Project design document form
(Version 10.1)

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

BASIC INFORMATION	
Title of the project activity	Mare Chicose Landfill Gas Project
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	11.0
Completion date of the PDD	08/03/2019
Project participants	Sotravic Limited Rhizome Limited
Host Party	Republic of Mauritius
Applied methodologies and standardized baselines	Approved Methodology: ACM0001: "Flaring or use of landfill gas" (version 18.1) Standardized Baseline: ASB0019: "Grid Emission Factor of Mauritius" (version 01.0)
Sectoral scopes linked to the applied methodologies	Sectoral Scope 1: Energy industries (renewable-/non-renewable sources) Sectoral Scope 13: Waste Handling and Disposal
Estimated amount of annual average GHG emission reductions	156,114 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The Mare Chicose landfill is an active landfill site in Mauritius (location) which has been in operation since 1997 and has approximately received~7.9 million tonnes of waste as of Nov2018[1]. It receives ~530,000 tonnes of waste per year (Mare Chicose is the only landfill site on Mauritius island). It is a fully managed site with leachate collection system and a leachate basin.

The Project is to generate renewable electricity using the landfill gas collected from the aforesaid landfill and flare surplus landfill gas collected (technology/measure).

The project activity reduces emissions by:

i. Phase 1:
    a. Investing in a more efficient gas collection system (e.g. construction of additional wells, piping and installation of intermediary gas collection stations) than what is required to meet the contractual requirements;
    b. Flaring more of the collected gas than what is required, by installing advanced monitoring system, optimising the performance of the flare during operation, and minimising shut-down periods.

ii. Phase 2: Investing in an electricity generation plant so as to supply renewable electricity to the mostly coal-based Mauritius electrical grid; started operation in June 2011.

The project boundary is geographical boundary of republic of Mauritius (project boundary).

A basic gas collection and flaring system started operation in 2001 on the first three cells of the landfill, managed by the previous landfill operator. Taking into account the previous existence of this system and the need to improve and expand the landfill cells, the Republic of Mauritius, has set a contractual requirement to flare a set amount of methane. This corresponds to the baseline scenario, under which a basic landfill gas collection and flaring system shall flare the minimum amount of landfill gas as stated by MoLG (Ministry of Local Government, owner of landfill) in its tender document, and no electricity would have been generated (baseline scenario)[2]. Please refer table 2 in section A.3 below for more detail on regulatory / contractual requirement for flaringLFG and implementation status of the project.

On average, it is estimated that 156,114tCO_2e will be reduced annually over the 2ndcrediting period.

The Project promotes sustainable development, and will have several positive social and environmental impacts:

- First, the installed landfill gas collection and flaring system will be more efficient than the baseline situation, therefore enhancing the benefits arising from collecting and flaring the gas, particularly:
    - preventing potentially explosive situations associated with the subsurface migration of gas.
    - disposing of the perilous constituents, particularly methane, safely and controlling and reducing odour nuisances and health risks.
- Second, the Project will act as a model for LFG management, a key element in improving landfill management practices for the Host Country and other countries/islands in the region. Gas collection and flaring equipment and know-how are provided by Sotravic's JV

[1]Refer– Ex-ante ER Calculator, tab "Waste input history"

[2]Refer – Ex-ante ER Calculator, tab "$F_{CH4, BL,y}$"

partner Bilfinger Berger and their subsidiaries, therefore stimulating technology transfer between Europe and Mauritius.

- Third, the Project optimises the use of natural resources and will act as a clean energy demonstration project, encouraging less dependency on grid-supplied electricity. It promotes and diversifies sustainable energy systems.
- Finally, the Project increases employment opportunities. It will provide for both short- and long-term employment for local people: Local contractors and labourers for construction, and long-term staff for operation and maintenance.

Table 1: Sustainable development criteria for Mauritius[3]

Criteria	Sub-Criteria	Project
Economic	• Employment • Balance of payments • Increasing Share of Renewable Energy	The Project willresult in creating employment during the construction and post construction stages.The project will reduce import of fossil fuel by generating renewable electricity.The project will increase the fraction of energy derived from renewable sources.
Social	Employment Quality of Life Community Development	The Project will lead to the creation of 14 direct and indirect jobs for skilled engineers and technicians. Furthermore, the landfill infrastructure and quality of life of local stakeholders will be improved due to a reduction in the odour nuisance. The local community will also benefit from the CSR activities of the Project Developer.
Environmental	Protecting the Environment Air Quality Land Water Resources Biodiversity Marine Resources Natural Resource Utilisation Noise, Health, & Safety	The project will reduce the nuisance of the landfill odours in addition to preventing fires and explosions. The Project will not require any additional land to be cleared, but rather will utilise land already consigned to the landfill. The Project will not result in any additional environmental impacts as compared to the baseline scenario.
Other	Corporate Social Responsibility	The JV shall pursue CSR initiatives with the local community, especially local schools.

A.2. Location of project activity

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Cluny Road, Mare Chicose, Grand Port District, South Eastern Region of Mauritius. The geographic coordinates of the site are: 57° 37' 54.2" E and 20° 23' 11.8" S.

