Monitoring report form for CDM project activity
(Version 07.0)

MONITORING REPORT		
Title of the project activity	ESTRE's Paulínia Landfill Gas Project (EPLGP)	
UNFCCC reference number of the project activity	0165	
Version number of the PDD applicable to this monitoring report	04.5	
Version number of this monitoring report	2.0	
Completion date of this monitoring report	22/01/2020	
Monitoring period number	#27	
Duration of this monitoring period	01/07/2019 - 30/09/2019	
Monitoring report number for this monitoring period	Not applicable	
Project participants	ESTRE Ambiental S/A Nordic Environment Finance Corporation	
Host Party	Brazil	
Applied methodologies and standardized baselines	ACM0001 - "Flaring or use of landfill gas" (version 13.0.0)	
Sectoral scopes	13 - Waste handling and disposal	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	-	75,124 tCO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	155,674 tCO_2e	

SECTION A. Description of project activity

A.1. General description of project activity

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The CDM project activity "ESTRE's Paulínia Landfill Gas Project (EPLGP)" is implemented at the CGR Paulínia landfill[1]. The project activity promotes real and measurable permanent abatement of greenhouse gas (GHG) emissions through collection and destruction (combustion in high temperature enclosed flares) of landfill gas (LFG) that is generated at this landfill.

LFG is rich in methane (CH_4), a powerful GHG. The CGR Paulínia landfill has been under operation by the project owner and host-country project participant ESTRE Ambiental S/A. since its commissioning date in May 2000. The project's LFG collection and destruction system was completely implemented at the landfill in September 2006.

The construction of the project's LFG capture and destruction system (using high temperature enclosed flares) was initiated in March 2006 and was concluded in September 2006. While related testing and commissioning phases occurred in September 2006, the official starting of operations of the project activity (with monitoring data measurements being recorded) is 14/09/2006.

LFG is generated at the CGR Paulínia landfill as a result of anaerobic decomposition of municipal solid waste (MSW) historically disposed at the landfill. The project activity so far encompasses the following components/infrastructure:

(i) Capturing of LFG through a set of vertical LFG collecting wells that are interconnected through a LFG collection pipeline network
(ii) Destruction of all collected LFG (which is collected by the LFG collecting wells and transported through the LFG collection pipeline network) by combustion (in 6 high temperature enclosed flares installed in the project's LFG destruction facility).

As indicated in the registered version of the PDD valid for the 2nd 7-year renewable crediting period of the project activity (hereafter denominated as registered PDD), the project design under its current configuration does not encompass any utilization of LFG. The project activity was implemented and remains being operated without having any share of collected LFG being utilized as gaseous fuel for electricity generation, as gaseous fuel in boilers or for any purpose other than being destroyed through combustion in the set of 6 installed high temperature enclosed flares.

By the end of the considered monitoring period, the implemented project's LFG collection system encompassed about 380 vertical LFG collection wells. No horizontal LFG collection trenches have so far been utilized for collecting LFG at the CGR Paulínia landfill. During the considered monitoring period, LFG was collected at the CGR Paulínia landfill with the utilization of 4 centrifugal blowers which are connected to the project's LFG collecting pipeline network.

As part of the operation of the project activity, all collected LFG is conducted within the LFG collecting pipeline network to main pipelines that are interconnected in a main pipeline in the LFG destruction facility. LFG sent to the flares is combusted under high temperature and controlled conditions.

The amount and quality of collected LFG which is sent to the set of flares have been continuously measured, recorded and reported along the considered monitoring period. During the considered monitoring period, monitoring activities encompassed continuous measurements of LFG flow sent to each one of the flares, CH_4 content of collected LFG sent to the flares, LFG temperature and

[1] CGR stands for "*Centro de Gerenciamento de Resíduos"* in Brazilian Portuguese language ("Waste Management Center" when translated into English language).

LFG pressure. As also established in the project's monitoring procedure valid for the 2nd 7-year crediting period, the status/conditions of the high temperature enclosed flares and their compliance with operational requirements (as established by the flare equipment manufacturer) are also monitored in an individual basis.

All LFG related monitoring instruments/equipment (incl. LFG flow meter, LFG pressure sensor, LFG temperature sensor, LFG CH_4 content gas analyser) are installed in the main LFG pipeline of the project activity. Thermocouples for measuring temperature of the exhaust gas of the flares are installed in the upper section of each one of the 6 high temperature enclosed flares also installed as part of the project activity. The installed high temperature enclosed flares are also equipped with Ultra-violet (UV) flame detectors (of which status (flare "*ON*" or flare "*OFF*") is also continuously monitored). The set of LFG and flaring related continuous measurements are recorded and reported with an every minute frequency. Data is stored in a computerized database located in the project's control room.

During the considered monitoring period, the project activity was implemented and has operated under the following configuration:

- 4 identical centrifugal blowers with LFG collection capacity of up to 5,000 Nm^3/h each;
- 6 high temperature enclosed flares (of which specifications are presented in the registered PDD) [2];
- 2 backup captive off-grid electricity generators (fuelled by diesel) with nameplate installed capacity of 450 kVA and 512 kVA. These electricity generators are used to meet the project's electricity demand during temporary planned or unplanned events when the supply of grid-sourced electricity to the project activity is interrupted.
- All monitoring instruments/equipment which are required for measuring LFG related parameters, temperature of the exhaust gas of the flares, status of the flares and electricity consumption (of which specifications are presented in Section D.2).

The MSW disposal area at the CGR Paulínia landfill is about 603,812 square meters. During the considered monitoring period, about 64% of the project's existing LFG collecting wells were under continuous operation (in the average)[3].

Further details about installed GHG abatement equipment are included in Section B.1. Details about all installed monitoring equipment/instruments are made available in Section D.2.

ESTRE Ambiental S/A (the host country project participant for the project activity and the owner and operator of the CGR Paulínia landfill) has implemented a quality assurance and control (QA/QC) and environmental management (EMS) system for all activities undertaken at the CGR Paulínia landfill. The company's ISO 14001 certified QA/QC/EMS system was previously implemented in year 2006. The boundary/scope of this QA/QC/EMS system currently also encompasses applicable work procedures for the operation and monitoring of the project activity.

[2] During the whole considered monitoring period from 01/07/2019 to 30/09/2019, one of the flares (Flare 3) was completely out of service.

[3] As part of the normal operation of the CGR Paulínia landfill (and also as part of the normal operation of the project activity), some of the project's LFG collecting wells are often temporarily disconnected from the project's LFG collection pipeline in order to facilitate continuous activities of MSW disposal and, thus allowing transit of machinery (wheel loaders and excavators) and trucks as part of the normal day-to-day operations of the CGR Paulínia landfill. Furthermore, sometimes some of the project's LFG extracting wells are also often temporarily disconnected from the LFG collection pipeline due to repair, operational and/or maintenance reasons (performance of welding and other repair services at the project's LFG wells and/or pipeline, repositioning of the LFG pipeline, maintenance in the head of the LFG wells, drainage of condensate, etc.).

A.2. Location of project activity

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The project activity is implemented at the CGR Paulínia landfill that is located in the city of Paulínia that is positioned within the Metropolitan Region of Campinas, which is formed by 18 municipalities. The CGR Paulínia landfill is located at Estrada Municipal PLN 190, s/no., Parque da Represa, Paulínia – SP, Brazil. The project site is located about 130 km Northern São Paulo city.

The project site has the following geographical coordinates:

- Latitude: -22.773506
- Longitude: -47.196161

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	ESTRE Ambiental S/A	No
Norway	Nordic Environment Finance Corporation.	No

A.4. References to applied methodologies and standardized baselines

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The project activity applies the following large-scale CDM baseline and monitoring methodology:

- ACM0001 - ”Flaring or use of landfill gas” (version 13.0.0). (http://cdm.unfccc.int/filestorage/E/Y/F/EYFHCV3K4J5P06DTQSG9WLMOBNUX2I/EB67_repan12_ACM0001_ver13.0.0.pdf?t=aWV8bmVmZHlhfDAbkn62RDZuyjHVzDOMoxMx)

For the considered monitoring period, as also established in the registered PDD, the following methodological tools are also applied[4]:

- “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (version 01) (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf).

  The application of this tool refers to the ex-post application of the latest version of the “Tool to calculate the emission factor for an electricity system” (version 03.0) (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v3.0.pdf)

- “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (version 02)

[4] The registered PDD also refers to the methodological tool “Emissions from solid waste disposal sites” (version 06.0.1, EB66). However, it is crucial to note that, as outlined in the registered PDD, applicable guidance of this methodological tool is only applied in the context of ex-ante estimation of emission reductions to be achieved by the project activity during the 2nd 7-year crediting period. This methodological tool is not applied for the ex-post determination of emission reductions achieved by the project activity. The following methodological tools (that are also outlined in the registered PDD) are not applied in the context of the ex-post determination of emission reductions achieved by the project activity either:

- “Tool to determine the baseline efficiency of thermal or electric energy generation systems” (Version 01);
- “Tool to determine the remaining lifetime of equipment” (Version 01);
- “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);
- “Combined tool to identify the baseline scenario and demonstrate additionality” (Version 05.0.0);

(http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf)

- "Project emissions from flaring" (version 02.0.0, EB 68) (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v2.0.pdf);

- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0, EB 61) (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v2.0.0.pdf);

A.5. Crediting period type and duration

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From 14/09/2013 to 13/09/2020 (2nd 7-year renewable crediting period).

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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At the end of the considered monitoring period, the implemented project's LFG collection system consisted of about 380 operational vertical LFG collecting wells interconnected through a high density polyethylene pipeline network. The LFG collecting wells are used to extract LFG from inner section of the landfill. All collected LFG is transported to the project's LFG destruction facility (where the 6 high temperature enclosed flares are positioned) through a high density polyethylene (HDPE) pipeline network. This pipeline includes condensation pots (where most of the humidity in collected LFG is physically removed/drained through condensation).

During the considered monitoring period, collected LFG has been sucked and pressurized by the installed 4 centrifugal blowers powered by electricity motors. The quantity and quality of collected LFG that is sent to the installed 6 high temperature enclosed flares are measured by following applicable guidance of ACM0001 (version 13.0.0) and the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) (with Option C being applied). Thus, the determination of the absolute humidity of the gaseous stream is not required. Fraction of CH_4 in collected LFG stream as well as LFG flow for each individual flare (monitoring parameters "Volumetric flow of LFG stream in time interval *t* on a wet basis" ($V_{t,wb}$) and "Volumetric fraction of CH_4 in the collected LFG in time interval *t* on a wet basis" ($v_{l,t,wb}$) respectively) are assumed as monitored on the same basis.

During the whole monitoring period from 01/07/2019 to 30/09/2019, the project's LFG destruction facility operated under the following equipment/instrument configuration:

- 4 centrifugal blowers model 77A1.03, manufactured by Continental Industrie S.A.S powered by electric motor with nameplate power of 75 kW).
- LFG monitoring equipment/instruments:
    - 6 LFG mass flow meters (1 flow meter for each installed high temperature enclosed flare)
    - 1 LFG temperature sensor,
    - 1 LFG pressure sensor,
    - 1 CH_4/O_2 content gas analyzer,
    - 6 Thermocouples (1 thermocouple for each installed high temperature enclosed flare in order to measure temperature in the exhaust gases of each installed flare)
    - 6 UV flame detectors (1 flame detector in each installed flare in order to monitor the operational and flame status of each one of the installed flares)
- 6 high temperature enclosed flares manufactured by Biotecnogás s.r.l.
- 2 backup captive off-grid electricity generators (fuelled by diesel) with the following specifications:

	Generator 1	Generator 2
Manufacturer:	STEMAC S/A	Leon Heimer S/A
Model:	GTA	40/41
Nameplate installed capacity:	450 kVA	512 kVA

- 2 electricity meters (one for the electricity consumed by the project activity from the grid, and other to measure the electricity consumption supplied from the 2 captive off-grid backup electricity generators fuelled by diesel).

Further details about monitoring instruments/equipment are included in Section D.2.

The following picture provides overview of the main project activity's infrastructure (LFG flaring facility):

Figure 1 – Aerial view of the project's LFG flaring station

During the considered monitoring period, the project activity was implemented and has operated under full conformance with the previously conceived project design as outlined in the registered PDD.

The CGR Paulínia landfill is regarded as a very well-designed and well-managed landfill. It applies the best practice in Brazil in terms of landfill design and operation. As established by the valid environmental and operational permits, disposed MSW is constantly covered and levelled with the use of heavy equipment (excavators, compacting equipment, etc.). Furthermore, safety requirements are defined and addressed as part of the operation of the landfill by using a preventative approach. No practice to deliberately increase the amount of methane generated at the CGR Paulínia landfill has ever been applied. While the project activity represents real improvement in terms of LFG management at the landfill (when compared to the situation prior to the implementation of the project activity (baseline scenario)), no change in terms of MSW disposal practice at the CGR Paulínia landfill was ever promoted or influenced by the implemented CDM project activity. Further details are included in Section D.2 (under details for the monitoring parameter "Management of SWDS").

During the considered monitoring period, the project activity faced events when it became temporarily out of operation due to different reasons (occurrence of previously planned or unplanned equipment maintenance/repair events, performance regular calibration events, draining of excess of condensate material from the project's LFG pipeline, identification of unexpected problems in the PLC panel, data communication problems, etc.). Moreover, during the whole considered monitoring period, one of the high temperature enclosed fares (Flare 3) was completely

out of operation. Flare 3 is only expected to start operating again when the flow of collected LFG becomes sufficiently high for maintaining all the 6 installed high temperature enclosed flares operating continuously.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

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Not applicable for the considered and/or previous monitoring periods. There are no temporary deviations from the registered monitoring plan and/or applied CDM baseline and monitoring methodology and/or applicable methodological tools encompassed by the considered monitoring period and/or previously or yet to be approved by the CDM-EB.

It is however relevant to note that a temporary deviation from the monitoring plan was previously addressed and approved under PRC-0165-001 as a change applicable/valid for a monitoring period prior to the considered monitoring period (thus not in the context of the verification assessment for the considered monitoring period) as follows:

Ref of PRC processes so far encompassed by the project activity	Approval date	Description of the post-registration change(s) under the category "*Temporary deviations from the registered monitoring plan and/or applied CDM baseline and monitoring methodology and/or applicable methodological tools*"
PRC-0165-001	25/07/2016 (prior-approval track)	A temporary deviation from the registered monitoring plan has occurred within the period from 14/09/2013 to 31/07/2015 (period encompassing previously performed 16th and 17th periodic verifications) as an additional post-registration change as follows: - Monitoring of the amount of collected LFG sent to all the installed high temperature enclosed flares being performed on the basis of with measurements performed by a unique LFG flow meter during the period from 14/09/2013 to 31/07/2015.

