1, 13.1 |

| AREE TECNICHE<br>TECHNICAL AREAS | DESCRIZIONE DELL'AREA TECNICA<br>*TECHNICAL AREA DESCRIPTION* | SCOPO SETTORIALE<br>*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 Divisione Certificazione.
*in accordance with the instructions of the Certification Division.*

| REVISIONE<br>*REVISION* | DATA<br>*DATE* | MOTIVAZIONI PER LA REVISIONE<br>*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 |

Il Resp. CCPLS
*Head of CCPLS*

[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*

GHG_QUAL_CERT_EN_07_18 Page 1 of 1

RINA

# CERTIFICATO DI QUALIFICA
## *QUALIFICATION CERTIFICATE*

| | |
|---|---|
| Si attesta che il sig./sig.ra:<br>*We declare that Mr/Mrs/Ms:* | **Mayra Rocha** |
| è qualificato come[1]:<br>*is qualified as:* | **CDM-FIN EXP, CDM-TEC** |
| per le seguenti aree tecniche:<br>for the following technical areas: | 1.2 |

| AREE TECNICHE<br>TECHNICAL AREAS | DESCRIZIONE DELL'AREA TECNICA<br>*TECHNICAL AREA DESCRIPTION* | SCOPO SETTORIALE<br>*SECTORAL SCOPE* |
|---|---|---|
| 1.2 | Renewable Energy | 1 |

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

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

Il Resp. QPT
*Head of QPT*

[1] Legend:

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

RINA Services S.p.A. è accreditata 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*

# CERTIFICATO DI QUALIFICA
## *QUALIFICATION CERTIFICATE*

Si attesta che il sig./sig.ra: **Hui Feng LIU**

*We declare that Mr/Mrs/Ms:*

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

per le seguenti aree tecniche: **1.1, 1.2, 8.1, 9.2, 13.1**
for the following technical areas:

| AREE TECNICHE<br>TECHNICAL AREAS | DESCRIZIONE DELL'AREA TECNICA<br>*TECHNICAL AREA DESCRIPTION* | SCOPO SETTORIALE<br>*SECTORAL SCOPE* |
|---|---|---|
| 1.1 | Thermal energy generation | 1 |
| 1.2 | Renewables | 1 |
| 8.1 | Mining and mineral processes | 8 |
| 9.2 | Iron, steel and ferro-alloy production | 9 |
| 13.1 | Solid waste and wastewater | 13 |

in accordo alle istruzioni dell'unita Sostenibilità & Cambiamenti Climatici.
*in accordance with the instructions of the Sustainability & Climate Change Unit.*

| REVISIONE<br>*REVISION* | DATA<br>*DATE* | MOTIVAZIONI PER LA REVISIONE<br>*REASON FOR THE REVISION* |
|---|---|---|
| 0 | 10/09/2010 | - |
| 11 | 31/03/2017 | Updating qualification as ITRP |
| 12 | 30/07/2018 | Updating qualification as REG-EXP |

Il Resp. CCPLS
*Head of CCPLS*

[1] Legend:

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

[2] China

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 Progett 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*

# 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 | PP |
| 2 | Biogás Energia Ambiental S.A. | CDM-PDD updated for post registration changes “São João Landfill Gas to Energy Project (SJ )”. | version 1.0 of 12/09/2018<br><br>version 2.0 of 21/11/2018<br><br>version 4 of 27/03/2019<br><br>version 4.1 of 03/05/2019<br><br>version 4.2 of 06/06/2019<br><br>version 5.0 of 29/07/2019<br><br>version 5.1 0f 20/08/2019<br><br>version 5.2 of 01/10/2019 | PP |
| 3 | CDM Executive Board | CDM project cycle procedure for project activities | version 01.0 of 03/03/2017 (applicable only to the start of the validation)<br>version 2.0 of 29/11/2018 (applicable to the final report) | Other |
| 4 | CDM Executive Board | CDM project standard for project activities | version 01.0 of 03/03/2017 (applicable only to the start of the validation)<br>version 2.0 of 29/11/2018 (applicable to the final report) | Other |
| 5 | CDM Executive Board | CDM validation and verification standard for project activities | version 01.0 of 03/03/2017 (applicable only to the start of the validation)<br>version 2.0 of 29/11/2018 (applicable to the final report) | Other |
| 6 | CDM Executive Board | CDM Executive Board: Baseline and monitoring methodology ACM0001 “Flaring or use of landfill gas” | version 18.1 of 29/11/2018 | Other |