A.3. Technologies/measures

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The project activity involves the installation of an active landfill gas collection system, an enclosed flare system, and a modular electricity generation system. The technology used in the project activity, i.e. the collection, flaring and utilisation of the LFG comes predominantly from Europe. Thus, this equipment imported and installed at the Mare Chicose landfill site represents a transfer of technology from an Annex 1 to a Non-Annex 1 country.

Table 2 below describes the technologies involved:

- Used historically at the site by the previous landfill operator STAM[4] (Historical scenario)
- Required to meet the standard set by the government in the Tender document and follow-up correspondence (Baseline scenario). This equipment is paid for by the government.
- Used in the project activity (CDM project scenario).

[3] http://environment.govmu.org/English/Pages/cdm-Project-Portfolio.aspx

[4] Abbreviation for 'Société de Traitement et d'assainissement des Mascareignes Ltée'

Table 2: Comparison of scenarios

	Historical scenario	Baseline scenario	Project scenario
Landfill gas collection system	Historically, there was a landfill gas extraction system in a poor state. The gas wells had been poorly constructed, and this allowed air to be sucked into the system thereby increasing the oxygen content of the gas whilst reducing the overall methane content. The type of gas well head used did not allow the installation of leachate pumps, resulting in high levels of leachate in the gas well, which reduced the effective gas output of the wells. The gas pipe network connecting the gas wells to the flare had not been constructed properly resulting in accumulation of condensate in the pipes which lead to blockages.	The Mauritian Government took stock of the state of the landfill gas system in a report submitted by Gibb (Mauritius) in April 2003[5]. The report was written by Mr. Paul de Mattos of Lombard & Associates of South Africa. On the basis of this report the government elected to set out a tender for a private operator to address the historical issues. The tender document[6] stipulated, and thus the baseline is considered to be, a system which addressed the following issues: • Capping of all filled waste cells with a geo-membrane cover. This will reduce the possibility of oxygen entering into the system. • Construction of new **vertical** gas wells, spacing **50m apart**. • Install leachate pumps in gas wells which have high leachate levels. • New **in-line** gas collection network, i.e. where pipes coming out of gas wells are directly connected to the network without intermediary valve/collection station.	> The project activity involves the installation of state-of-the-art LFG collection technology: • The project will use **vertical** wells drilled into the waste to extract the LFG, spaced around **40m apart**. **Horizontal** wells will also be drilled temporarily to extract the maximum amount of gas from open cells (these may be replaced by vertical ones later on or may remain permanent). • **End-of-line** collection system with pipes that connect groups of gas wells to **manifolds**. The manifolds are connected to a main pipe and then into the main header pipe which delivers the gas to the extraction plant and the flare/power plant. They allow the optimisation of the extraction of gas from each well. The system operates at a pressure slightly lower than atmospheric, as blowers will draw the gas from the wells through the collection system and deliver it to the flare and potentially to the LFG power generation system. > To assist in the design and setup of the gas collection system, Sotravic has hired gas experts from German company UmatDeponietechnik GmbH, who under the consortium of Bilfinger Berger have over 15 years of experience in the design, installation and operation of LFG collection systems.

[5]Gibb report on state of the landfill (04/2003) (named as Document D.2.2 in CP1)

[6]Refer, Tender document (12/2004) section V.8.3 (pp. 106-107) (named as Document D.2.1 in CP1)

	Historical scenario	Baseline scenario	Project scenario
Flaring system	A gas flare was installed on site in 1997, but only started operating in 2001. During this standing period, formation of rust and general degradation of the flare became evident. When Sotravic took over the concession of the landfill, the flare was operating at only half its original capacity and without any safety features. Two semi-open flares were also at the site, operating part of the time.	In the baseline scenario, on the basis of the Government issued tender requirements (regulatory requirement)[7], there would have been one new flare operated under the following conditions: • Contractor to maintain and operate the whole system and ensure that at least 75% of the gas collected is flared at least 95% of the time. • Contractor to ensure that the gas reaching the flare has an O_2 content less than 3% for at least 95% of the operating time. An O_2 level between 3-6 % may be tolerated while leaks are being investigated and any levels between 6-8% will only be allowed in extreme cases and may not exceed 1% of the daily operating time.	> The project activity involves the installation of two stationary enclosed (low height)gas flares consisting of pipe work, valves, blower, stack with burners, instrumentation and control panel. The designed capacity for the flares is 1500 Nm^3/h. The combustion temperature in the flare stack is specified to be between 1000° – 1200° C[8]. > These flares are provided by German company Hofstetter, who have about 30 years of experience in dealing with combustion technology. > The first flare arrived on site in August 2007 and was commissioned in May 2008, once gas flow was sufficient and flare settings correctly adjusted. The second flare was ordered in March 2009 in order to cope with the expanded gas collection network. It was commissioned in September 2009.