B.2.2. Corrections

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Not applicable for the considered monitoring period. There are no Corrections (in information that do not affect the project design) encompassed by the considered monitoring period that are to be submitted with this Monitoring Report as part of the request for issuance (post-registration change – issuance track). Furthermore, there are no changes under this category that were previously approved by the CDM-EB (post-registration change – prior approval track) as being applicable specifically for the considered monitoring period either.

It is however relevant to note that Corrections (in information that do not affect the project design) were previously approved under PRC-0165-001 as changes applicable/valid for monitoring period(s) prior to the considered monitoring period (thus not in the context of the verification assessment for the considered monitoring period) as follows:

Ref of PRC processes so far encompassed by the project activity	Approval date	Description of the post-registration change(s) under the category "*Corrections (in information that do not affect the project design)*"
PRC-0165-001	25/07/2016 (prior-approval track)	Corrections (that do not affect the project design): - Inclusion of additional fixed (ex-ante determined) parameters as required by ACM0001 (version 13.0.0) + applicable methodological tools; - General text revisions of project description in order to fully comply with the currently applicable requirements for completing the CDM-PDD form (version 06.0) as established by the attachment document "Instructions for filling out the project design document form for CDM project activities" and to enhance/improve the project design description; - Minor text improvements (incl. review of statements and correction of previously existent typographic mistakes) in order to improve the overall project description; - Revisions in the texts referring to individual flow meters to measure LFG flow sent to each flare in order to adequate to the actual project's configuration (one LFG flow meter installed for each individual flare); - Revision/correction of the adopted calculation approach for the parameter "flare efficiency for minute m" ($\eta_{flare,m}$) as per the methodological tool "Project emissions from flaring"

B.2.3. Changes to the start date of the crediting period

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Not applicable for the considered and/or previous monitoring periods. There are no changes to start date of the crediting period encompassed by the considered monitoring period and/or previously approved by the CDM-EB.

In fact, no change to start date of the crediting period was ever addressed in the context of previously performed and approved post-registration changes for the project activity (PRC-0165-001).

B.2.4. Inclusion of monitoring plan

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Not applicable for the considered and/or previous monitoring periods. There is no inclusion of monitoring plan (and/or applicable methodological tools) encompassed by the considered monitoring period and/or previously approved by the CDM-EB as being applicable for the considered monitoring period.

In fact, no inclusion of monitoring plan was ever addressed in the context of previously performed and approved post-registration changes for the project activity (PRC-0165-001).

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

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Not applicable for the considered monitoring period. There are no permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied CDM baseline and monitoring methodology and/or applicable methodological tools encompassed by the considered monitoring period that are to be submitted with this Monitoring Report as part of the request for issuance (post-registration change – issuance track). Furthermore, there are no changes under this category that were previously approved by the CDM-EB (post-registration change – prior approval track) as being applicable specifically for the considered monitoring period either.

It is however relevant to note that permanent changes to the registered monitoring plan (revision of the monitoring plan) were previously approved under PRC-0165-001 as changes applicable/valid for monitoring period(s) prior to the considered monitoring period (thus not the context of the verification assessment for the considered monitoring period) as follows:

Ref of PRC processes so far encompassed by the project activity	Approval date	Description of the post-registration change(s) under the category *"Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied CDM baseline and monitoring methodology and/or applicable methodological tools"*
PRC-0165-001	25/07/2016 (prior-approval track)	- Inclusion of additional alternative approach for the determination of the amount of methane in collected LFG which is sent to the flares ($F_{CH4,sent\_flare,y}$) as per Option C of the applicable "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"; - Inclusion of the maximum operation temperature of 1,200ºC in the flare specifications and in the monitored parameter $SPEC_{flare}$;

B.2.6. Changes to project design

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Not applicable for the considered monitoring period. There are no permanent changes to the design of the project activity encompassed by the considered monitoring period that are to be submitted with this Monitoring Report as part of the request for issuance (post-registration change – issuance track). Furthermore, there are no changes under this category that were previously approved by the CDM-EB (post-registration change – prior approval track) as being applicable specifically for the considered monitoring period either.

It is however relevant to note that permanent changes to the design of the project activity were previously approved under PRC-0165-001 (not in the context of the verification assessment for the considered monitoring period) as changes applicable/valid for monitoring period(s) prior to the considered monitoring period (thus not the context of the verification assessment for the considered monitoring period) as follows:

Ref of PRC processes so far encompassed by the project activity	Approval date	Description of the post-registration change(s) under the category *"Permanent changes to the design of the project activity"*

PRC-0165-001	25/07/2016 (prior-approval track)	- Revision of the ex-ante estimates of GHG emission reductions to be achieved by the project activity during the 2nd 7-year crediting period by considering updated amount of annual waste to be disposed at the CGR Paulínia landfill;

B.2.7. Changes specific to afforestation or reforestation project activity

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Not applicable.

SECTION C. Description of monitoring system

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As part of the application of the designed monitoring plan valid for the 2nd 7-year crediting period, as reported in the registered PDD, LFG and flaring related monitoring data is automatically measured, processed and recorded with the use of related monitoring instruments/equipment (e.g. a Programmable Logic Controller (PLC) unit and a SQL based database (with customized design and configuration)) that are all integrated to a data supervisory system (SCADA) of which design and configuration are also customized to the project activity.

The monitoring equipment is presented in the next figure:

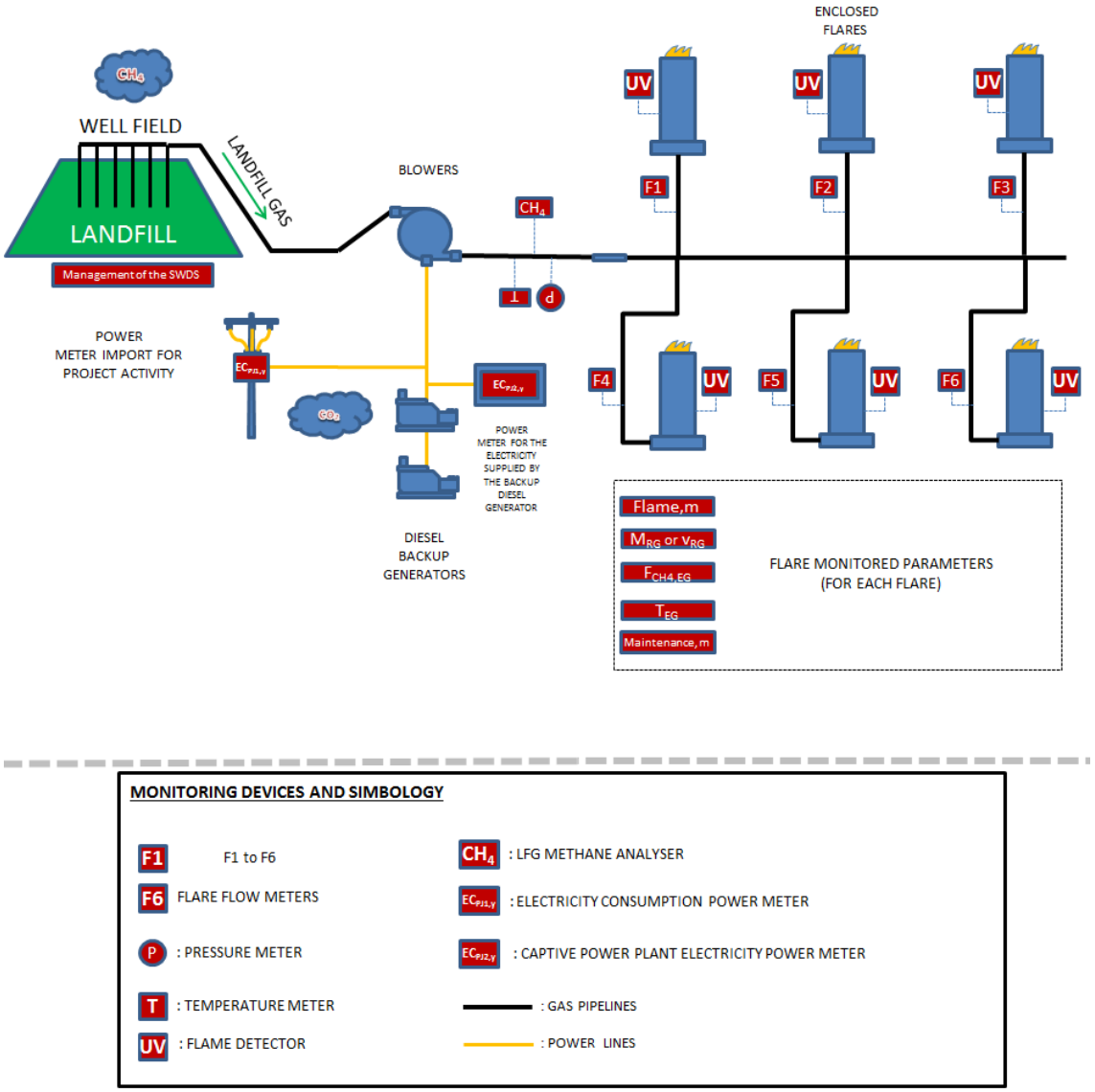


Figure 2 – Monitoring equipment

While values for related measurements are visible at the project's supervisory system (SCADA system), all continuously measured parameters (parameters related to volumetric flow of the gaseous stream, LFG CH_4 concentration, LFG temperature, LFG pressure, flare temperature, flare operating hours, electricity from the grid and electricity from diesel generators) are processed in a programmable logic controller (PLC) unit and recorded electronically in database which has the capability to aggregate, record and report collected data in the frequency range required. Every-minute recorded data is used as input data for emission reduction calculations.

Backup of recorded monitoring data is carried out every week. The monitoring instruments uncertainty levels, methods and the associated accuracy levels are presented in section D.2 of the Monitoring Report. Data records are kept and archived electronically for two years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

As part of the QA/QC procedure applicable for the operation of the project activity, recorded data are daily analyzed by consultants. If any implausible value is detected among available records, apparent or real inconsistencies are then reported in a log-book and corrective actions will be performed if required/applicable.

During the considered monitoring period, continuous measurements of LFG flow sent to each installed flare, LFG pressure, LFG temperature, LFG CH_4 content, LFG O_2 content[5], temperature of the exhaust gas in each installed flare, status of the flame detector in each installed flare, consumption of grid-sourced electricity by the project activity and consumption of electricity sourced by the backup off-grid electricity generators (fuelled by diesel) were all processed by the project's PLC unit and recorded within an every-minute frequency by the project's SQL format database.

As part of the implemented data reporting and emission reduction calculation procedures applicable for the 2nd 7-year crediting period of the project activity, one MS-Excel format spreadsheet file with monitoring records (raw-data file) is generated for each individual month.

The data file contains LFG and flaring related monitoring records for every 1-month period encompassed by the considered monitoring period, as well as data from electricity consumption by the project activity (both from the grid and from the off-grid captive backup diesel generator). Data in MS-Excel format is handled as a primary data input for the performance of emission reduction calculations (data is used as input data for the compilation of monthly emission reduction calculation spreadsheets that are enclosed to this Monitoring Report)[6].

As per applicable documented working procedures, the project activity is managed by the Operational Director at ESTRE Ambiental S.A (under authority of the President). The Operational Director manages the Biogas Coordinator who supervises the Biogas Supervisor, which is responsible by the 4 operators, environmental assistant, welding supervision and 4 general assistants.

The Biogas Coordinator is in charge of all monitoring related activities (handling of data, preparation of the Monitoring Report and emission reduction calculation spreadsheet). The project activity is fully supported by CDM specialists (consultants) from the CDM consultancy company UniCarbo Energia e Biogás Ltda. The operation of the project activity and the application of the monitoring plan is responsibility of the Biogas Coordinator, who reports all relevant project related issues to the Operational Director (operation status of the project activity, results and events, collection and storage of monitoring data, calibration events, and maintenance of equipment). The CDM specialists (consultants) also support the project team in operational and monitoring related issues.

The diagram bellow shows the hierarchy for the project management.

[5] Continuous monitoring of LFG O_2 content is not required as per ACM0001 (version 13.0.0) + applicable methodological tools. Moreover, the monitoring plan of the registered PDD does not refer to monitoring of LFG O_2 contents either. However, LFG O_2 content is measured due to safety and operational requirements.

[6] Besides of the data in MS-Excel format for LFG and electricity related parameters, records/calculations related to the determination of flare efficiency values (for each individual flare) and all ex-ante determined parameters are also handled as a primary data input for the determination of emission reductions achieved by the project activity during the considered monitoring period.

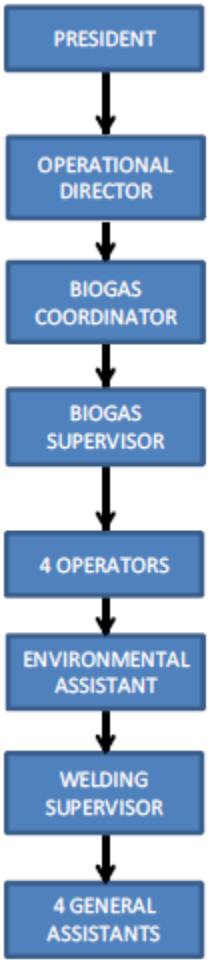


Figure 3 - ESTRE Ambiental S/A's organizational structure

Under conformance with the monitoring plan for the project activity, all the measurement instruments/equipment were subject to regular calibration (if applicable) as per manufacturer's specifications. The project's LFG coordinator is responsible for checking/confirming instrument/equipment's proper working conditions, as well as checking and storing up the calibration certificates and records. All considered calibration frequencies are in line with the manufacturer's specifications. Calibration certificates for all monitoring instruments/equipment will be kept archived during the entire 2nd 7-year crediting period and at least two years after its ending.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	**OX_{top_layer}**
Unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline.
Source of data	The registered PDD refers to the default value as per the CDM baseline and monitoring methodology ACM0001 (version 13.0.0). The value is consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal sites" (version 06.0.1).