| | | | | |
|---|---|---|---|---|
| 7 | CDM Executive Board | CDM-PDD-FORM: Project design document form, including its Attachment: Instructions for completing this form | Version 10.1 of 28/06/2017 | 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" "20181121_São João_CERs_v.2.xlsx" "20190503_São João_CERs_v.3.xlsx" 20190606_São João_CERs_v.4.xlsx | Version 1 of 12/09/2018 Version 2 of 21/11/2018 version 3 of 03/05/2019 version 4 of 06/06/2019 | 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 02.0.0 dated 20/07/2012 | 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 | Version 3 of 22/09/2017 | Other |

| | | | | |
|---|---|---|---|---|
| | | combustion | | |
| 24 | CEPAGRI | Temperature and preciptation 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<br><br>São João | Operational license nº 30007689 and 30007689, dated 25/05/2012 valid until 25/05/2017<br><br>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-historic data) | Accessed on 07/05/2019 | 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 | Accessed on 26/10/2018 | PP |

| | | | | |
|---|---|---|---|---|
| | | .php?p=4633 | | |
| 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):<br>Enclosure 1.xls (registered PDD)<br>Enclosure 1_Rev2.xls (revised due to changes)<br><br>20190729_Enclosure 1_Rev3.xlsx<br>20190729_Enclosure 1_Rev3-original.xls<br><br>Appendix 3 - Enclosure 2 – actual_v.2.xls | 11/09/2018<br><br><br><br><br>29/07/2019<br><br><br>20/08/2019 | PP |
| 40 | Biogás Energia Ambiental S.A. | CAPEX evidences:<br>CAPEX INVESTIMENTO INTERLIGACAO.xlsx and receipts (CAPEX _ INTERLIGAÇÃO CTL x SJEA.rar) | - | PP |
| 41 | Continental Blower LLC | Technical Data Sheet Continental Blower LLC (CONTINENTAL_Blower.pdf) | - | PP |
| 42 | TÜV SÜD Industrie Service GmbH | Validation report with the validation opinion, | Revision 01 of 20/01/2010 | PP |
| 43 | São João Energia Ambiental S.A> and Ecourbis Ambiental S.A. | Contract to supply LFG from Ecourbis to São João (CONTRATO SJEA x ECOURBIS.PDF) | 30/09/2013 | PP |
| 44 | São João Energia Ambiental S.A and EQAO | Comparison between CERS estimated and performed SJEA_Estimative Vs. Performed.xlsx<br><br>Amount of methane monitored: REL-02 METANO - JULHO 2019.zip<br><br>CERs estimative “Appendix 1-Enclosure” available at “https://cdm.unfccc.int/Projects/DB/DNV-CUK1145141778.29/view”, accessed on 23/08/2019 | - | PP |
| 45 | São João Energia Ambiental S.A and EQAO | Financial statements published in the Sao Paulo State Official Gazette :<br>SJEA Publicado 2008-2007 pg 18.pdf<br>SJEA Publicado 2008-2007 pg 17.pdf<br>SJEA Publicado 2007-2006.pdf<br>Balanço 2017_2018.pdf<br>Balanço 2016_2017.pdf | 20/08/2019 | PP |

| | | | | |
|---|---|---|---|---|
| | | Balanço 2015_2016.pdf<br>Balanço 2014_2015.pdf<br>Balanço 2013_2014.pdf<br>Balanço 2012_2013.pdf<br>Balanço 2011_2012.pdf<br>Balanço 2010_2011.pdf<br>Balanço 2009_2010.pdf | | |
| 46 | CDM Executive Board | Investment Analysis Tool | Tool 27 Version 9 of 29/11/2018 | Others |