[7]Refer Tender document (12/2004) section V.8.1 (p.103) (named as Document D.2.1 in CP1)

[8] A copy of the Hofstetter flare specifications is available to the Validator upon request (named as Document D.1.1 in CP1)

	Historical scenario	Baseline scenario	Project scenario
Electricity generation system	No electricity generation	No electricity generation[9]	The project has an installed electricity generation capacity of 3.3MW (3*1.1 MW). All the three engine-generator set installed on site are 1100 kW each. Commissioning of initial 2 X 1.1 MW happened in October 2011 and subsequently additional 1.1 MW in January 2013 thereby establishing the total electricity generation capacity as 3.3 MW. As per manufacturer specification (Scomat), the life of the engine generator sets is, till 2033, subject to scheduled maintenance.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Mauritius (host)	Sotravic Limited	No
Republic of Mauritius (host)	Rhizome Ltd.	No

A.5. Public funding of project activity

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The project will not receive any public funding from Parties included in Annex I of the UNFCCC.

A.6. History of project activity

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Not applicable. The project is not a new project and is already registered with UNFCCC as a CDM project activity (ref no 4359). This PDD is revised PDD to address the CP renewal for CP2 and post registration changes.

A.7. Debundling

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Not applicable

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

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ACM0001: “Flaring or use of landfill gas”, version 18.1, adopted at EB101.

Furthermore, the project will use the following tools, which are referred to in ACM0001:

[9] See Tender document: “No consideration has been given to the possibility of commercial exploitation of this gas for energy generation in this Contract” (Tender document (12/2004)section V.8.1 (p.103)) (named as Document D.2.1 in CP1)

- "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0), adopted at EB 66;
- "Project emissions from flaring"; version 2.0.0 adopted at EB68;
- "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"; version 3.0, adopted at EB 96;
- "Emissions from solid waste disposal sites"; version 08, adopted at EB 94.
- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 03.0 adopted at EB 87

For the electricity component (consumption and/or exportation), the project refers to the Standardized baseline for determination of Grid Emission Factor (subsequently "GEF"):

- ASB0019: "Grid Emission Factor of Mauritius", version 01.0, valid from 07 Jan 2016.

The following tools, as referred in ACM0001 have not been applied, as deemed not relevant to the project activity.

- "Combined tool to identify the baseline scenario and demonstrate additionality", version 7.0, adopted at EB 96
- "Tool to determine the remaining lifetime of equipment", version 1, adopted at EB 50
- "Determining the baseline efficiency of thermal or electric energy generation systems", version 2.0, adopted at EB 87
- "Project and leakage emissions from transportation of freight", version 1.0, adopted at EB 70
- "Tool to calculate project or leakage CO_2 from fossil fuel combustion", version 3.0, EB 96

For simplification and improved readability of the PDD, version numbers of the Methodologies and Tools may not be referenced throughout the document. All version numbers stated above apply for the whole document.

B.2. Applicability of methodologies and standardized baselines

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ACM0001

The methodology is applicable to landfill gas capture project activities, that include the destruction of methane emissions and displacement of a more-GHG-intensive service by capturing landfill gas from the landfill site and/or flaring and/or using to produce energy (i.e. electricity, thermal energy).

The methodology is applicable under following conditions:

Applicability Criteria	Justification
a) Install a new LFG capture system in an existing or new (Greenfield) SWDS where no LFG capture system was or would have been installed prior to the implementation of the project activity; or b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that: i. The captured LFG was vented or flared and not used prior to the implementation of the project activity; and ii. In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available;	a) Not applicable b) The Mare Chicose landfill site had a basic gas collection and flaring system (with no other use / electricity generation) before implementation of the project activity. The Project invests into a landfill gas collection and flaring system that is more efficient than the baseline situation, therefore enhancing the benefits arising from collecting and flaring the gas, particularly: • preventing potentially explosive situations associated with the subsurface migration of gas. • disposing of the perilous constituents, particularly methane, safely and controlling and reducing odour nuisances and health risks.

c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways: i. Generating electricity; ii. Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or iii. Supplying the LFG to consumers through a natural gas distribution network; iv. Supplying compressed/liquefied LFG to consumers using trucks; v. Supplying the LFG to consumers through a dedicated pipeline;	c) The Project involves utilization of captured landfill gas for generation of electricity and flaring the surplus gas captured, if any.

d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.	d) As per non-binding best practice on page 5 of the methodology: 1.a. **Prevailing MSW management practice in Mauritius:** As per the, Ministry of Social Security, National Solidarity, and Environment and Sustainable Development (Environment and Sustainable Development Division) the current practice of solid waste management in Mauritius comprises the Mare Chicose Sanitary Landfill and five transfer stations located across the island[10]. The Mare Chicose Landfill is the sole landfill in Mauritius. 1.b. **Facility that recycle organic waste in Mauritius:** A compost plant with a capacity of 300 tonnes of waste daily, set up by a private promoter, is also operational at La Chaumiere since 2011. 1.c - This composting project has a separate contract with the government for 20 years to supply 180,000 tonnes of MSW annually for compositing. Further, the composting plant has reduced the MSW going to landfill [11] rather than the other way around. Hence the landfill does not impact the waste which would have been recycled in the absence of the project activity. 1.d – not applicable. Therefore, the Mare Chicose Landfill does not collect waste that would be recycled in the absence of the project activity.