Value(s) applied	0.1
Choice of data or measurement methods and procedures	Default value as per the applied CDM baseline and monitoring methodology ACM0001 “Flaring or use of landfill gas” (version 13.0.0)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**GWP_{CH4}**
Unit	tCO_2e/tCH_4
Description	Global Warming Potential of CH_4
Source of data	The registered PDD refers to IPCC Fourth Assessment Report: Climate Change 2007, item 2.10.2: Direct Global Warming Potentials, Table 2.14. Available at: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html The applied value is also in accordance with the “Standard for application of the global warming potential to clean development mechanism project activities and programmes of activities for the second commitment period of the Kyoto Protocol”.
Value(s) applied	25
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**$SPEC_{flare}$**
Unit	Temperature - °C Flow rate - Nm^3/h Maintenance schedule - number of days
Description	Manufacturer’s flare specifications for temperature, flow rate and maintenance schedule interval.
Source of data	The registered PDD refers to data as per the flare manufacturer.
Value(s) applied	Flare 1 and Flare 2: Flare model: 2000 HT - $SPEC_{flare, Flare\ 1}$ / $SPEC_{flare, Flare\ 2}$ Operational LFG flow for each flare (for continuous operation): — Minimum flow: 400 Nm^3/h ---

	<table><tr><td></td><td>Maximum flow: 2,000 Nm³/h</td></tr><tr><td>Minimum flare temperature</td><td>850 °C</td></tr><tr><td>Maximum flare temperature</td><td>1,200 °C</td></tr><tr><td>Maximum duration in days between maintenance events</td><td>7 days[7]</td></tr></table> Flare 3, Flare 4, Flare 5 and Flare 6: <table><tr><td colspan="2">Flare model: 2500 HT - $SPEC_{flare, Flare 3}$ / $SPEC_{flare, Flare 4}$ / $SPEC_{flare, Flare 5}$ / $SPEC_{flare, Flare 6}$</td></tr><tr><td>Operational LFG flow for each flare (for continuous operation):</td><td>Minimum flow: 500 Nm³/h --- Maximum flow: 2,500 Nm³/h</td></tr><tr><td>Minimum flare temperature</td><td>850 °C</td></tr><tr><td>Maximum flare temperature</td><td>1,200 °C</td></tr><tr><td>Maximum duration in days between maintenance events</td><td>7 days</td></tr></table>
Choice of data or measurement methods and procedures	As established by the methodological tool “Project emissions from flaring”, the flare specifications and operational + maintenance requirements (as set/recommended by the equipment manufacturer) are documented and considered for the ex-ante determination of applicable values for the parameter $SPEC_{flare}$.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	All flare specification and operation details/requirements are based on information provided by the equipment manufacturer.

Data/Parameter	**R_u**
Unit	Pa.m3/kmol.K
Description	Universal ideal gases constant
Source of data	Default value as per the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 02.0.0)
Value(s) applied	8,314

[7] The maximum duration in days between maintenance events has been chosen considering ESTRE preventive maintenance program which defines the frequency for checking flare equipment situation every week.

Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Data is use for determination of baseline emissions
Additional comments	-

Data/Parameter	**P_{ref}**
Unit	Pa
Description	Atmospheric pressure at reference conditions
Source of data	The registered PDD refers to the default value as per the “Project emissions from flaring”.
Value(s) applied	101,325
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**T_{ref}**
Unit	K
Description	Temperature at reference conditions
Source of data	The registered PDD refers to the default value as per the “Project emissions from flaring”.
Value(s) applied	273.15
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**MM_i**
Unit	kg/kmol
Description	Molecular mass of greenhouse gas *i*

Source of data	The registered PDD refers to the default value as per the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0).
Value(s) applied	As outlined in the registered PDD, the following value of molecular mass is applicable for CH_4 (the only GHG which is considered):

Compound	Structure	Molecular mass (kg/mol)
Methane	CH_4	16.0

Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**MM_k**
Unit	kg/kmol
Description	Molecular mass of gas k
Source of data	The registered PDD refers to the default value as per the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0).
Value(s) applied	

Compound	Structure	Molecular mass (kg/mol)
Nitrogen	N_2	28.0

Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**MM_{H2O}**
Unit	kg/kmol
Description	Molecular mass of water
Source of data	The registered PDD refers to the default value as per the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0).
Value(s) applied	18.0152
Choice of data or measurement methods and procedures	-

Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**$EF_{grid,BM,y}$**
Unit	tCO_2/MWh
Description	Build margin emission factor for the grid in year *y*
Source of data	As outlined in the registered PDD, the selected value is the value calculated by the DNA of Brazil and valid for year 2012.
Value(s) applied	0.2010
Choice of data or measurement methods and procedures	The build margin emission factor has been defined by the Brazilian DNA.
Purpose of data/parameter	Calculation of project emissions (due to consumption of grid-sourced electricity by the project activity).
Additional comments	-

Data/Parameter	**w_{BM}**
Unit	%
Description	Weighting of build margin emissions factor
Source of data	Applicable default value as per the "Tool to calculate the emission factor for an electricity system" (version 3.0.0)
Value(s) applied	0.75 (75%) during the 2nd 7-year crediting period
Choice of data or measurement methods and procedures	The applicable value valid for 2nd crediting period as per the "Tool to calculate the emission factor for an electricity system" (Version 3.0.0) is selected.
Purpose of data/parameter	Data is used for determination of baseline emissions (associated with electricity generation by the project activity) and project emissions (due to the consumption of grid electricity by the project activity).
Additional comments	-

Data/Parameter	**w_{OM}**
Unit	%
Description	Weighting of operating margin emissions factor
Source of data	Applicable default value as per the "Tool to calculate the emission factor for an electricity system" (version 3.0.0)

Value(s) applied	0.25 (25%) during the 2nd 7-year crediting period
Choice of data or measurement methods and procedures	The applicable value for the 2nd crediting period as per the "Tool to calculate the emission factor for an electricity system" (version 3.0.0) is selected.
Purpose of data/parameter	Data is used for determination of baseline emissions (associated with electricity generation) and project emissions (due to the consumption of grid electricity by the project activity).
Additional comments	-

Ex-ante determined parameters not used in the context of ex-post determination and calculation of emission reductions achieved by the project activity:

The following ex-ante determined parameters (that are also included in the registered PDD) are not used for the purpose of ex-post determination of baseline emissions and project emissions achieved by the project activity during the considered monitoring period:

- Waste composition
- Efficiency of the LFG capture system that will be installed in the project activity (η_{PJ})
- Default value for model correction factor to account for model uncertainties ($\varphi_{default}$)
- Oxidation factor (reflecting the amount of methane from the considered SWDS that is oxidized in the soil (or other material covering the waste)) (OX)
- Fraction of methane in the SWDS gas (volume fraction) (F)
- Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS ($DOC_{f,default}$)
- Methane correction factor ($MCF_{default}$)
- Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j)
- Decay rate for the waste type *j* (k_j)

Data for the above-listed parameters are used only in the context of ex-ante estimation of annual accumulated values for the "Amount of methane in the LFG which is flared and/or used in the project activity in year y" ($F_{CH4,PJ,y}$) (in the context of ex-ante estimation of emission reductions to be achieved by the project activity during the 2nd 7-year renewable crediting period). Due to that, details for the above-listed parameters are not included in this Section as they are not relevant in the context of determination of emission reductions achieved by the project activity during the considered monitoring period. Relevant details for such not reported parameters are included in Section B.6.2 of the registered PDD.

D.2. Data and parameters monitored

Data/Parameter	**Management of SWDS**
Unit	Dimensionless
Description	Management of the SWDS
Measured/calculated/ default	As per the adopted monitoring procedure for the project activity, the management of the CGR Paulínia landfill is yearly compared against the previously conceived original construction and operational design of the landfill in order to confirm that the overall management and operation of the CGR Paulínia landfill (including relevant aspects related to landfilling practice) were not modified with the unique aim to increase generation of methane on site. By performing the checking annually, it is monitored whether any practice aiming to increase methane generation in the landfill has occurred. As required by ACM0001 (version 13.0.0), any change in the management of the landfill after the implementation of the project activity

	should be justified by referring to applicable technical or regulatory specifications.
Source of data	A technical report regarding the operational conditions of the CGR Paulínia landfill (by taking into account required reporting of operational conditions of the landfill as required in the valid Operational Licence for the CGR Paulínia landfill landfill) was elaborated by the technical staff of ESTRE Ambiental S/A on 07/10/2019. This technical report is titled "*Relatório de Atendimento das exigências técnicas LO parcial 37002080*" was submitted to the environmental agency/authority of the State of São Paulo (CETESB). The title of the technical report is translated into English language as "*Report of compliance of technical requirements as per Operational License 37002080*". Previous versions of the same report was issued by ESTRE Ambiental S/A on 08/01/2019 and 05/07/2019 and were also submitted CETESB. As outlined in both version of such technical report, the current design configuration and operational conditions of the CGR Paulínia landfill are under conformance with all previously conceived design and operational conditions of the landfill that were established as part of the licensing process of the landfill prior to the implementation of the project activity.
Value(s) of monitored parameter	The content of the issued technical reports confirms that the previously conceived original design of the landfill (dated prior to the implementation of the project activity) has not modified during the period from 14/09/2006 (date when the project activity started to operate) until October 2019. These reports confirm that no practices to deliberately increase methane generation at the CGR Paulínia landfill have occurred (when compared to management and MSW landfilling practices prior to implementation of the project activity). Aspects, conditions and circumstances related to management of the landfill (e.g. waste disposal, waste covering, waste compacting, management of leachate, draining of rainwater, etc.) were not changed with an aim to increase methane generation on site. It is relevant to note that MSW management business (collection and disposal of MSW) in Brazil has its own economics, dynamics, policies and related regulations. That makes MSW disposal activity for the CGR Paulínia landfill and other similar landfills in Brazil completely independent from the CDM mechanism and/or revenues of commercialization of CERs generated by project based destruction of methane in landfills. In the particular case of the CGR Paulínia landfill, it is important to note that this landfill was designed and it has operated *inter alia* as per terms and conditions from MSW disposal of the public service concession contracts previously established with the Administration of the Municipality of Campinas and other Municipalities in the region. Moreover, the design and operation of this particular landfill is also under conformance with previously defined terms and conditions of the environmental licensing of the site that are regularly monitored by the competent environmental authority from São Paulo State (CETESB). While the occurrence of changes in the quantitative condition related to MSW disposal in this landfill are completely independent from the CDM project activity, the project activity per se does not represent any incentive for promoting a change in the management of the landfill in order to increase the amount of methane generated in the site. Furthermore, as outlined in the registered PDD, the project activity does not encompass any MSW management related measures. Currently, there is still no climate change of waste management policy in Brazil which would provide an incentive or a mandate to have MSW being disposed in landfills with better/improved LFG collection / destruction systems (such as the project's LFG collection and destruction system currently implemented at the CGR Paulínia landfill).

Monitoring equipment	Not applicable. No measuring equipment is used for monitoring management of the CGR Paulínia landfill.
Measuring/reading/recording frequency	Annual checking is performed.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**$O_{pj,h}$**
Unit	-
Description	Operation of the equipment that consumes the LFG
Measured/calculated/ default	The registered PDD defines the following: "*(…) For each equipment unit j using the LFG monitor that the plant is operating in hour h by the monitoring parameter below:* • *Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment. The flare temperature meter (thermocouple) is located at the middle third of each of the 6 flares at the flare system. The minimum flare temperature which guarantees the operation of the equipment is 850ºC.* *$O_{pj,h}$ = 0 when:* • *One or more temperature measurements are missing or below the minimum threshold in hour h (instantaneous measurements are made at least every minute);* *Otherwise, $O_{pj,h}$ = 1* *The accuracy and uncertainty of the monitoring instrument will be in accordance with manufacturer specifications. (…)*" In the particular case of the project activity, the operation of each one of the flares is monitored continuously on the basis of measurements of temperature in the exhaust gas of the flare in question (measurements performed by the installed 6 thermocouples (1 thermocouple for each enclosed flare)).
Source of data	The temperature in the exhaust gas of the enclosed flares is continuously measured as part of the operation of the project activity by applying appropriate monitoring instruments (6 thermocouples) (with recordable electronic signal).
Value(s) of monitored parameter	While measurements of temperature in the exhaust gas of the enclosed flares are performed by installed 6 thermocouples (one for each individual installed flare), the monitoring parameter $O_{pj,h}$ is thus measured, recorded

	and reported on the basis of the following sub-parameters: - $O_{pj,h,flare-1}$: Operation of the Flare 1 - $O_{pj,h,flare-2}$: Operation of the Flare 2 - $O_{pj,h,flare-3}$: Operation of the Flare 3 - $O_{pj,h,flare-4}$: Operation of the Flare 4 - $O_{pj,h,flare-5}$: Operation of the Flare 5 - $O_{pj,h,flare-6}$: Operation of the Flare 6 The monthly emission reduction calculation spreadsheets (that are enclosed to this Monitoring Report) include all records for $O_{pj,h,flare-1}$, $O_{pj,h,flare-2}$:, (…), $O_{pj,h,flare-6}$ during the considered monitoring period. Measurement data is recorded and reported with an every-minute frequency.
Monitoring equipment	Continuous measurements are performed by thermocouples that are installed in each one of the 6 high temperature enclosed flares. The specifications and calibration details for the installed thermocouples are presented below in the applicable table for the monitoring parameter "Temperature in the exhaust gas of the enclosed flare in minute *m*" ($T_{EG,m}$).
Measuring/reading/recording frequency	Continuous measurements of temperature in the exhaust gas of the enclosed flares are recorded and reported with an every-minute frequency. Based on such measurement records, values of $O_{pj,h}$ for each installed enclosed flare ($O_{pj,h,flare-1}$, $O_{pj,h,flare-2}$:, (…), $O_{pj,h,flare-6}$) are also determined and reported with an every minute frequency.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	$\mathbf{V_{t,wb}}$
Unit	m^3 wet gas/h
Description	Volumetric flow of the gaseous stream in time interval t on a wet basis
Measured/calculated/ default	Continuously measured by 6 installed LFG flow meters (one flow meter for each installed high temperature enclosed flare)
Source of data	Measured as part of the operation of the project activity by applying appropriate monitoring instruments (6 LFG flow meters) (with recordable electronic signal).
Value(s) of monitored	The monthly emission reduction calculation spreadsheets (that are enclosed

parameter	to this Monitoring Report) include all records of measurement data of LFG flow sent to the installed high temperature enclosed flares during the considered monitoring period. Measurement data is recorded and reported with an every-minute frequency.