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

**Table 1. CLs from this validation**

| **CL ID** | 1 | **Section no.** | D.1 | **Date:** 14/11/2018 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| *In accordance with the project cycle section 9.6. Submission of request for post-registration changes together with request for renewal of crediting period* "a new version of the PDD including both the updates for the purpose of renewal of crediting period and the post-registration change (in both clean and track-change versions)". | | | | |
| **Project participant response** | | | | **Date:** 21/11/2018 |
| *As discussed during the site visit, the Project Participants understand the request for a tracked-change PDD for the post registration change. However, the requiring for a tracked PDD for the purpose of renewal together with the post registration change does not make sense to our understanding. Standard requirements, template, methodology and tools are not the same when compare to the timing of the project registration. In this case, the project was registered using ACM0001 version 2 and the current version of the methodology used in this renewal of the crediting period is 18. Therefore, the PDD will be practically all tracked.*<br><br>*However, as required by the CDM-EB93-A06-PROC and DOE, the tracked PDD reflecting changes from the post registration change and renewal of the crediting period, including updated requirements from standard, methodology and related tools, is attached to this response. The PDD is also tracked considering issues raised by DOE during validation. Please refer to the 2nd version of the document.* | | | | |
| **Documentation provided by project participant** | | | | |
| • *20181121_São João_PDD_v.2-track PDD 1stPC.docx* | | | | |
| **DOE assessment** | | | | **Date:** 15/01/2019 |
| PP has provided the track change version of the PDD.<br>This CL is closed | | | | |

| **CL ID** | 2 | **Section no.** | D.3 | **Date:** 12/11/2018 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| PP is requested to provide the evidence of the capacity of the blower /41/ | | | | |
| **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;*<br>• *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.<br>This CL is closed | | | | |

| **CL ID** | 3 | **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℃ 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** | 4 | **Section no.** | D.6 | **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** | 5 | **Section no.** | D.6 | **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.<br>This CL is closed. |

| **CL ID** | 6 | **Section no.** | D.6 | **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.*<br><br>*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.<br>This CL is closed | | | | |

| **CL ID** | 7 | **Section no.** | D.6 | **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:<br>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:*<br>- *In Brazil there are no requirements on how often flow-meters must be calibrated;*<br>- *In the Netherlands, for turbine meters of the size of used in the project, calibration is never required;*<br>- *In Germany, a calibration every 10-years is enforce by law;*<br>- *The manufacturer states that it's up to the clients to determine the calibration frequency.*<br><br>*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*<br>*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*<br>*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. CARs from this validation**

| **CAR ID** | 1 | **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 November 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.*<br><br>*Project Participant response in 10/04/2019:*<br>*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:*<br>*(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;*<br>*(b) Permanent changes*<br>*i. Corrections;*<br>*ii. Permanent change to the registered monitoring plan;*<br>*iii. Changes to project design:*<br>*- 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";*<br>*- 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.*<br><br>***Project Participant response in 03/05/2019:***<br>*The PP clarifies that any LFG with temperature and flow records out of manufacturer specification (i.e. 1,000ºC – 1,200ºC temperature and 500Nm$^3$/h - 5,000Nm$^3$/h flow rate), data is not considered for emission reduction purposes. As data (including temperature and flow) is recorded every 5-minutes in the PLC system in the temporary deviation, a -10 per cent discount will applied in the baseline emission and +10 per cent in project emissions, which is a significant discount in emission reductions considering the equipment error (more than five times). Please refer to PPs response in CAR 7. Also, the main purpose of the LFG is generate electricity; if LFG is sent to flare, it means that the project is not efficient and no revenue from electricity is expect to be received from this burned LFG.* | | | | |
| **Documentation provided by project participant** | | | | |
| • *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*<br>• *20190327_São João_PDD_v.4-track PDD 1stPC-RE.docx;*<br>• *20190503_São João_PDD_v.4.1-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

**RINA response 30/04/2019**
For the deviation, in the section B.7.3 describes:

- *In the case of project emissions from flaring, biogas 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 as established by the manufacturer*. However, in accordance with the tool, both temperature and flow have to be in accordance with manufacturer specification and flame detected (please, confirm how the parameter flamem is registered considered the 5 min (in the case the flame is not on in a minute, inside the 5 minutes register).