[10]http://environment.govmu.org/English/Pages/swmd/SWMD-Solid-Waste-In-Mauritius.aspx

[11] Journal of The Institution of Engineers Mauritius, September 2016, Page 35 http://www.iemauritius.com/uploads/IEM%20JOURNAL%202016.pdf

The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is: (a) Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and (b) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln: (i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or (ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary; (c) In the case of LFG supplied to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline, the baseline scenario is assumed to be displacement of natural gas. (d) In the case of LFG from a Greenfield SWDS, the identified baseline scenario is atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons	a) As per the tender document for landfill management contract awarded to Sotravic, the minimum regulatory requirement is a basic landfill gas collection and flaring system that shall flare the minimum amount of landfill gas without electricity generation (baseline scenario). Refer page 17 below for details. b) The electricity generated by the project, in the absence of the project activity would have been generated in the Mauritian grid and/or captive DGs. c) Not applicable d) Not applicable
This methodology is not applicable: (a) In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace; (b) If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.	a) OnlyACM0001: “Flaring or use of landfill gas” (version 18.1) has been applied b) The project landfill is managed as per the tender awarded by the MoLG (owner of landfill). The waste disposal practices / landfill management has remained same since pre-project scenario. Hence, any deliberation to increase methane generation compared to the situation prior to the implementation of the project activity is not possible.

Applicability conditions of the Standardized baseline methodology is as discussed below:

Applicability condition	Justification
Clean development mechanism (CDM) project activities can apply this standardized baseline under the following conditions: (a) The project activity is implemented in Mauritius and is connected to the project electricity system; (b) The CDM approved methodology that is applied to the project activity requires the determination of CO2 emission factor(s) through the application of the “Tool to calculate the emission	a) The project is implemented in Mauritius.The project power plant is connected with Mauritius Electricity Grid (project electricity system). b) the methodology refers to the “Baseline, project and/or leakage emissions from electricity consumption and monitoring of

factor for an electricity system" (hereinafter referred to as "the tool"); (c) The project activity uses ex ante option for the grid emission factor as indicated in the tool i.e. no monitoring and recalculation of the emissions factor during the crediting period is required.	electricity generation" tool which refers to the "Tool to calculate the emission factor for an electricity system" for determination of grid emission factor c) The project uses ex-ante option for grid emission factor

Applicability conditions of the appliedmethodological tools is as discussed below:

"Project emissions from flaring"

Applicability condition	Justification
1) This tool is applicable to the flaring of flammable greenhouse gases where: • Methane is the component with the highest concentration in the flammable residual gas; and • The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas). 2) The tool is not applicable to the use of auxiliary fuels and therefore the residual gas must have sufficient flammable gas present to sustain combustion. 3) For the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare.	1) • The gas being flared at the project activity has major component as methane. • The residual gas steam to be flared is obtained from the Mare Chicose landfill. 2) No auxiliary fuel is being mixed with landfill gas to aid combustion. 3) The enclosed flare specifications are available for the flares that have been installed. The installed flares are low height enclosed flares

"Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"

Applicability condition	Justification
If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: • Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; • Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or • Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.	The project falls under scenario B "Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s) primarily [12] using option B2 (taking a default emission factor of 1.3tCO2e / MWh).

[12]The electricity consumption from the Grid will be accounted directly while calculating Baseline emissions from Electricity Generation while calculating $EG_{PJ,grid,y}$

"Emissions from solid waste disposal sites"

Applicability condition	Justification
Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS; Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS.	Application A: The project captures and utilizes landfill gas from Mare Chicose Sanitary Landfill.

"Tool to determine the mass flow of a greenhouse gas in a gaseous stream"

Applicability condition	Justification
1. Flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions. 2. Methodologies where CO_2 is the particular and only gas of interest should continue to adopt material balances as the means of flow determination and may not adopt this tool as material balances are the cost-effective way of monitoring flow of CO_2.	1. The Flow and composition of residual or flared gases or exhaust gases will be measured for the determination of baseline or project emissions. 2. Not applicable.

B.3. Project boundary, sources and greenhouse gases (GHGs)

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According to ACM0001 baseline methodology, the project boundary is the site of the project activity where the gas will be captured and destroyed/used andall power generation sources connected to the Mauritius electricity grid.

The following activities and emission sources are considered within the project boundary:

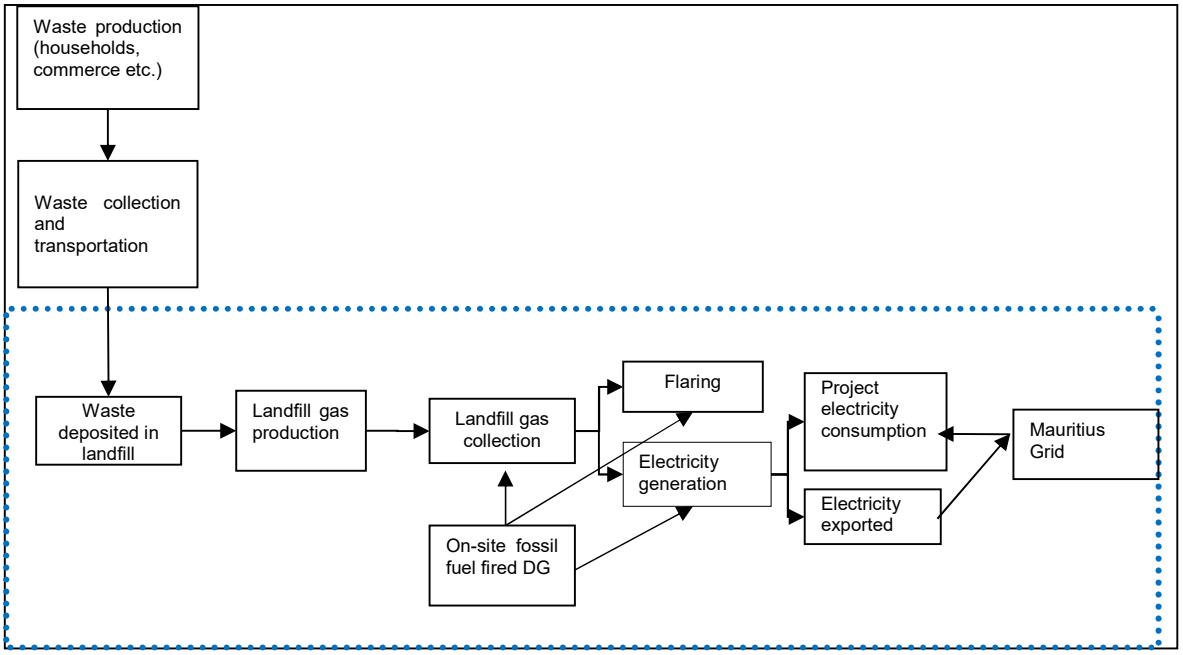
Table 4: Summary of gases and sources included in the project boundary and justification/explanation where gases and sources are not included

	Source	GHG	Included?	Justification/Explanation
Baseline	Emission from decomposition of waste at the SWDS site	CH_4	Yes	The major source of emissions in the baseline.
		N_2O	No	N_2O emissions are small compared to CH_4 emissions from SWDS. This is conservative.
		CO_2	No	CO_2emissions from decomposition of organic waste are not accounted since the CO_2 is also released under the project activity
	Emissions from electricity generation	CO_2	Yes	Major emission source if power generation is included in the project activity.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Emission from heat generation	CO_2	No	No heat energy generation is planned in the project activity.
		CH_4	No	Noheat energy generation is planned in the project activity.
		N_2O	No	Noheat energy generation is planned in the project activity.
	Emission from the use of Natural gas	CO_2	No	Excluded for simplification. This is conservative.
		CH_4	No	There is no natural gas distribution network planned in the project activity.
		N_2O	No	Excluded for simplification. This is conservative.

	Source	GHG	Included?	Justification/Explanation
Project activity	Emission from fossil fuel consumption for purpose other than for electricity generation or transportation due to the project activity	CO_2	No	No fossil fuel consumed by the project activity other than for electricity generation.
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from electricity consumption due to the project activity	CO_2	Yes	May be an important emission source.
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from flaring	CO_2	No	Emissions are considered negligible
		CH_4	Yes	May be an important emission source
		N_2O	No	Emissions are considered negligible
	Emission from distribution of LFG using trucks and dedicated pipeline	CO_2	No	No distribution of LFG via trucks or pipeline to external points of use is planned.
		CH_4	No	No distribution of LFG via trucks or pipeline to external points of use is planned.
		N_2O	No	Emissions are considered negligible

A flow diagram of the project setup is presented in the figure below. The flow diagram comprises the elements of the LFG collection systems and the equipment for electricity generation. The Project boundary is delineated by the broken blue line.

Figure 1: Diagram of project boundary



B.4. Establishment and description of baseline scenario

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The methodological tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (version 03.0.1) has been used to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period.

Step 1: Assess the validity of the current baseline for the next crediting period: The validity of the current baseline is assessed using the following Sub-steps

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The most plausible baseline scenario for the project is assumed to be the capture of LFG and destruction through flaring without utilized for energy generation, and generation of equivalent electricity in local grid as per the simplified procedures to identify the baseline scenario and demonstrate additionality section of the large-scale consolidated methodology “Flaring or use of landfill gas” (version 18.1).

The current baseline scenario (capture and flaring of the landfill gas as per the contractual requirementsand generation of electricity in the regional grid) complies with all relevant mandatory national and/or sectoral policies. There is no mandatory legal requirement to collect, recover and utilize landfill gas for electricity generation in Mauritius[13].

Step 1.2: Assess the impact of circumstances

There is no major change in the market characteristics that will impact the baseline.The tariff for export of electricity to grid has remained stable over the first crediting period andhas remainedfixed for last three years. Hence, there is no need to update the current baseline under renewal of the crediting period.

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

[13]extracts of tender document for management of landfill

This sub-step is not applicable because the baseline scenario identified at the validation of the project activity was not the "continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would not undertake an investment later".

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

The validity of data and parameters (like IPCC default values etc.) that were fixed ex-antee at the start of the first crediting period has been checked and updated under step 2.2 below.

Step 2: Update the current baseline and the data and parameters
2.1: Update the current baseline
The current baseline emissions have been updated for the subsequent crediting period, based on the latest approved version of the methodology ACM0001.

Step 2.2: Update the data and parameters
The data and/or parameter(s) have been updated as applicable (for eg: $F_{CH4,BL,y}$, $EF_{CM,grid,y}$, TDL_y etc.).