Monitoring equipment	While measurements are performed by installed 6 LFG flow meters (one flow meter for each individual installed flare), the monitoring parameter $V_{t,wb}$ is thus measured, recorded and reported on the basis of the following sub-parameters: - $V_{t,wb,flare-1}$: Volumetric flow of LFG to Flare 1 - $V_{t,wb,flare-2}$: Volumetric flow of LFG to Flare 2 - $V_{t,wb,flare-3}$: Volumetric flow of LFG to Flare 3 - $V_{t,wb,flare-4}$: Volumetric flow of LFG to Flare 4 - $V_{t,wb,flare-5}$: Volumetric flow of LFG to Flare 5 - $V_{t,wb,flare-6}$: Volumetric flow of LFG to Flare 6 Measurements are performed by 6 LFG flow meters that are installed in independent sections of the LFG pipeline located between the centrifugal blowers and each one of the installed 6 high temperature enclosed flares, thus ensuring the flow of LFG sent to each one of the flares is continuously measured. *Specifications and calibration details for the installed LFG flow meters:* *Flow meter used for measuring $V_{t,wb,flare-1}$ (Flare 1):* - Manufacturer: Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. - Model: FT2 - Accuracy: ±1% - Serial Number: 1505000326 - Calibration frequency (as specified by the monitoring methodology/tool and/or in the PDD): The registered PDD establishes the following regarding applicable calibration frequency for the installed LFG flow meters: "*Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications*." - Calibration frequency (as per the application of the monitoring plan and recommendations from the equipment manufacturer): Calibration events are performed every 3 years - Date(s) of performance of calibration event(s) valid for the considered monitoring period: - Calibration event dated 05/07/2018, valid until 04/07/2021 (3 years). Calibration certificate Number 1505000326 0718 M7, issued by Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. *Flow meter used for measuring $V_{t,wb,flare-2}$ (Flare 2):* - Manufacturer: Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. - Model: FT2 - Accuracy: ±1% - Serial Number: 1505000325 - Calibration frequency (as specified by the monitoring methodology/tool and/or in the PDD): The registered PDD establishes the following regarding applicable calibration frequency for the installed LFG flow meters: "*Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications*." - Calibration frequency (as per the application of the monitoring plan and recommendations from the equipment manufacturer): Calibration events are performed every 3 years

	- Date(s) of performance of calibration event(s) valid for the considered monitoring period: - Calibration event dated 29/06/2018, valid until 28/06/2021 (3 years). Calibration certificate Number 1505000325 0618 M7, issued by Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. *Flow meter used for measuring $V_{t,wb,flare-3}$ (Flare 3):* - Manufacturer: Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. - Model: FT2 - Accuracy: ±1% - Serial Number: 1507000470 - Calibration frequency (as specified by the monitoring methodology/tool and/or in the PDD): The registered PDD establishes the following regarding applicable calibration frequency for the installed LFG flow meters: "*Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications*." - Calibration frequency (as per the application of the monitoring plan and recommendations from the equipment manufacturer): Calibration events are performed every 3 years - Date(s) of performance of calibration event(s) valid for the considered monitoring period: - Calibration event dated 12/07/2018, valid until 11/07/2021 (3 years). Calibration certificate Number 1505000470 0718 FC, issued by Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. *Flow meter used for measuring $V_{t,wb,flare-4}$ (Flare 4):* - Manufacturer: Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. - Model: FT2 - Accuracy: ±1% - Serial Number: 1505000328 - Calibration frequency (as specified by the monitoring methodology/tool and/or in the PDD): The registered PDD establishes the following regarding applicable calibration frequency for the installed LFG flow meters: "*Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications*." - Calibration frequency (as per the application of the monitoring plan and recommendations from the equipment manufacturer): Calibration events are performed every 3 years - Date(s) of performance of calibration event(s) valid for the considered monitoring period: - Calibration event dated 02/08/2018, valid until 01/08/2021 (3 years). Calibration certificate Number 1505000328 0818 M7, issued by Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. *Flow meter used for measuring $V_{t,wb,flare-5}$ (Flare 5):* - Manufacturer: Contech Indústria e Comércio de Equipamentos

	Eletrônicos Ltda. - Model: FT2 - Accuracy: ±1% - Serial Number: 1505000327 - Calibration frequency (as specified by the monitoring methodology/tool and/or in the PDD): The registered PDD establishes the following regarding applicable calibration frequency for the installed LFG flow meters: "*Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications*." - Calibration frequency (as per the application of the monitoring plan and recommendations from the equipment manufacturer): Calibration events are performed every 3 years - Date(s) of performance of calibration event(s) valid for the considered monitoring period: - Calibration event dated 06/08/2018, valid until 05/08/2021 (3 years). Calibration certificate Number 1505000327 0818 FC, issued by Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. *Flow meter used for measuring $V_{t,wb,flare-6}$ (Flare 6):* - Manufacturer: Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda. - Model: FT2 - Accuracy: ±1% - Serial Number: 1505000329 - Calibration frequency (as specified by the monitoring methodology/tool and/or in the PDD): The registered PDD establishes the following regarding applicable calibration frequency for the installed LFG flow meters: "*Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications*." - Calibration frequency (as per the application of the monitoring plan and recommendations from the equipment manufacturer): Calibration events are performed every 3 years - Date(s) of performance of calibration event(s) valid for the considered monitoring period: - Calibration event dated 20/06/2018, valid until 19/06/2021 (3 years). Calibration certificate Number 1505000329 0618 M7, issued by Contech Indústria e Comércio de Equipamentos Eletrônicos Ltda.
Measuring/reading/recording frequency	Continuous measurements are recorded and reported with an every-minute frequency.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the

	company's ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	The design of the installed LFG flow meters ensures that measurement data is automatically converted and recorded in normal cubic meters per hour (Nm^3/h). Due to that, measurements of LFG pressure and LFG temperature are not required for performing GHG calculations (see further details in Section E.1).

Data/Parameter	$\mathbf{V_{i,t,wb}}$
Unit	m^3 CH_4/m^3 wet gas
Description	Volumetric fraction of greenhouse gas methane in a hourly time interval *t* on a wet basis
Measured/calculated/ default	Continuously measured by continuous CH_4 content gas analyzer.
Source of data	Measured as part of the operation of the project activity by applying appropriate monitoring instruments (CH_4 content gas analyser) (with recordable electronic signal).
Value(s) of monitored parameter	The monthly emission reduction calculation spreadsheets (that are enclosed to this Monitoring Report) include measurement data for $v_{i,t,wb}$ that are recorded and reported with an every-minute frequency.

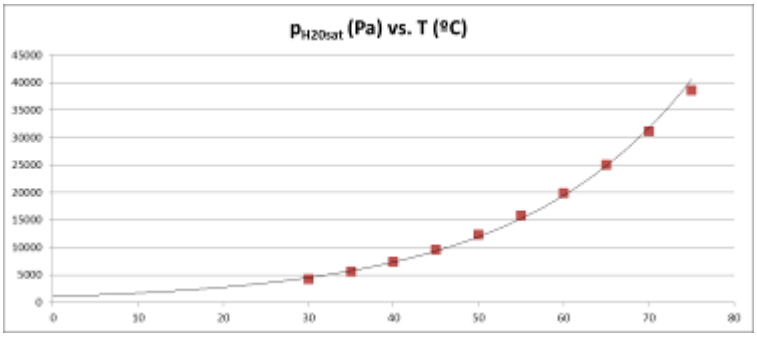
Monitoring equipment	Measurements are performed by installed continuous CH_4 content gas analyser for which the LFG sample collecting point is located in the main LFG pipeline in a section between the centrifugal blowers and the high temperature enclosed flares. *Specifications and calibration details for the installed continuous CH_4 content gas analyzer:* - Manufacturer: SIEMENS AG - Model: ULTRAMAT 23 - Accuracy: ±0.5% - Serial Number: N1-UN-0653 - Calibration frequency (as per the application of the monitoring plan and recommendations from the equipment manufacturer): Calibration events are performed every year. - Date(s) of performance of calibration event(s) valid for the considered monitoring period: 17/05/2019 - Validity of the performed calibration event(s): The calibration event performed on 17/05/2019 is valid until 16/05/2020 (1 year). - Entity/company responsible for performing the calibration event(s): The valid calibration event was performed by Isocell Soluções em Analítica. The calibration event valid for the considered monitoring period was performed by using certified span gas cylinders with a known CH_4 composition. Certified span gases utilized for performing the calibration events valid for the considered monitoring period: - Gas cylinder with a calibration mixture of 89.99 mol/mol of CH_4: cylinder n° 342734, certificate number 2337891, supplied by Air Products Brasil Ltda.
Measuring/reading/recording frequency	Continuously measurements are recorded/reported every minute.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**T_t**
Unit	K
Description	Temperature of the gaseous stream in time interval *t*
Measured/calculated/ default	Continuously measured by LFG temperature sensor. Measurements are primarily recorded and reported in ^oC. Recorded/reported data is converted into Kelvin and data is also reported in this unit, thus meeting the related monitoring requirement as per the registered PDD.
Source of data	Measured as part of the operation of the project activity by applying

	appropriate monitoring instruments (temperature sensor) (with recordable electronic signal).
Value(s) of monitored parameter	The monthly emission reduction calculation spreadsheets (that are enclosed to this Monitoring Report) include measurement data for T_t that are recorded and reported with an every-minute frequency.
Monitoring equipment	Measurements are performed by installed LFG temperature sensor that is installed in the main LFG pipeline in a section between the centrifugal blowers and the high temperature enclosed flares. *Specifications and calibration details for the LFG temperature sensor:* - Manufacturer: ABB S.p.A. - Model: TSP321 - Accuracy: ±0.35% - Serial Number (S/N): 210000516854001 - Calibration frequency: as specified by the monitoring methodology/tool): Periodically calibrated by an officially accredited entity. - Calibration frequency (as per the application of the monitoring plan): every 3 years - Date(s) of performance of calibration event(s) valid for the considered monitoring period: 28/05/2019 - Validity of the performed calibration event(s): The calibration event dated 28/05/2019 is valid until 27/05/2022 (3 years) - Entity/company responsible for performing the calibration event(s): The calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda.
Measuring/reading/recording frequency	Continuously measurements are recorded/reported every minute.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	In accordance with the registered PDD, since measurements of LFG flow are automatically converted and recorded in normalized cubic meters (by considering standard temperature and pressure (STP) conditions), monitoring of "Pressure of the gaseous stream in time interval *t*" (P_t) and "Temperature of the gaseous stream in time interval *t"* (T_t) are not required.

Data/Parameter	**P_t**
Unit	Pa
Description	Pressure of the gaseous stream in time interval *t*
Measured/calculated/	Continuously measured by LFG pressure sensor.

default	
Source of data	Measured as part of the operation of the project activity by applying appropriate monitoring instruments (pressure sensor) (with recordable electronic signal).
Value(s) of monitored parameter	Measurement data for P_t that are recorded with an every-minute frequency are available in the raw data file which serves as input data for the monthly emission reductions calculation spreadsheets. While monitoring records of P_t are not used in the calculations of emission reductions achieved by the project activity during the considered monitoring period, the monthly emission reductions calculation spreadsheets thus not present any monitoring records for this parameter.
Monitoring equipment	Measurements are performed by installed LFG pressure sensor that is installed in the main LFG pipeline in a section between the centrifugal blowers and the high temperature enclosed flares. *Specifications and calibration details for the LFG pressure sensor:* - Manufacturer: ABB S.p.A. - Model: 2600T - Accuracy: ±0.075% - Serial Number: 6410001002 - Calibration frequency (as specified by the monitoring methodology/tool): Periodically calibrated by an officially accredited entity - Calibration frequency (as per the application of the monitoring plan): every 3 years - Date(s) of performance of calibration event(s) valid for the considered monitoring period: 28/05/2019 - Validity of the performed calibration event(s): The calibration event dated 28/05/2019 is valid until 27/05/2022 (3 years) - Entity/company responsible for performing the calibration event(s): The calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda.
Measuring/reading/recording frequency	Continuously measurements are recorded/reported every minute.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	In accordance with the registered PDD, since measurements of LFG flow are automatically converted and recorded in normalized cubic meters (by considering standard temperature and pressure (STP) conditions), monitoring of "Pressure of the gaseous stream in time interval *t*" (P_t) and "Temperature of the gaseous stream in time interval *t"* (T_t) are not required.

<table>
<tr><td>Data/Parameter</td><td>$P_{H2O,t,Sat}$</td></tr>
<tr><td>Unit</td><td>Pa</td></tr>
<tr><td>Description</td><td>Saturation pressure of H_2O at temperature T_t in time interval t</td></tr>
<tr><td>Measured/calculated/ default</td><td>Default values as per selected literature.</td></tr>
<tr><td>Source of data</td><td>Data selected as per the literature “Fundamentals of Classical Thermodynamics”. Authors: Gordon J. Van Wylen, Richard E. Sonntag and Borgnakke; 4th Edition 1986. Published by John Wiley & Sons, Inc.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>$P_{H2O,t,Sat}$ is determined as a function of temperature of LFG (T_t by the equation:
$P_{H2O,t,Sat} = 1{,}031.3 * e^{(0.049 * Tt)}$, with a correlation coefficient of $R^2 = 0.998$.
Further details are presented below in “Calculation Method”.</td></tr>
<tr><td>Monitoring equipment</td><td>Not applicable.</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>Not applicable.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>The Absolute Vapor Pressure of Water was obtained from the mentioned literature and is presented in the following table within the rage of interest for the required calculations:
<table>
<tr><th>Temperature</th><th>$P_{H2O,t,Sat}$</th></tr>
<tr><td>ºC</td><td>Pa</td></tr>
<tr><td>30</td><td>4,246</td></tr>
<tr><td>35</td><td>5,628</td></tr>
<tr><td>40</td><td>7,384</td></tr>
<tr><td>45</td><td>9,593</td></tr>
<tr><td>50</td><td>12,349</td></tr>
<tr><td>55</td><td>15,758</td></tr>
<tr><td>60</td><td>19,940</td></tr>
<tr><td>65</td><td>25,030</td></tr>
<tr><td>70</td><td>31,190</td></tr>
<tr><td>75</td><td>38,580</td></tr>
</table>
The following graphic represents the above data and the regression calculated to adjust data:

</td></tr>
</table>

	As $P_{H2O,t,Sat}$ is a function of temperature and best represented by an exponential function, the exponential regression method is applied to the above data and the following equation is obtained: $P_{H2O,t,sat} = 1{,}031.3 * e^{(0.049 * Tt)}$ This equation represents the above data with a correlation coefficient of $R^2 = 0.998$. Thus, by applying the above equation, $P_{H2O,t,sat}$ is determined as a function of the temperature.
QA/QC procedures	Not applicable.
Purpose of data/parameter	Calculation of baseline emissions.
Additional comments	It is important to note that $P_{H2O,t,Sat}$ is only used in the context of the determination of the methane mass flow in the residual gas (in a dry basis) for each minute *m* of the two time periods in year *y* during which the flare efficiency is measured (parameter $F_{CH4,RG,t}$). The calculations of every-minute values of $P_{H2O,t,Sat}$ for the 2 time periods during which the flare efficiency is measured is thus presented only in the flare efficiency calculation spreadsheet. "*MR 27 - Paulinia - V.2 - FE*".