This CAR remains open

**RINA response 07/05/2019**
*The PP clarified that any LFG with temperature and flow records out of manufacturer specification (i.e. 1,000ºC – 1,200ºC temperature and 500Nm$^3$/h - 5,000Nm$^3$/h flow rate), data is not considered for emission reduction purposes. A conservative discount will be applied for the deviation.*

*This CAR is closed*

| CAR ID | 2 | 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.*

***Project Participant response in 03/05/2019**:*
*The CO2 emission factor of the grid was revised in sheet "Baseline Emissions", CER spreadsheet. Please refer to the revised version of the document.*

*In addition, the Project Participants clarify that, due to the revision of the Project Standard (v.2.0), the post-registration change will be submitted before the request for renewal of the crediting period of the project. As the first crediting period ended on 21/05/2014, the estimated emission reductions refer to the next 7-year period of the project (2nd crediting period) based on updated methodology and tools (including data vintage and weights). No emission reduction will be discounted due to delay in the renewal process as the deadline for request for renewal for project activities that crediting period expired before 31 December 2018 is 31 Dec 2019 according to the Information Alert sent by the CDM Team.*

**Documentation provided by project participant**

- *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*
- *20181121_São João_CERs_v.2.xlsx;*
- *20190503_São João_PDD_v.4.1-track PDD 1stPC.docx;*
- *20190503_São João_CERs_v.3.xlsx;*
- *E-mail from the CDM Team – Information Alert: CHANGES TO THE RULES FOR RENEWAL OF CREDITING PERIOD FOR PROJECT ACTIVITIES.msg.*

| **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

**RINA response 30/04/2019**
Revised spreadsheet was not provided. Moreover, some sections of the PDD while describing the emission factor, describes the third crediting period. Data vintage is not correctly considered.

This CAR remains open

**RINA response 07/05/2019**
PP has provided the revised spreadsheet and data vintage was revised in the PDD.

This CAR is closed

| **CAR ID** | 3 | **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.*<br><br>***Project Participant response in 10/04/2019:***<br>*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.<br>This CAR remains open<br><br>**RINA response 30/04/2019**<br>PDD was correctly revised. Thia CAR is closed. | |

| **CAR ID** | 4 | **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;*<br><br>• *20181121_São João_CERs_v.2.xlsx;*<br><br>• *Caterpillar Diesel Generator Set – Technical data (page 4).* | | | | |
| **DOE assessment** | | | | **Date:** 14/01/2019 |
| PDD was revised in accordance with technical data sheet.<br><br>This CAR is closed | | | | |

| **CAR ID** | 5 | **Section no.** | D.7 | **Date:** 14/11/2018 |
|---|---|---|---|---|
| **Description of CAR** | | | | |
| Appendix 7 of the revised PDD is not completed with the changes applicable to the project activity. Please, provide the evidences/justify the changes applicable to the project activity. | | | | |
| **Project participant response** | | | | **Date:** 21/11/2018 |

*Appendix 7 of the PDD was revised to consider post-registration changes of the project due to CTL biogas purchase. Details regarding the reassessment of additionality and monitoring procedures were also included (section B.5 and B.7, respectively). To the understanding of the project participants, there is no need to revise calculation of emission reductions (section B.6) as equations and calculations do not change, but the monitoring plan only. Please refer to the 2nd version of the document.*

***Project Participant response in 10/04/2019:***
*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:** 15/01/2019 |
|---|---|

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.*

Moreover, 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.

This CAR remains open.

**RINA response 30/04/2019**
Revised PDD describes the changes in accordance with the Project standard. Moreover, the requirements of CDM project cycle procedure, version 2 will be followed.