B.5. Demonstration of additionality

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As per the "CDM project standard for project activities (version 01.0), for renewal of crediting period of a registered CDM project activity, the project participants are not required to reassess the additionality of the project activity nor update the section of the PDD relating to additionality.

However, given the methodology provides a simplified procedure for demonstration of additionality, additionality has been re-assessed as per para 22 of ACM0001, as follows

Simplified procedures to identify the baseline scenario and demonstrate additionality

Prior to the implementation of the project activity the LFG was flared but not utilized for energy generation hence as per the para 22 of the ACM0001, the project deemed automatically additional.

a) The LFG is used to generate electricity in one or several power plants with a total nameplate capacity that equals or is below 10 MW;

b) The LFG is flared.

In the project activity, the LFG is used to generate electricity in project power plant and the total proposed capacity of the generating plant is 3.3 MW i.e. below 10 MW. Prior to the project activity there was no power generation facility consuming LFG. There is no generation and consumption of heat in the project, but the LFG is used for electricity generation and/or flared.

The monitoring plan has been updated to include monitoring parameters related to simplified procedure for identification of baseline scenario and demonstrate additionality.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

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Note that all equations numbers refer to the number in the relevant methodology/tool.

Baseline Emissions :

The Baseline emissions are determined according to the large-scale consolidated methodology ACM0001 "Flaring or use of landfill gas" (version 18.1):

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

Where:

BE_y = Baseline emissions in year *y*(t CO_2e/yr)

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

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

$BE_{HG,y}$ = Baseline emissions associated with heat generation in year *y* (t CO_2/yr)

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

As the proposed project activity does not include a thermal energy component and natural gas use/distribution, all following equations will exclude these components for simplification. The revised equation for the baseline emission calculation is as follows:

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

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

The baseline emissions of methane from the SWDS will be determined based on the amount of methane that is captured under the project activity and the amount that would be captured and destroyed in the baseline scenario (such as due to regulations, if any). In addition, the effect of methane oxidation that is present in the baseline and absent in the project is considered:

$$BE_{CH4} = \{(1 - OX_{top\_layer}) \times F_{CH4,PJ,y} - F_{CH4,BL,y}\} \times GWP_{CH}$$

Where:

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

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

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

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

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

A. Methane destroyed by the project activity ($F_{CH4,PJ,y}$) – ex-post monitored:

Sum of the quantities fed to the flare(s) and the power plant(s):

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

Where:

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

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

$F_{CH4,EL,y}$ = Amount of methane in the LFG which is used for electricity generation in year *y*(t CH_4/yr)

$F_{CH4,HG,y}$ = Amount of methane in the LFG which is used for heat generation in year *y*(t CH_4/yr)

$F_{CH4,NG,y}$ = Amount of methane in the LFG which is sent to the natural gas distribution network and/or dedicated pipeline and/or to the trucks in year *y* (t CH_4/yr)

The project does not involve any heat generation and natural gas distribution hence the parameter $F_{CH4,HG,y}$and $F_{CH4,NG,y}$will become zero in the above equation. The revised equation for calculation

of amount of methane in the LFG which is flared and/or used in the project activity in year *y* will be as follows:

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

$F_{CH\ ,EL,y}$isdetermined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" and monitoring the working hours of the power plant(s) ($Op_{j,h}$). If several flares or electricity generators are used, and will be the sum of the quantities destroyed in all the flares and all the generators.The quantity of methane destroyed by flaring is calculated using the following equation:

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

Where:

$F_{CH4,Flared,y}$	=	Amount of methane in the LFG which is destroyed by flaring during inyear*y* [$tCH_{4/yr}$];
$F_{CH4,sent\_flare,y}$	=	Amount of methane in the LFG which issent to the flare(s) in the year *y* [$tCH_{4/yr}$];
$PE_{flare,y}$	=	Project emissions from flaring of the residual gas stream in year *y*;
GWP_{CH4}	=	Global Warming Potential of methane [tCO_2e/tCH_4].

$F_{CH4,EL,y}$isdetermined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" and monitoring the working hours of the power plant(s) ($Op_{j,h,y}$)

B. Methane destroyed by the project activity ($F_{CH4,PJ,y}$) –*ex-ante* estimate:

The amount of methane that will be destroyed/combusted during the year is estimated *ex-ante* with the following equation:

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

$BE_{CH4,SWDS,y}$ is the methane generation from the landfill in the absence of the project activity at year *y* [tCO_2e], calculated as per the equation (1) of methodological tool *"Emissions from solid waste disposal site"(version 08.0)*.

$$BE_{CH\ ,SWDS,y} = \varphi_y \times (1 - f_y) \times GWP_{CH4} \times (1 - OX) \times \frac{16}{12} \times F \times DOC_{f,y} \times MCF_y \times (W_{j,x} \times DOC_j \times e^{-k \times (y-x)} \times (1 - e^{-kj}))$$

Where:

Parameter	Unit	Value	Description
$BE_{CH4,SWDS,y}$	tCO_2e	Refer ER calculator	Baseline methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (t CO2e/yr)
Φ_y	-	0.75	model correction factor to account for model uncertainties
f_y	-	0	Fraction of methane captured at the SWDS[14] and flared, combusted or used in another manner;
GWP_{CH4}	$tCO_2e/t\ CH_4$	25 for 2nd commitmentperiod	Global Warming Potential of methane, valid for the relevant commitment period;
OX	-	0.1	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste);
F	volume fraction	0.5	Fraction of methane in the SWDS gas (volume fraction);

[14] Solid Waste Disposal Site, as defined in the *methodological tool "Emissions from solid waste disposal site"(version 08.0).*

DOC_f	-	0.5	Fraction of degradable organic carbon that can decompose;
MCF_y	-	1.0	Methane correction factor for year y (anaerobic managed SWDS);
$W_{j,x}$	Tonnes	Refer ER calculator	amount of organic waste type *j* prevented/disposed from disposal in the SWDS in the year *x*;
DOC_j	weight fraction	See B.6.2	Fraction of degradable organic that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
k_j	-	See B.6.2	Decay rate for the waste type *j*;
j	-	-	Type of residual waste or types of waste in the MSW
x	-	1997	Year since the landfill started receiving wastes, runs from the first year of landfill operation (x=1) to the year for which emissions are calculated (x=y);
y	-	2019	Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months).
η_{PJ}	0.5	Default by methodology	Efficiency of the LFG capture system that will be installed in the project activity

The default values above were taken from the ***"****Tool to determine emissions from solid waste disposal site" applyin****g*** *the* Application A. The f_y: 0 (as this gets accounted under$F_{CH4,BL,y}$)$W_{j,x}$: Refer ER calculator for this parameter.

C. Amount of methane that would have been destroyed/combusted in the absence of the Project due to regulatory and/or contractual requirements ($F_{CH4,BL,y}$)

$F_{CH4,BL,y}$is given/defined in the contractual requirements as a quantity directly[15]. This is calculated from the annual "estimated and accepted methane yield" (YIELDy) shown in Table 5
$F_{CH\ ,BL,y}$ = $YIELD_y$ * 75% [destruction efficiency] * 95% [of time] * 8,760 [hrs/yr] * 0.0007168 [t/m^3 CH_4]

[15] See details in section B.6.2belowand Tender document (12/2004) and Letter from Mauritius government confirming minimum gas flaring requirements (11/2008) (named as documents D.2.1 and D.2.3 in CP1)

	Estimated and accepted methane yield
Unit	m3 CH4 / hour
2009	343
2010	445
2011	484
2012	540
2013	504
2014	470
2015	439
2016	410
2017	382
2018	357
2019	333
2020	311
2021	290
2022	271
2023	253
2024	236
2025	220
2026	205
2027	192
2028	179
2029	167
2030	156

Table 5

	Baseline level of methane to be destroyed (MD_{BL},y)
Source	Contractual requirements
Unit	t CH4/yr
2009	1,535
2010	1,991
2011	2,165
2012	2,416
2013	2,255
2014	2,103
2015	1,964
2016	1,834
2017	1,709
2018	1,597
2019	1,490
2020	1,391
2021	1,297
2022	1,212
2023	1,132
2024	1,056
2025	984
2026	917
2027	859
2028	801
2029	747
2030	698

* As per ACM0001 requirements, these calculations
disposal of waste at a solid waste disposal site". Hov

Table 6

Therefore, according to ACM0001, this quantity will be used for $F_{CH\ ,BL,y}$and there is no need to calculateit as per section 5.4.1.3 of the methodology. Refer ER calculator for the values of $F_{CH\ ,BL,y}$in each year of project operation.

Determination of $BE_{EC,y}$

$$BE_{EC,y} = EG_{PJ,grid,y} \times EF_{grid,CM,y}$$

$$EG_{PJ,grid,y} = EG_{PJ,export,grid,y} - EG_{PJ,import,grid,y}(1 + TDL_y)$$

Where:

$EG_{PJ,export,grid,y}$ = Electricity exported to grid by the project power plant in year y (MWh).

$EG_{PJ,import,grid,y}$ = Electricity imported from grid in year y (MWh) by the project facility. This parameter includes total electricity imported from grid, aggregating that monitored using bi-directional energy meters and that monitored from any additional import line not covered by the bidirectional export-import meter (MWh).

TDL_y = Average technical transmission and distribution losses for providing electricity in year y (fraction)

$EF_{grid,CM,y}$ = Combined margin emission factor for the grid in year y (tCO2/MWh)

Project emissions:

Project emissions are calculated as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y} + PE_{SP,y}$$

Where:

PE_y = Project emissions in year *y* [tCO_2/yr];

$PE_{EC,y}$ = Emission from consumption of electricity in the project case. The project emissions from electricity consumption $PE_{EC,y}$ will be calculated following the latest version of Tool: *"baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"*[tCO_2/yr].