Data/Parameter	**$EF_{grid,CM,y}$**
Unit	tCO_2/MWh
Description	Combined margin emission factor for the grid in year y
Measured/calculated/ default	Calculated as the weighted average of the dispatch data analysis OM (Operating Margin) and the BM (Build margin).
Source of data	The selected values for $EF_{grid,CM,y}$ valid for months of year 2019 encompassed by the considered monitoring period are calculated as the weighted average of the operating margin and build margin emission factors. To weight these two factors, the default values applicable to both for the 2nd crediting period are applied. The values of $EF_{grid,CM,y}$ valid for the considered monitoring period are thus obtained as follows: $EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$
Value(s) of monitored parameter	- From 01/07/2019 to 31/07/2019: 0.2986 tCO_2/MWh - From 01/08/2019 to 31/08/2019: 0.2836 tCO_2/MWh - From 01/09/2019 to 30/09/2019: 0.2909 tCO_2/MWh
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Value(s) valid for the year encompassed by the considered monitoring period are to be used.
Calculation method (if applicable)	Value applicable for the monitoring period is calculated by considering the applicable guidance of the "Tool to calculate the emission factor for an electricity system".

QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management and control (QA/QC) (EMS).
Purpose of data/parameter	Calculation of project emissions (due to consumption of grid-sourced electricity by the project activity)
Additional comments	-

Data/Parameter	**$EF_{grid,OM,y}$**
Unit	tCO_2/MWh
Description	Operating margin emission factor for the grid in year *y*
Measured/calculated/ default	Calculated (based on official monthly values as calculated and published by the DNA of Brazil).
Source of data	Selected average values of $EF_{grid,OM,y}$ valid for all months of year 2019 that are encompassed by the considered monitoring period are calculated by the DNA of Brazil and are made public available at the website of the DNA of Brazil: http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_despacho.html
Value(s) of monitored parameter	Average values of operation margin CO_2 emission factor for the National Electricity Grid of Brazil for all months of year 2018 that are encompassed by the considered monitoring period (from 01/01/2018 to 30/06/2018) are applied as summarized below: - July 2019: 0.5914 tCO_2/MWh - August 2019: 0.5312 tCO_2/MWh - September 2019: 0.5606 tCO_2/MWh
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Values are updated annually.
Calculation method (if applicable)	Values applicable for the considered monitoring period are calculated by the DNA of Brazil as per applicable guidance of the calculation method "dispatch data analysis operating margin CO_2 emission factor" of the "Tool to calculate the emission factor for an electricity system".
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of project emissions (due to consumption of grid-sourced electricity by the project activity)
Additional comments	-

Data/Parameter	**$TDL_{j,y}$**
Unit	-
Description	Average technical transmission and distribution losses for providing electricity to source j in year y
Measured/calculated/ default	Default value is selected.
Source of data	Default conservative value as per the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” is selected.
Value(s) of monitored parameter	0.20 (20%)
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Annually. For the considered monitoring period, the default value as per the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” is selected.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company’s ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of project emissions (due to consumption of grid-sourced electricity by the project activity)
Additional comments	-

Data/Parameter	**$EG_{EC1,y} = EC_{PJ1,y}$**
Unit	MWh
Description	Quantity of electricity consumed from the grid by the project activity during the year y
Measured/calculated/ default	Continuously measured by electricity meter.
Source of data	Measured as part of the operation of the project activity by applying appropriate monitoring instrument (electricity meter).
Value(s) of monitored parameter	Monthly records of grid-sourced electricity consumption valid for the considered monitoring period:

Month	Amount of consumed grid electricity (MWh)
Jul. 2019	79.7
Aug. 2019	68.6

	Sep. 2019 | 48.9
Monitoring equipment	One electricity meter was used for measuring consumption of grid-sourced electricity by the project activity during the considered monitoring period. Its specifications are listed below: *Specifications and calibration details for the electricity meter during the considered monitoring period:* - Manufacturer: ABB S.p.A. - Model: ETE30 - Accuracy: ±0.5% - Serial Number: 1001864115020195 - Calibration frequency (as specified by the monitoring methodology/tool): The registered PDD establishes the following: "*(...) Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. Periodical calibration as per manufacturer specifications to ensure validity of data measured.* *The readings will be double checked by the electricity distribution company.* *The calibration frequency of this monitoring equipment should be according to the manufacturer's specifications*.". - Calibration frequency (as per the recommendation of the meter manufacturer): it is important to note that the installed meters are approved/certified by INMETRO (The Brazilian national authority for metrology and standardization issues), and they are thus in conformance with INMETRO's requirements for maintenance and testing of electricity meters. According to the instrument manufacturer, the meters are to be calibrated every year. An yearly calibration frequency was thus adopted. - Date(s) of performance of calibration event(s) valid for the considered monitoring period: 30/05/2019 - Validity of the performed calibration event(s): The calibration event dated 30/05/2019 is valid until 29/05/2020 - Entity/company responsible for performing the calibration event(s): The valid calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda.
Measuring/reading/recording frequency	Continuously measurements are recorded/reported every minute.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of project emissions (due to consumption of grid-sourced electricity by the project activity).
Additional comments	-

<table>
<tr><td>Data/Parameter</td><td>$EG_{EC2,y} = EC_{PJ2,y}$</td></tr>
<tr><td>Unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Quantity of electricity consumed from diesel generators by the project activity during the year y</td></tr>
<tr><td>Measured/calculated/ default</td><td>Continuously measured by electricity meter.</td></tr>
<tr><td>Source of data</td><td>Measured as part of the operation of the project activity by applying appropriate monitoring instrument (electricity meter).</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>Monthly records of electricity sourced by the 2 installed backup diesel generators valid for the considered monitoring period:
<table>
<tr><th>Month</th><th>Amount of electricity sourced by the backup diesel generators(MWh)</th></tr>
<tr><td>Jul. 2019</td><td>0</td></tr>
<tr><td>Aug. 2019</td><td>0</td></tr>
<tr><td>Sep. 2019</td><td>0</td></tr>
</table>
</td></tr>
</table>

Monitoring equipment	One electricity meter was used for measuring electricity sourced by the backup captive off-grid electricity generators (fuelled by Diesel) during the considered monitoring period. Its specifications are listed below: *Specifications and calibration details for the electricity meter used within the considered monitoring period:* - Manufacturer: ABB S.p.A. - Model: ETE30 - Accuracy: ±0.5% - Serial Number: 1002503115100408 - Calibration frequency (as specified by the monitoring methodology/tool): The registered PDD establishes the following: "*(...) Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. Periodical calibration as per manufacturer specifications to ensure validity of data measured.* *The readings will be double checked by the electricity distribution company.* *The calibration frequency of this monitoring equipment should be according to the manufacturer's specifications*.". - Calibration frequency (as per the recommendation of the meter manufacturer): it is important to note that the installed meters are approved/certified by INMETRO (The Brazilian national authority for metrology and standardization issues), and they are thus in conformance with INMETRO's requirements for maintenance and testing of electricity meters. According to the instrument manufacturer, the meters are to be calibrated every year. An yearly calibration frequency was thus adopted. - Date(s) of performance of calibration event(s) valid for the considered monitoring period: 30/05/2019 - Validity of the performed calibration event(s): The calibration event dated 30/05/2019 is valid until 29/05/2020. - Entity/company responsible for performing the calibration event(s): The valid calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda.
Measuring/reading/recording frequency	Continuously measurements are recorded/reported every minute.
Calculation method (if applicable)	Not applicable.
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of project emissions (due to consumption of electricity sourced by the backup diesel generators).
Additional comments	-

Data/Parameter	**$F_{CH4,EG,t}$**
Unit	kg
Description	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period *t*
Measured/calculated/ default	Measurements are performed by a third party accredited entity.
Source of data	Related measurements and calculations were performed by the independent third party inspection services company "Merieux NutriSciences / Bioagri Ambiental Ltda." in the following dates: - 23/01/2019 (Flares no. 1, 2 and 3) - 25/02/2019 (Flares no. 4, 5 and 6) - 24/10/2019 (Flares no. 1, 4 and 5) - 25/10/2019 (Flares no. 2 and 6) **Note:** Since Flare 3 was not under operational status during the whole considered monitoring period, no additional biannual measurement for this particular Flare is valid for the considered monitoring period. Furthermore, since Flare 3 has not combusted any LFG during the considered monitoring period, no related emission reduction is claimed and determination of flare efficiency for this particular flare by applying Option B.1 of the methodological tool "Project emissions from flaring" (version 02.0.0) is not available for this particular flare for the considered monitoring period either. Biannual measurements of mass flow of methane in the exhaust gas are performed on the basis of measurements of CH_4 concentration in a collected gas sample + measurements of speed of exhaust gas in the upper section of the flares with one hour of duration each. Measurements were performed as per applicable guidance of the following standards: US-EPA Method 18 – Measurement of Gaseous Organic Compound Emission by Gas Chromatography (available online: https://www3.epa.gov/ttnemc01/promgate/m-18.pdf); CETESB L9.221 - "Pipelines and chimneys in stationary emission sources- Sampling points determination procedure) (available online: http://www.esaat.com.br/docs/met_cetesb/CETESB-L9.221.pdf) CETESB L9.222 - "Pipelines and chimneys in stationary emission sources – Determination of speed and outflow of gases) (available online: http://www.esaat.com.br/docs/met_cetesb/CETESB-L9.222.pdf) CETESB L9.223 - "Pipelines and chimneys in stationary emission sources – Determination of dry molecular mass and the excess of the air flow gas" (available online: http://www.esaat.com.br/docs/met_cetesb/CETESB-L9.223.pdf) CETESB L9.224 - "Pipelines and chimneys in stationary emission sources – Determination of humidity of effluents" (available online: http://www.esaat.com.br/docs/met_cetesb/CETESB-L9.224.pdf)
Value(s) of monitored parameter	While biannual related measurements were performed for each one of the installed 6 flares, the monitoring parameter $F_{CH4,EG,t}$ is thus measured, recorded and reported on the basis of the following sub-parameters:

- $F_{CH4,EG,t,flare-1}$: Mass flow of methane in the exhaust gas of Flare 1
- $F_{CH4,EG,t,flare-2}$: Mass flow of methane in the exhaust gas of Flare 2
- $F_{CH4,EG,t,flare-3}$: Mass flow of methane in the exhaust gas of Flare 3
- $F_{CH4,EG,t,flare-4}$: Mass flow of methane in the exhaust gas of Flare 4
- $F_{CH4,EG,t,flare-5}$: Mass flow of methane in the exhaust gas of Flare 5
- $F_{CH4,EG,t,flare-6}$: Mass flow of methane in the exhaust gas of Flare 6

For the determination of values of $F_{CH4,EG,t}$, average the accumulated mass of methane measured during one hour of continuous measurements are considered (average of every-minute measurements).

The table below summarizes the performed biannual determination of $F_{CH4,EG,t}$ for each one of the installed flares valid for the considered monitoring period:

Flare	Dates of performed measurements	Company responsible for the performance of measurements	Identified value of $F_{CH4,EG,t,flare-n}$
Flare 1 ($F_{CH4,EG,t,flare-1}$)	23/01/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.0397
	24/10/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	3.5367
Flare 2 ($F_{CH4,EG,t,flare-2}$)	23/01/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.0223
	25/10/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.0070
Flare 3 ($F_{CH4,EG,t,flare-3}$)	23/01/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.6440
Flare 4 ($F_{CH4,EG,t,flare-4}$)	25/02/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.0103
	24/10/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.0060
Flare 5 ($F_{CH4,EG,t,flare-5}$)	25/02/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.0230
	24/10/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.0060
Flare 6 ($F_{CH4,EG,t,flare-6}$)	25/02/2019	Merieux NutriSciences / Bioagri Ambiental Ltda.	0.0223
	25/10/2019	Merieux NutriSciences / Bioagri Ambiental	0.0317

	Ltda.
Monitoring equipment	Measurements were performed by the independent 3rd party inspection service company "Merieux NutriSciences / Bioagri Ambiental Ltda." by using an appropriated chromatographer and a pitot tube.
Measuring/reading/recording frequency	Biannual
Calculation method (if applicable)	-
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's 14001 certified quality management and control (QA/QC). Mérieux NutriSciences Brasil / Bioagri Ambiental Ltda. is an independent third party inspections services company specialized in inspections and testing of air emissions from stationary sources accredited by the Instituto Nacional de Metrologia, Qualidade e Tecnologia (INMETRO) (the Brazilian national authority for metrology and certification affairs), which is responsible for the regulation of operation of inspection entities and labs.
Purpose of data/parameter	Calculation of baseline emissions.
Additional comments	Among the standards of which guidance and requirements were followed as part of performed biannual determination of $F_{CH4,EG,t}$ for the installed flare within the considered monitoring period, the US-EPA Method 18 – Measurement of Gaseous Organic Compound Emission by Gas Chromatography has been widely internationally recognized and/or accepted by different national and international organizations as a standard for performance of emission measurements from stationary emission sources in a wide range of industries (e.g. The California Air Resources Board (CARB), Scottish Environment Protection Agency (SEPA). Different agencies in the United States (USA) and in other countries require or recommend that determination of concentration of VOC portion in landfill gas is to be performed by applying US-EPA Method 18. The US-EPA Method 18 is also referred in the most popular and acknowledged pollution control handbooks and guides (i.e. Pollution Control Handbook for Oil and Gas Engineering, 2016, published by John Wiley & Sons, Inc. – USA, US-EPA Guidance for evaluating landfill gas emissions from closed or abandoned facilities, SEPA Guidance for monitoring landfill gas engine emissions, Pollution Prevention and Abatement Handbook 1998 – The World Bank Group, etc.). The technical test/evaluation reports for the performed biannual determination of $F_{CH4,EG,t}$ for the installed flare within the considered monitoring period (reports issued by the independent 3rd party inspection service company "BIOAGRI Ambiental Ltda / Mérieux NutriSciences Brasil) also refer to methods recommended by the environmental authority of São Paulo State in Brazil. Compliance with these methods has also been acknowledged as best practice for performance of air emission measurements by different environmental regulatory agencies in Brazil.