This CAR is closed.

| **CAR ID** | 6 | **Section no.** | D.7 | **Date:** 14/11/2018 |
|---|---|---|---|---|

**Description of CAR**

*In accordance with project standard, para 244. If the proposed or actual changes affect the additionality of the registered CDM project activity as referred to in paragraph 243(d) above, the demonstration of the impacts of the changes on the additionality shall be based on all original input data. In addition: (a) If investment analysis was used, the project participants shall only modify the key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity*. PP is requested to provide the evidences of the key parameters modified in the financial analysis.

| **Project participant response** | **Date:** 21/11/2018 |
|---|---|
| *Revised cash flow of the project was provided during the site visit. As discussed during the visit, key parameters related to Capex and Opex were change due to the biogas purchase from CTL in order to attend electricity contract sale. Also, the assessment period was extended to consider all concession period and the installed capacity was revised according to nameplate of engines. However, no equipment was change and, therefore, no change was made in the electricity generation. The following changes were made:*<br>• *Capex:*<br>*Sheet "PDD" - cell "AE17"; sheet "sens" - line 197; sheet "input" - cell "J4"*<br>• *Opex:*<br>*Sheet "sens" - line 161*<br>*Please refer to the revised version of the PDD and the project cashflow.* | |
| **Documentation provided by project participant** | |
| • *20181121_São João_PDD_v.2-track PDD 1stPC.docx*<br>• *Enclosure 1_Rev2.xlsx* | |
| **DOE assessment** | **Date:** 28/01/2019 |
| PP has provided the revised documents in accordance with the requirements of project standard, only key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity were modified and the evidences were provided.<br>This CAR is closed. | |

| **CAR ID** | 7 | **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:*<br><br>*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.*<br><br>*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.*<br><br>*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.*<br><br>*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.*<br><br>***Project Participant response in 10/04/2019:***<br>*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:*

*(e) 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;*

*(f) Permanent changes*

*vii. Corrections;*

*viii. Permanent change to the registered monitoring plan;*

*ix. 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.*

***Project Participant response in 03/05/2019:***

*According to ACM0001, for the determination of Baseline emissions of methane from the SWDS, the sum of the quantities of methane flared and used in power plant(s), boiler(s), air heater(s), glass melting furnace(s), kiln(s) and natural gas distribution. Therefore, in the case of the project activity, it shall be considered the sum of FIT524, FIT544 and FIT564 (flares), as well as FIR800 (electricity generators). Information was corrected in the PDD.*

*In order to apply the conservative approach and discount factors, the PP adopted:*

- *Temporary deviation (§231, the CDM Project Standard):*
  - *Apply -10% in baseline emissions and +10% in project emissions during the period from 22/05/2014 to 05/11/2018 (a conservative approach as the discount is more than five times the equivalent error of equipment);*

- *Permanent change (§239, the CDM Project Standard):*
  - *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.*

**Documentation provided by project participant**

- *20181121_São João_PDD_v.2-track PDD 1stPC.docx;*
- *20190503_São João_PDD_v.4.1-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.*<br>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:<br>*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.*<br><br>This CAR remains open.<br><br>**RINA response 30/04/2019**<br>*Revised PDD describes: In the case of baseline emissions of methane from SWDS, 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*. However, FIR 800 is dedicated to measure the biogas flow to electricity generation.<br><br>Moreover, PP is requested to clarify how the proposed Permanent change to the registered monitoring plan is in accordance with paragraph 239 of PS for project activities (version 2.0).<br><br>This CAR remains open<br><br>**RINA response 07/05/2019**<br>Revised PDD presents the requirements of Project standard.<br><br>This CAR is closed. | |

**Table 3. FARs from this validation**

| FAR ID | xx | Section no. | | Date: DD/MM/YYYY |
|---|---|---|---|---|
| **Description of FAR** | | | | |
| *N/A* | | | | |
| **Project participant response** | | | | **Date:** DD/MM/YYYY |
| | | | | |
| **Documentation provided by project participant** | | | | |
| | | | | |
| **DOE assessment** | | | | **Date:** DD/MM/YYYY |
| | | | | |

- - - - -

## Document information

| *Version* | *Date* | *Description* |
|---|---|---|
| 02.0 | 31 October 2017 | Revision to align with the requirements in the “CDM validation and verification standard for project activities” (version 01.0). |
| 01.0 | 23 March 2015 | Initial publication. |

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: post-registration change, project activities, validation report