Data/Parameter	**$T_{EG,m}$**
Unit	^{o}C

Description	Temperature in the exhaust gas of the enclosed flare in minute *m*
Measured/calculated/ default	Continuously measured by thermocouples installed in the 6 enclosed flares (one thermocouple for each installed high temperature enclosed flare).
Source of data	Measured as part of the operation of the project activity by applying appropriate monitoring instruments (thermocouples) (with recordable electronic signal).
Value(s) of monitored parameter	Values for each one of the installed 6 high temperature enclosed flares are reported in the set of monthly emission reduction calculation spreadsheets (that are enclosed to this Monitoring Report). Measurement data is recorded and reported with an every-minute frequency. While measurements are performed by 6 thermocouples (one thermocouple installed in each individual installed flare), the monitoring parameter $T_{EG,m}$ is measured, recorded and reported on the basis of the following sub-parameters: - $T_{EG,m,flare-1}$: Temperature in the exhaust gas of Flare 1 - $T_{EG,m,flare-2}$: Temperature in the exhaust gas of Flare 2 - $T_{EG,m,flare-3}$: Temperature in the exhaust gas of Flare 3 - $T_{EG,m,flare-4}$: Temperature in the exhaust gas of Flare 4 - $T_{EG,m,flare-4}$: Temperature in the exhaust gas of Flare 5 - $T_{EG,m,flare-4}$: Temperature in the exhaust gas of Flare 6

Monitoring equipment	*Specifications and calibration details for the installed/utilized thermocouples:* *Thermocouple used for measuring $T_{EG,m,flare-1}$ (Flare 1):* - Manufacturer: ELSI s.r.l. - Model: type S - Accuracy: [2.704 + (0.0025 x measured temperature)] ℃, if measured temperature is equal or higher than 600℃ - Serial Number: 12318234 - Calibration frequency (as specified by the monitoring methodology/tool): periodically calibrated by an officially accredited entity - Calibration frequency (as per the application of the monitoring plan): yearly Date(s) of performance and validity of calibration event(s) valid for the considered monitoring period: - Calibration event dated 28/05/2019, valid until 27/05/2020 (1 year). - Entity/company responsible for performing the calibration event(s): The calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda. *Thermocouple used for measuring $T_{EG,m,flare-2}$ (Flare 2):* - Manufacturer: ELSI s.r.l. - Model: type S - Accuracy: [2.704 + (0.0025 x measured temperature)] ℃, if measured temperature is equal or higher than 600℃ - Serial Number: 11-09/5207 - Calibration frequency (as specified by the monitoring methodology/tool): periodically calibrated by an officially accredited entity - Calibration frequency (as per the application of the monitoring plan): yearly - Date(s) of performance and validity of calibration event(s) valid for the considered monitoring period: - Calibration event dated 28/05/2019, valid until 27/05/2020 (1 year). - Entity/company responsible for performing the calibration event(s): The calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda. *Thermocouple used for measuring $T_{EG,m,flare-3}$ (Flare 3):* - Manufacturer: ELSI s.r.l. - Model: type S - Accuracy: [2.704 + (0.0025 x measured temperature)] ℃, if measured temperature is equal or higher than 600℃ - Serial Number: 08-12/64188 - Calibration frequency (as specified by the monitoring methodology/tool): periodically calibrated by an officially accredited entity - Calibration frequency (as per the application of the monitoring plan): yearly - Date(s) of performance and validity of calibration event(s) valid for the considered monitoring period: - Calibration event dated 28/05/2019, valid until 27/05/2020 (1 year). - Entity/company responsible for performing the calibration event(s): The calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda.

	Thermocouple used for measuring $T_{EG,m,flare-4}$ (Flare 4): - Manufacturer: ELSI s.r.l. - Model: type S - Accuracy: [2.704 + (0.0025 x measured temperature)] ℃, if measured temperature is equal or higher than 600℃ - Serial Number: 11-06/1675 - Calibration frequency (as specified by the monitoring methodology/tool): periodically calibrated by an officially accredited entity - Calibration frequency (as per the application of the monitoring plan): yearly Date(s) of performance and validity of calibration event(s) valid for the considered monitoring period: - Calibration event dated 28/05/2019, valid until 27/05/2020 (1 year). - Entity/company responsible for performing the calibration event(s): The calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda. *Thermocouple used for measuring $T_{EG,m,flare-5}$ (Flare 5):* - Manufacturer: ELSI s.r.l. - Model: type S - Accuracy: [2.704 + (0.0025 x measured temperature)] ℃, if measured temperature is equal or higher than 600℃ - Serial Number: 11-09/5209 - Calibration frequency (as specified by the monitoring methodology/tool): periodically calibrated by an officially accredited entity - Calibration frequency (as per the application of the monitoring plan): yearly Date(s) of performance and validity of calibration event(s) valid for the considered monitoring period: - Calibration event dated 28/05/2019, valid until 27/05/2020 (1 year). - Entity/company responsible for performing the calibration event(s): The calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda. *Thermocouple used for measuring $T_{EG,m,flare-6}$ (Flare 6):* - Manufacturer: ALUTAL Controles Industriais Ltda. - Model: type S - Accuracy: ±1.5 ℃ or ±0.25% of measured value (where the highest value is considered) - Serial Number: 11086340 - Calibration frequency (as specified by the monitoring methodology/tool): periodically calibrated by an officially accredited entity - Calibration frequency (as per the application of the monitoring plan): yearly - Date(s) of performance and validity of calibration event(s) valid for the considered monitoring period: - Calibration event dated 28/05/2019, valid until 27/05/2020 (1 year). - Entity/company responsible for performing the calibration event(s): The calibration event was performed by CEIME Calibração e Comércio de Instrumentos Ltda.
Measuring/reading/recording	Continuously measurements are recorded/reported every minute.

frequency	
Calculation method (if applicable)	-
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**$Flame_m$**
Unit	Flame on or Flame off
Description	Flame detection of flare in the minute m
Measured/calculated/ default	Continuously measured by Ultra violet (UV) flame detectors (one UV flame detector for each installed high temperature enclosed flare).
Source of data	For each one of the flares, whenever flame is detected in the flare, flame status "*ON*" or "1" value is attributed. Whenever no flame is detected in the flare, flame status "*OFF*" or "0" is attributed [8].
Value(s) of monitored parameter	Values for each one of the installed 6 high temperature enclosed flares are reported in the set of monthly emission reduction calculation spreadsheets (that is enclosed to this Monitoring Report). Measurement data is recorded and reported with an every-minute frequency. While measurements are performed by 6 UV flame detectors (one UV flame detector installed in each individual installed flare), the monitoring parameter $Flame_m$ is thus measured, recorded and reported on the basis of the following sub-parameters: - $Flame_{m,flare-1}$: Flame detection in Flare 1 - $Flame_{m,flare-2}$: Flame detection in Flare 2 - $Flame_{m,flare-3}$: Flame detection in Flare 3 - $Flame_{m,flare-4}$: Flame detection in Flare 4 - $Flame_{m,flare-5}$: Flame detection in Flare 5 - $Flame_{m,flare-6}$: Flame detection in Flare 6

[8] For the considered monitoring period, the flame status of the flares was attributed with "ON" or "*OFF*" values.

Monitoring equipment	6 UV flame detectors (one UV flame detector installed in each individual installed flare). *Specifications of the installed/utilized UV Flame detectors:* - Manufacturer: Krom Schroder - Model: UVS6 - Calibration frequency: No calibration event is required as the equipment has a self-checking function.
Measuring/reading/recording frequency	Continuously measurements are recorded/reported every minute.
Calculation method (if applicable)	Not applicable
QA/QC procedures	Monitoring equipment/instruments are calibrated and maintained as per instrument specifications and/or recommendations of manufacturer. Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the project activity are performed at ESTRE Ambiental S/A. in accordance with detailed working instructions that are included in the company's ISO 14001 certified quality management and control (QA/QC).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**$Maintenance_y$**
Unit	Calendar dates
Description	Maintenance events completed in year *y*
Measured/calculated/ default	-
Source of data	Maintenance logs
Value(s) of monitored parameter	As per the applied maintenance practice for the project activity, general inspection services on the flares are performed every week. Weekly performed general maintenance service includes at least visual checking of the conditions of the flares' ceramic revetment material. While the ceramic revetment material for all flares are currently under good conditions, no material replacement or major overhauling was yet performed. Maintenance service in the flares (including inspection events) are weekly performed by trained and skilled technical service team under conformance with maintenance requirements for the flares (as established by equipment manufacturer) and as required by the ex-ante determined parameter $SPEC_{flare}$. Further details about the parameter $SPEC_{flare}$ are included in Section D.1.
Monitoring equipment	Not applicable.
Measuring/reading/recording frequency	$Maintenance_y$ is monitored annually as per the monitoring plan of the registered PDD.
Calculation method (if applicable)	Not applicable.

QA/QC procedures	The maintenance event logs and documentation for the whole project activity are recorded as per requirement of the company's ISO 14001 certified quality and control (QA/QC).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Monitoring of this parameter is required for the case of enclosed flares and the project participant selects Option B to determine flare efficiency. These dates are required so that they can be compared to the maintenance schedule to check that maintenance events were completed within the minimum time between maintenance events specified by the manufacturer ($SPEC_{flare}$).

The following monitoring parameters (which are also included in the monitoring plan of the registered PDD) were not monitored during the considered monitoring period and/or were not considered in the context of the determination of achieved emission reductions for the considered monitoring period since the methodological options for which they are applicable were not selected/applied as monitoring or calculation approaches for the determination of baseline emissions achieved by the project activity during the considered monitoring period:

- Volumetric flow of gaseous stream in time interval t on a dry basis ($V_{t,db}$)
- Volumetric fraction of greenhouse gas methane in a hourly time interval *t* on a dry basis ($v_{i,t,db} = v_{i,RG,m}$)

D.3. Implementation of sampling plan

>>
Not applicable.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>
Under conformance with provisions and calculation approach of the registered PDD, Baseline emissions (BE_y) for the considered monitoring period are determined (in tCO_2e) as follows:

$$BE_y = BE_{CH4,y}$$

Where:

$BE_{CH4,y}$ Baseline emissions of methane from the SWDS[9]. As established by ACM0001 (version 13.0.0), the determination of $BE_{CH4,y}$ is based on the amount of methane that is actually captured and combusted (destroyed) by the project activity and also by taking into account the amount of methane that, in the absence of the project activity (baseline scenario), would be otherwise captured and destroyed in the landfill by the pre-project conventional passive LFG destruction system. In addition, the effect of methane oxidation (that, as per ACM0001 (version 13.0.0), is assumed as existing in the baseline and not in the project scenario) is also taken into account. $BE_{CH4,y}$ is thus determined as follows:

[9] SWDS = Solid Waste Disposal Site.

$BE_{CH4,y} = (1 – OX_{top\_layer}) * (F_{CH4,PJ,y} – F_{CH4,BL,y}) * GWP_{CH4}$

Where:

OX_{top_layer} Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline scenario. OX_{top_layer} is ex-ante determined as 10%. Further details about the selection of the value for OX_{top_layer} is included in Section D.1 and in the registered PDD.

$GWP_{CH4,y}$ Global warming potential of CH_4. GWP_{CH4} is ex-ante determined as 25. Further details about the selection of the value for GWP_{CH4} is included in Section D.1 and in the registered PDD.

$F_{CH4,BL,y}$ Amount of methane in the LFG that would be flared in the baseline scenario (absence of project activity). As outlined in Section B.6.1 of the registered PDD, $F_{CH4,BL,y}$ is calculated as follows:

$F_{CH4,BL,y} = 0.2 * F_{CH4,PJ,y}$

Where:

$F_{CH4,PJ,y}$ In the particular context of the determination of value of every minute value of $F_{CH4,BL,y}$ for the considered monitoring period and under conformance with ACM0001 (version 13.0.0), the term "*0.2 * $F_{CH4,PJ,y}$*" is calculated as 0.2 times the total amount of captured methane that is sent to all flares for combustion during each the minute *m* within the considered monitoring period ($F_{CH4,PJ,capt,y}$).
Thus, differently than the approach required for the determination of Amount of methane in the LFG flared by the project activity ($F_{CH4,flared,y}$), records for operational status of the flares (parameter Operation of the equipment that consumes the LFG ($O_{pj,h}$)), flame detection in the flares (monitoring parameter $Flame_m$), and/or efficiency of the flares (calculation parameter $\eta_{flare,calc,y}$) are not taken into account in related calculations. This is under conformance with ACM0001 (version 13.0.0). In the particular context of determination of $F_{CH4,BL,y}$, the following thus applies:

$F_{CH4,BL,y} = 0.2 * F_{CH4,PJ,capt,y}$

Where:
$F_{CH4,PJ,capt,y} = F_{CH4,sent\_flare,y,flare-1} + F_{CH4,sent\_flare,y,flare-2} + F_{CH4,sent\_flare,y,flare-3} + F_{CH4,sent\_flare,y,flare-4} + F_{CH4,sent\_flare,y,flare-5} + F_{CH4,sent\_flare,y,flare-6}$

Details for the determination of every-minute values for $F_{CH4,sent\_flare,y,flare-n}$ are presented below (under "*Determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$*").

For the considered monitoring period, the accumulated value for $F_{CH4,BL,y}$ is calculated as 963 tCH_4.

$F_{CH4,PJ,y}$ Amount of methane in the LFG which is flared and/or used in the project activity.

In the particular case of the project activity, $F_{CH4,PJ,y}$ is determined as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y}$$

Where:

$F_{CH4,flared,y}$ Amount of methane in the LFG flared by the project activity (in tCH_4). In accordance with calculation guidance included in the registered PDD and by following applicable guidance of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0), for each individual flare every-minute values for $F_{CH4,flared,y}$ are determined as the difference between the amount of methane supplied to the flares and residual methane emissions from combustion of LFG in the flares, as follows:

$$F_{CH4,flared,y} = F_{CH4,sent\_flare,y} – (PE_{flare,y} / GWP_{CH4})$$

Where:

$F_{CH4,sent\_flare,y}$ Amount of methane in the LFG which is sent to the flares. Details for the determination of every-minute values for $F_{CH4,sent\_flare,y}$ for each individual flare are presented below (under "*Determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$*").

$PE_{flare,y}$ Project emissions from flaring of the residual gas stream. Details for the determination of every-minute values for $PE_{flare,y}$ for each individual flare are presented below (under "*Determination of $PE_{flare,y}$*").

Determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$:
For the considered monitoring period, Option C of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) (where the gaseous stream the tool shall be applied to is the stream of collected LFG that is sent to the flares)[10] is the selected approach for determination of every minute values for $F_{CH4,sent\_flare,y}$ valid for each installed flare (calculation sub-parameters $F_{CH4,sent\_flare,y,flare-1}$, $F_{CH4,sent\_flare,y,flare-2}$, $F_{CH4,sent\_flare,y,flare-3}$, $F_{CH4,sent\_flare,y,flare-4}$, $F_{CH4,sent\_flare,y,flare-5}$ and $F_{CH4,sent\_flare,y,flare-6}$).

[10] It is relevant to note that the registered PDD states that $F_{CH4,sent\_flare,y}$ will be determined as per *applicable guidance of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"* in which selection of the calculation method (Option A, B or C) is selected ex-post.

By following calculation Option C (that is one of the applicable calculation methods the registered PDD refers to), the mass flow of greenhouse gas *i* ($F_{i,t}$) (*i* = CH_4) for each installed flare is determined as follows:

$$F_{CH4,sent\_flare,y,flare\text{-}n} = F_{CH4,t,flare\text{-}n} = V_{t,wb,n,flare\text{-}n} * v_{i,t,wb} * \rho_{CH4,n}$$

Where:

Sulfix "*flare-n*": (flare in question: Flare 1, Flare 2, Flare 3, Flare 4, Flare 5 and Flare 6)

$V_{t,wb,n}$ Volumetric flow of the gaseous stream (LFG) in time interval *t* on a wet basis at reference conditions. For the considered monitoring period, every-minute values of the calculation parameter $V_{t,wb,n}$ valid for each flare (calculation sub-parameters $V_{t,wb,n,flare\text{-}1}$, $V_{t,wb,n,flare\text{-}2}$, $V_{t,wb,n,flare\text{-}3}$, $V_{t,wb,n,flare\text{-}4}$, $V_{t,wb,n,flare\text{-}5}$ and $V_{t,wb,n,flare\text{-}6}$) are measured and reported (in Nm^3 wet gas/h) in the set of monthly emission reduction calculation spreadsheets valid for the considered monitoring period (and enclosed to this Monitoring Report). Since measurements of LFG flow sent to the each one the flares are automatically converted and recorded in normalized cubic meters (Nm^3), monitoring of pressure and temperature of the LFG is not required for the determination of monitoring records for $V_{t,wb,n}$.

$v_{i,t,wb}$ Volumetric fraction of CH_4 in the gaseous stream in time interval *t* on a wet basis. As per the applied monitoring procedure, every-minute values of the monitoring parameter $v_{i,t,wb}$ (in m^3 of CH_4 / m^3 of wet LFG) are reported in the set of monthly emission reduction calculation spreadsheet valid for the considered monitoring period (and enclosed to this Monitoring Report). Further monitoring details about the monitoring parameter $v_{i,t,wb}$ are included in Section D.2.

$\rho_{CH4,n}$ Density of CH_4 in the gaseous stream (LFG) at reference conditions. For the considered monitoring period, value of $\rho_{CH4,n}$ (in kg of CH_4 / m^3 of CH_4) is calculated and reported in the set of monthly emission reduction calculation spreadsheets valid for the considered monitoring period (and enclosed to this Monitoring Report) as follows:

$$\rho_{CH4,n} = (P_{ref} * MM_i) / (R_u * T_{ref})$$

Where:

P_{ref} Absolute pressure at reference conditions. P_{ref} is ex-ante determined as 101,325 Pa. Further details about the ex-ante determined parameter P_{ref} are included in Section D.1 and in the registered PDD.

T_{ref} Temperature at reference conditions. T_{ref} is ex-ante determined as 273.15 Kelvin. Further details about the ex-ante determined parameter T_{ref} are included in Section D.1 and in the registered PDD.

MM_i Molecular mass of greenhouse gas *i* (*i* = CH_4). MM_i (*i* = CH_4) is ex-ante determined as 16.04 kg/mol. Further details about the ex-ante determined parameter MM_i (*i* = CH_4) are presented in Section D.1 and in the registered PDD.

R_u Universal ideal gases constant. R_u is ex-ante determined as 8,314 Pa.m^3 /kmol.K. Further details about the determination of R_u are presented in the registered PDD.

$\rho_{CH4,n}$ is calculated as 0.7156650 kgCH_4 / m$^3CH_4$ as reported in the set of monthly emission reduction calculation spreadsheet valid for the considered monitoring period.

While the calculated every-minute values $F_{i,t,flare-n}$ are equivalent to every-minute values for $F_{CH4,sent\_flare,y,flare-n}$ (where *n* = 1, 2, 3, 4, 5 and 6), the set of monthly emission reduction calculation spreadsheets valid for the considered monitoring period include the determination of every minute values of $F_{CH4,sent\_flare,y,flare-n}$ that is applicable for each one of the installed 6 high temperature enclosed flares (for which collected LFG is sent for combustion under controlled conditions).

Determination of $PE_{flare,y}$:

$PE_{flare,y}$ is determined for each one of the installed flares ($PE_{flare,y,flare-1}$, $PE_{flare,y,flare-3}$, $PE_{flare,y,flare-4}$, $PE_{flare,y,flare-5}$ and $PE_{flare,y,flare-6}$) by following the applicable stepwise guidance of the methodological tool "Project emissions from flaring" (version 02.0.0). Every minute values for $PE_{flare,y,flare-1}$, $PE_{flare,y,flare-2}$, $PE_{flare,y,flare-3}$, $PE_{flare,y,flare-4}$, $PE_{flare,y,flare-5}$ and $PE_{flare,y,flare-6}$ are determined as a function of every-minute records of mass flow of methane sent to the flare in question (for each flare *n*, $F_{CH4,RG,m,flare-n} = F_{CH4,sent\_flare,y,flare-n}$, where *n* = 1, 2, 3, 4, 5 and 6) as well as based on calculated values for flare efficiency ($\eta_{flare,m} = \eta_{flare,calc,y}$) for each one of the flares as follows:

$$PE_{flare,y} = GWP_{CH4} * \sum_{m=1}^{525,600} F_{CH4,RG,m} * (1 - \eta_{flare,m}) * 10^{-3}$$

Where:

$F_{CH4,RG,m}$ Methane mass flow in the residual gas. For each minute *m* of the considered monitoring period and for each individual flare *n*,, values for $F_{CH4,RG,m}$ are equal to every-minute reported measurement records of the calculation sub-parameter "Amount of methane in the LFG which is sent to the flares" ($F_{CH4,sent\_flare,y}$) that is valid for each individual flare (calculation sub-parameters $F_{CH4,sent\_flare,y,flare-1}$, $F_{CH4,sent\_flare,y,flare-2}$, $F_{CH4,sent\_flare,y,flare-3}$, $F_{CH4,sent\_flare,y,flare-4}$, $F_{CH4,sent\_flare,y,flare-5}$ and $F_{CH4,sent\_flare,y,flare-6}$)

$\eta_{flare,m}$ Flare efficiency in minute *m*. For the considered monitoring period, $\eta_{flare,m}$ is calculated based on performed measurements of methane in exhaust gas of the flare by following applicable guidance as per Option B (Measured flare efficiency) of the methodological tool "Project emissions from flaring" (version 02.0.0) from which the following related guidance of the registered PDD is applied:

"(…)

Option B: Measured flare efficiency:

For each one of the high temperature enclosed flares which are part of the project activity, the flare efficiency in the minute m is determined as a value which is calculated based on performed related measurements ($\eta_{flare,m} = \eta_{flare,calc,m}$) when the following two conditions are simultaneously met (in order to demonstrate that the flare is operating):

(1) The temperature of the exhaust gas of the flare (monitoring parameter $T_{EG.m}$) and the flow rate LFG to the flare (monitoring parameter $F_{CH4,RG,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m

(2) Flame is detected in the flare in minute m (monitoring parameter $Flame_m$).

Otherwise $\eta_{flare,m}$ is set as 0%.
(…)"

In applying Option B, the project participants chose to determine $\eta_{flare,calc,m}$ for each individual flare by applying guidance of Option B.1 (with related measurements of emission of methane in the exhaust gas of the flare being performed by an accredited independent third party entity (e.g. an independent inspection/analysis service company) on a biannual basis).

In order to calculate the flare efficiency value for each flare ($\eta_{flare,calc,m}$) biannual values for the monitoring parameter "Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period t" ($F_{CH4,EG,t}$)) are considered as per the following calculation formula[11]:

Option B.1: Biannual measurement of the flare efficiency":
For each individual flare, the calculated flare efficiency $\eta_{flare,calc,y}$ for low-heigh flares is determined as follows:

$$\eta_{flare,calc,y} = 1 - \frac{1}{2}\sum_{t=1}^{2}\left(\frac{F_{CH4,EG,t}}{F_{CH4,RG,t}}\right) - 0.1$$

Where:

$F_{CH4,EG,t}$ Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period *t*. As established by the registered PDD, for the considered monitoring period, $F_{CH4,EG,t}$ was measured for each individual flare as per appropriate national or international standard during 2 set of measurement events valid for the period encompassed by the considered monitoring period. For each flare, 1-hour length biannual measurements of residual methane in the exhaust gas of the flare and measurements of speed of exhaust gas of the flare (for the determination of flow of methane exhaust gas of the flares) were performed by the third party inspection service company "Merieux NutriSciences / Bioagri Ambiental Ltda.", which is an inspection service company specialized in emission measurements and air pollution inspections.

t The two time periods in year y during which the flare efficiency is measured, each a minimum of one hour and separated by at least six months. Related measurements for each individual flare were performed in the following dates:

- 23/01/2019 (Flares no. 1,2 and 3)
- 25/02/2019 (Flares no. 4, 5 and 6)
- 24/10/2019 (Flares no. 1,4 and 5)

[11] As per the provisions of the Methodological tool "Project emissions from flaring" (version 02.0.0), for enclosed flares that are defined as low height flares (which is the case of the flares installed in the Project Activity), the flare efficiency shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Options A or B.

$F_{CH4,RG,t}$ Mass flow of methane in the residual gas on a dry basis at reference conditions in the time period *t.* Details for the determination of every-minute values for $F_{CH4,RG,t}$ for each individual flare are presented below.

Determination of $F_{CH4,RG,t}$:

As per the applicable guidance of the methodological tool "Project emissions from flaring" (version 02.0.0) and also as per the registered PDD, the methane mass flow in the residual gas (in a dry basis) for each minute *m* of the two time periods in year *y* during which the flare efficiency is measured shall be calculated by following the applicable guidance of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". Values for the parameter $F_{CH4,RG,t}$ valid for each flare (calculation sub-parameters $F_{CH4,RG,t,flare-1}$, $F_{CH4,RG,t,flare-2}$, $F_{CH4,RG,t,flare-3}$, $F_{CH4,RG,t,flare-4}$, $F_{CH4,RG,t,flare-5}$ and $F_{CH4,RG,t,flare-6}$) are thus calculated as follows:

$$F_{CH4,RG,t,flare-n} = V_{t,db,n,flare-n} * v_{CH4,t,db} * \rho_{CH4,n}$$

Where:

$\rho_{CH4,n}$ Density of greenhouse gas *i* (*i* = CH_4) in the gaseous stream (LFG) at normal conditions. Further details for the determination of $\rho_{CH4,n}$ are presented above under the sub-section "*Determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$*".

$v_{CH4,t,db}$ Volumetric fraction of greenhouse gas *i* (*i* = CH_4) in the gaseous stream in a time interval *t* on a dry basis. The following is stated in footnote 3 of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream":

> "*(…) Flow measurement on a dry basis is not feasible at reasonable costs for a wet gaseous stream, so there will be no difference in the readings for volumetric fraction in wet basis analyzers and dry basis analyzers (…)*."

Thus, every-minute values of $v_{CH4,t,db}$ are regarded as equal to every-minute values of the monitoring parameter $v_{i,t,wb}$ (for which further details are presented above under the sub-section "*Determination of every-minute values for the calculation parameter $F_{CH4,sent\_flare,y}$*").

$V_{t,db,n,flare-n}$ Volumetric flow of the gaseous stream (LFG) in time interval *t* on a dry basis for flare *n* (n = 1, 2, 3, 4, 5 and 6). As per Option B of the applicable methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", the volumetric flow of the gaseous stream on a dry basis for each flare (calculation sub-parameters $V_{t,db,n,flare-1}$, $V_{t,db,n,flare-2}$, $V_{t,db,n,flare-3}$, $V_{t,db,n,flare-4}$, $V_{t,db,n,flare-5}$ and $V_{t,db,n,flare-6}$) is

determined by converting the measured volumetric flow from wet basis to dry basis as follows:

$V_{t,db,n,flare-n} = V_{t,wb,n,flare-n} / (1 + v_{H2O,t,db})$

Where:

$V_{t,wb,n,flare-n}$ Volumetric flow of the gaseous stream (LFG) in time interval *t* on a wet basis at normal conditions. Further details of $V_{t,wb,n,flare-n}$ are presented above under the sub-section "*Determination of every-minute values for the calculation parameter* $F_{CH4,sent\_flare,y}$"

$v_{H2O,t,db}$ Volumetric fraction of H_2O in the gaseous stream in time interval *t* on a dry basis. As per applicable guidance of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", $v_{H2O,t,db}$ is calculated as follows:

$$v_{H2O,t,db} = \frac{m_{H2O,t,db} * MM_{t,db}}{MM_{H2O}}$$

Where:

MM_{H2O} Molecular mass of H_2O. MM_{H2O} is ex-ante determined as 18.0152 kg/kmol. Further details about the ex-ante determined parameter MM_{H2O} are included in Section D.1 and in the registered PDD.

$MM_{t,db}$ Molecular mass of the gaseous stream in time interval *t* on a dry basis. As per applicable guidance of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", $MM_{t,db}$ is calculated as follows:

$$MM_{t,db} = \sum_{k} (v_{k,t,db} * MM_{k})$$

Where:

k All gases, except H_2O, contained in the gaseous stream (e.g. N_2, CO_2, O_2, CO, H_2, CH_4, N_2O, NO, NO_2, SO_2, SF_6

and PFCs). See simplification below.

$V_{k,t,db}$ Volumetric fraction of gas *k* in the gaseous stream in time interval *t* on a dry basis. As per applicable guidance of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream":

> "*(…) The determination of the molecular mass of the gaseous stream ($MM_{t,db}$) requires measuring the volumetric fraction of all gases (k) in the gaseous stream. However, as a simplification, the volumetric fraction of only the gases k that are greenhouse gases and are considered in the emission reduction calculation in the underlying methodology must be monitored and the difference to 100% may be considered as pure nitrogen."*

ACM0001 (version 13.0.0) does not include any restriction to such simplification. Thus, only the volumetric fraction of gases that are greenhouse gases and are considered in related calculations (CH_4 in the particular case of the project activity) should be measured and the difference to 100% is just considered as pure nitrogen. Further details for the determination of the volumetric fraction of CH_4 in the gaseous stream ($V_{k,t,db}$ = $v_{CH4,t,db}$) are presented above under the calculation parameter $v_{CH4,t,db}$.

MM_k Molecular mass of gas *k* (*k* = CH_4 and N_2). The molecular mass of CH_4 and N_2 are ex-ante determined as 16.04 and 28.01, respectively. Further details about the ex-ante determined values for MM_k are included in Section D.1 and in the registered PDD.

$m_{H2O,t,db}$ Absolute humidity in the gaseous stream in time interval *t* n a dry basis. As per Option 2 of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", by conservatively assuming that the gaseous stream is saturated ($m_{H2O,t,db}$ = $m_{H2O,t,db,Sat}$), $m_{H2O,t,db}$ is calculated as follows [12]:

$$m_{H2O,t,db,Sat} = \frac{p_{H2O,t,Sat} * MM_{H2O}}{(P_t - p_{H2O,t,Sat}) * MM_{t,db}}$$

Where:

MM_{H2O} Molecular mass of H_2O. MM_{H2O} is ex-ante determined as 18.0152 kg/kmol. Further details about the ex-ante determined values for MM_{H2O} are included in Section D.1 and in the registered PDD.

P_t Absolute pressure of the

[12] It is important to note that the simplified calculation for the absolute humidity of the gaseous stream ($m_{H2O,t,db}$) presented in Option 2 of the methodological "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 02.0.0) shall be applied by assuming the gaseous stream is dry or saturated depending on which is the conservative situation. Footnote 4 of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" states the following:

> "*An assumption that the gaseous stream is saturated is conservative for the situation that the mass flow of greenhouse gas I is underestimated (applicable for calculating baseline emissions). Conversely, an assumption that the gas stream is dry is conservative for the situation that the greenhouse gas t is overestimated (applicable for calculating project emissions).*"

In this particular case, $m_{H2O,t,db}$ is calculated for the determination of the mass flow of methane in the residual gas on a dry basis during the time period t ($F_{CH4,RG,t}$). While $F_{CH4,RG,t}$ is used for the determination of the parameter $PE_{flare,y}$ (project emissions from flaring the residual gas), the assumption that the gaseous stream is dry (conservatively applicable for calculating project emissions) would not be conservative in this case as an overestimation of the amount of methane in the residual gas would actually increase the calculated efficiency of the flares, thus resulting in a reduction of $PE_{flare,y}$ and consequent increment of emission reductions.

gaseous stream in time interval *t*. Further monitoring details for P_t are included in Section D.2.

$MM_{t,db}$ Molecular mass of the gaseous stream in a time interval *t* on a dry basis. Further details for the determination of $MM_{t,db}$ are presented above.

$P_{H2O,t,Sat}$ Saturation pressure of H_2O at temperature T in time *t*, Further monitoring details about the monitoring parameter $P_{H2O,t,Sat}$ are included in Section D.2.

In summary, for the considered monitoring period, the following values of $\eta_{flare,m} = \eta_{flare,calc,y}$ were obtained[13]:

Flare 1 ($\eta_{flare,calc,y,flare-1}$): 0.8920648

Flare 2 ($\eta_{flare,calc,y,flare-2}$): 0.8999686

Flare 3 (($\eta_{flare,calc,y,flare-2}$): 0[14]

Flare 4 ($\eta_{flare,calc,y,flare-4}$): 0.8999825

Flare 5 ($\eta_{flare,calc,y,flare-5}$): 0.8999778

Flare 6 ($\eta_{flare,calc,y,flare-6}$): 0.8998965

As per the applied monitoring procedure, compliance with operational and maintenance requirements for the flares, as established by the *ex-ante* determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$), is also considered for the determination and application of the values of $\eta_{flare,m} = \eta_{flare,calc,y}$ as part of the determination of the value of $F_{CH4,PJ,y} = F_{CH4,flared,y}$ valid for the considered monitoring period.

This is reflected in the monthly emission reduction spreadsheets. Data records for the monitoring parameter "Flame detection of flare in the minute m" ($Flame_m$) are also considered for the determination and application of the values of $\eta_{flare,m}$ as part of the determination of the value of $F_{CH4,PJ,y} = F_{CH4,flared,y}$ valid for the considered monitoring period. This is also reflected in the set of monthly emission reduction spreadsheets.

For each installed flare, the time the flare has operated is determined by monitoring the flame combustion status/condition by using an UV flame detector (of which status signal (flame status "*ON*" or "*OFF*") is continuously recorded and reported). Moreover, the monitoring requirements related to operational

[13] As per the provisions of the Methodological tool "Project emissions from flaring" (version 02.0.0), for enclosed flares that are defined as low height flares (which is the case of the flares installed in the project activity), the flare efficiency shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Options A or B. 0.1 was thus subtracted as part of the determination/calculation of values of $\eta_{flare,m} = \eta_{flare,calc,y}$ for all installed flares.

[14] While Flare 3 has not operated during the whole considered monitoring period, values of $\eta_{flare,m} = \eta_{flare,calc,y}$ for this flare are set to "zero" for every minute within the considered monitoring period.

requirements/conditions for the flare (as established in the specifications for operational conditions defined by the flares' designer and manufacturer as per the ex-ante determined parameter $SPEC_{flare}$ (min. and max. flow of LFG to the flares + temperature of exhaust gas of the flares + meeting of maintenance requirements)) are also considered in the context of the application of determined values for $\eta_{flare,m}$ along the considered monitoring period. As outlined in the set of monthly emission reduction spreadsheets, for each minute *m* within the considered monitoring period whenever a particular flare has combusted LFG by not operating in accordance with the operational criteria (as established by the ex-ante estimated parameter $SPEC_{flare}$ (in terms of LFG flow, temperature of exhaust gas or maintenance practice)), no destruction of methane is accounted for the flare in question as part of the calculation of the value of $F_{CH4,PJ,y} = F_{CH4,flared,y}$ valid for the considered monitoring period.

For the considered monitoring period, the accumulated value for $F_{CH4,PJ,y} = F_{CH4,flared,y}$ is calculated as 4,305 tCH_4.

For the considered monitoring period, baseline emissions of methane from the SWDS ($BE_y = BE_{CH4,y}$) are calculated as 75,195 tCO_2e.

The summarized emission reduction calculation spreadsheets (that are enclosed to this Monitoring Report) summarizes the determination of $BE_y = BE_{CH4,y}$ for the considered monitoring period.

E.2. Calculation of project emissions or actual net removals

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As outlined in the registered PDD, the operation of the project activity requires consumption of electricity (grid-source electricity or electricity sourced by captive off-grid backup electricity generators). As also established in the registered PDD, project emissions due to consumption of these electricity carriers are determined by following the applicable guidance of the "Tool to calculated baseline, project and/or leakage emissions from electricity consumption".

Project emissions (PE_y) for the considered monitoring period are determined (in tCO_2e) as follows:

$$PE_y = PE_{EC,1} + PE_{EC,2}$$

Where:

$PE_{EC,1,y}$ Project emissions due to the consumption of grid-sourced electricity by the project activity

$PE_{EC,2,y}$ Project emissions due to the consumption of electricity sourced by captive off-grid backup electricity generators

Project emissions due to the consumption of grid-sourced electricity by the project activity ($PE_{EC,1,y}$)

Project emissions due to the consumption of grid-sourced electricity by the project activity ($PE_{EC,1,y}$) are calculated as per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01) as follows:

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

Where:

$TDL_{j,y}$ Average technical transmission and distribution losses for providing electricity to source *j* in year *y.* $TDL_{j,y}$ is determined as 20%. Further details about the ex-post determination of $TDL_{j,y}$ are included in Section D.2.

$EC_{PJ,1}$ Quantity of electricity consumed from the grid by the project activity during the year *y* As per the applied monitoring procedure, monthly records of grid-sourced electricity consumption valid for the considered monitoring period are summarized below:

Month	Amount of consumed grid-sourced electricity (MWh)
Jul. 2019	79.7
Aug. 2019	68.6
Sep. 2019	48.9

Additional monitoring details about the monitoring parameter $EC_{PJ,1}$ are included in Section D.2.

$EF_{EL,grid}$ Emission factor for grid-sourced electricity in year *y.* $EF_{EL,grid}$ is determined as the combined margin emission factor ($EF_{grid,CM,y}$) that is calculated as the weighted average of the operating margin and build margin emission factors. To weight these two factors, the default values applicable to both for the 2nd crediting period are applied. The combined margin emission factor is thus obtained as follows:

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

Where:

w_{OM} Weighting of operating margin emissions factor. w_{OM} is ex-ante selected as 0.25%. Further details about the ex-ante selected parameter w_{OM} are included the registered PDD.

w_{BM} Weighting of operating margin emissions factor. w_{BM} is ex-ante selected as 0.75%. Further details about the ex-ante selected parameter w_{BM} are included in the registered PDD.

$EF_{grid,OM}$ $EF_{grid,OM}$ Operating margin CO_2 emission factor. As per the applied monitoring procedure, the selected values for the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM\text{-}DD,y}$ represent the monthly official average values for the months of 2019 encompassed by the considered monitoring period as calculated and made public available by the DNA of Brazil. Applied values of $EF_{grid,OM,y} = EF_{grid,OM\text{-}DD,y}$ are as follows:

- July 2019: 0.5914 tCO_2/MWh
- August 2019: 0.5312 tCO_2/MWh
- September 2019: 0.5606 tCO_2/MWh

$EF_{grid,BM}$ Build margin CO_2 emission factor in year *y*. $EF_{grid,BM}$ is ex-ante determined as 0.2010 tCO_2/MWh. Further details about the ex-ante determined parameter $EF_{grid,BM}$ are included in the registered PDD.

For the considered monitoring period, values of $EF_{grid,CM,y}$ are thus calculated as follows:

- July 2019: 0.2986 tCO_2/MWh
- August 2019: 0.2836 tCO_2/MWh
- September 2019: 0.2909 tCO_2/MWh

For the considered monitoring period, project emissions due to the consumption of grid-sourced electricity by the project activity ($PE_{EC,1}$) are thus calculated as 71 tCO_2 (rounded value)

Project emissions due to the consumption by the project activity of electricity sourced by backup captive off-grid electricity generators ($PE_{EC2,y}$)

Project emissions due to the consumption by the project activity of electricity sourced by backup captive off-grid electricity generators ($PE_{EC2,y}$) are calculated as follows:

$PE_{EC2,y} = EC_{PJ2,y} * EF_{EL,j,y}$

Where:

$EC_{PJ2,y}$ Quantity of electricity sourced by backup captive off-grid electricity generators consumed by the project activity. No electricity was sourced by the backup captive off-grid electricity generators during the considered monitoring period.

$EF_{EL,j,y}$ Emission factor for the diesel generators in year *y*. $EF_{EL,j,y}$ is determined as 1.3 tCO_2/MWh (conservative default value as per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption").

For the considered monitoring period, project emissions due to the consumption of electricity sourced by backup captive off-grid electricity generators ($PE_{EC,2,y}$) are calculated as 0 (null).

The summarized emission reduction calculation spreadsheet (that is enclosed to this Monitoring Report) includes all calculations related to the determination of $PE_{EC,1}$ and $PE_{EC,2}$ for the considered monitoring period.

Total project emissions ($PE_y = PE_{EC,y}$) for the considered monitoring period are calculated as 71 tCO_2 (rounded value).

E.3. Calculation of leakage emissions

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Not applicable.

E.4. Calculation of emission reductions or net anthropogenic removals

Emission reductions achieved by the project activity during the considered monitoring period are determined as the difference between the accumulated calculated values for baseline emissions (BE_y) and project emissions (PE_y) valid for such period. Calculations of baseline emissions (BE_y) are presented in Section E.1. Calculations of project emissions (PE_y) are presented in Section E.2. During the monitoring period from 01/07/2019 to 30/09/2019, achieved emission reductions are calculated as follows:

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	75,195	71	-	-	75,124	75,124

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante for this monitoring period in the PDD (t CO_2e)
75,124	155,674

E.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"

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The 155,674 tCO_2e value is calculated as the share of the estimated total emission reductions to be achieved during the 92-day length share of the monitoring period within year 2019 (based on total value for emission reductions for year 2019 as reported in the registered PDD). Such estimates are calculated as 617,621 tCO_2e * 92 / 365.

E.6. Remarks on increase in achieved emission reductions

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Achieved emission reductions for the project activity are lower than the calculated value of ex-ante estimation of emission reductions as per the registered PDD that is valid for the considered 92-day monitoring period encompassing a fraction of year 2019. When compared to the previously estimated/calculated ex-ante determined value, emission reductions achieved by the project activity during the considered monitoring period represents ~48% of the previously calculated ex-ante estimated value comparable for the same period (as per data in the registered PDD). The following aspects justify and explain the relative difference between (i) such value for ex-ante estimation of emission reductions (as per the registered PDD) that are calculated as applicable for the considered monitoring period and (ii) emission reductions actually achieved by the project activity during the considered monitoring period:

Aspect/condition which represents a decrease factor of reported emission reductions for the considered monitoring period when compared against the ex-ante estimation of emission reduction for the same period as per the registered PDD:

1) *Uncertainties associated with the application of First Order Decay (FOD) multi-phased model for estimating the emission reductions in the registered PDD:*
   As outlined in the registered PDD, like other similar CDM project activities encompassing LFG collection and destruction/utilization, the amount of methane to be generated by decomposition of MSW disposed at the CGR Paulínia landfill and collected by the project activity was derived by applying the First Order Decay (FOD) model as per the methodological tool "Emission from Solid Waste Disposal Sites" (version 06.0.1) in the context of the determination of ex-ante estimated emission reductions to be achieved during the 2nd 7-year renewable crediting period. In this particular aspect it is relevant to note that share of MSW disposal (which is accounted in the application of the FOD model in the registered PDD) has occurred in an area of the CGR Paulínia landfill which is not yet encompassed by the project's LFG collection network (area 2). This aspect per se represents a decrease factor of reported emission reductions for the considered monitoring period (when compared against ex-ante estimates of emission reductions for the same period as reported in the registered PDD).

2) *Non-meeting of operational conditions for the flares in terms of temperature of the exhaust gases of the flare (monitoring parameter $T_{EG.m}$) and the flow rate of LFG to the flare (monitoring parameter $F_{RG,m}$) (as per applicable manufacturer's specification/requirements for the flares as defined under parameter $SPEC_{flare}$) during limited time instants within the*

considered monitoring period, thus resulting in null emission reductions being accounted for the project activity during such minor shares of the considered monitoring period.

E.7. Remarks on scale of small-scale project activity

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Not applicable.

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Document information

Version	*Date*	*Description*
07.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).

Version	*Date*	*Description*
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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