$PE_{FC,y}$ = Emissions from consumption of fossil fuels due to the project activity, for

purpose other than electricity generation, in year y (t CO_2/yr)

$PE_{DT,y}$ = Emissions from the distribution of compressed/liquefied LFG using trucks, in year y (t CO_2/yr)

$PE_{SP,y}$ = Emissions from the supply of LFG to consumers through a dedicated pipeline, in year y (t CO_2/yr)

There may be some fossil fuel use on-site to generate captive power as an emergency/back-up supply. In that case, project emissions will be accounted for under $PE_{EC,y}$. No other sources of fossil project emissions are expected, hence $PE_{FC,y}$, $PE_{DT,y}$and $PE_{SP,y}$have been omitted from equation 22 of ACM0001.The revised equation will be as follow:

$$PE_y = PE_{EC,y}$$

Note that project emissions due to flaring are accounted for separately in equation 4 of ACM0001 above.

A. Project emissions from flaring (used in the calculation of $PE_{flared,y}$for equation 4 of ACM0001)

Project emissions from flaring will be calculated and monitored according to the procedures described in the "*Project emissions from flaring*". As the project uses enclosed flares, two options are available to determine the flare efficiency. Option A is chosen, i.e. to use a 80% default value(for low height enclosed flares).

The project emissions from flaring gases are calculated as follows:

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

Where:

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

$F_{CH4,RG,m}$ = Mass flow rate of methane in the residual gas in the minute *m* [kg/m];

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

GWP_{CH4} = Global Warming Potential of methane valid for commitment period [tCO_2e/tCH_4].

The flare efficiency for the minute m ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating:

1. The temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m; and
2. The flame is detected in minute m ($Flame_m$).

Otherwise $\eta_{flare,m}$is 0%.

B. Project emissions from electricity consumption (use of captive power plant on site)

This procedure follows the *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption*and monitoring of electricity generation".

Project emissions are calculated with the following formula:

$$\text{(T.2.1)} PE_{EC,y} = \sum EC_{PJ,j,y} \times EF_{EL,j,y}$$

Where:

$PE_{EC,y}$ Project emissions from electricity consumption by the project activity during the year *y* [tCO_2/yr];

$EC_{PJ,j,y}$ Quantity of electricity consumed by the project electricity consumption source *j (DG)* in year *y* [MWh/yr];

$EF_{EL,j,y}$ Emission factor for electricity generation for source j in year *y* [tCO_2/MWh]. This value equals 1.3 tCO_2/MWh (as per option B2 of the Tool);

Leakage emissions:

No leakage effects need to be accounted under this methodology.

Emission reductions:

Equation 26 of ACM0001 is copied below and explicated in order to clearly differentiate between the various sources of project emissions. Project emissions from flaring are already included in the calculation of BE_y. Hence, they have not to be deducted once more in the overall emission reduction calculation in equation (26). Only project emissions from electricity use are included in PE_y.

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year *y* [tCO_2e/yr];

BE_y Baseline emissions in year *y* [tCO_2e/yr];

PE_y Project emissions in year *y* [tCO_2e/yr];

All *ex-ante* calculations to obtain the emission reduction from the project activity are listed in Section B.6.3.

B.6.2. Data and parameters fixed ex ante

No specific table is given for the following parameters listed in the methodology/tools (being not applicable to the project):

- From ACM0001:
  - $F_{CH4,BL,x-1}$ - this is applicable in case of case 3 under section 5.4.1.3 of methodology; instead, the level of methane to be destroyed in the baseline ($F_{CH4,BL,R,y}$) is taken directly from regulatory requirements (see section B.6.1).
  - NCV_{CH4}– no heat generation component under the project
  - $EF_{CO2,BL,HG,j}$ - no heat generation component under the project
  - $fd_{CH4,HG,j,default}$ - no heat generation component under the project

- From Tool: Emissions from Solid waste Disposal sites
  - BMP_{MSW} *and* BMP_j– Default values of DOC_f are being used

Table for the following parameters have been included in the list of “Data and parameters available at validation” while the methodology/tools list them in the list of “Data and parameters monitored”:

- From ACM0001
  - $\mathbf{F_{CH4,BL,y}}$–This is being fixed ex-ante as the value is being sourced from tender issued by local government and hence need not be monitored.
- From the Tool: “*Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation*”:
  - $EF_{grid,CM,y}$ – fixed ex-ante using standardized baseline ASB0019
- From the *“Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”*:
  - f_y,and $W_{j,x}$ because they are determined only once *ex-ante* for the purpose of estimating baseline emissionfrom SWDS using Application A approach.
- From the *“Tool to determine the mass flow of greenhouse gas in a gaseous stream”*:
  - R_u, MM_i, MM_k, MM_{H2O} – not required as project uses option C with thermal mass flow meters

ACM0001 (Data / Parameters):

Data/Parameter	OX_{top_layer}
Data unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	ACM00001, version 18.1
Value(s) applied	0.1
Choice of data or measurement methods and procedures	Default value specified in methodology
Purpose of data	Calculation of Baseline emissions
Additional comment:	Consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal sites"

Data/Parameter	GWP_{CH4}
Data unit	t CO_2e/t CH_4
Description	Global warming potential of CH_4
Source of data	IPCC
Value(s) applied	25 (from IPCC Fourth Assessment Report (AR4))
Choice of data or measurement methods and procedures	Default value specified in methodology
Purpose of data	Calculation of Baseline emissions
comment	Shall be updated according to any future COP/MOP decisions or at the renewal of crediting period

Data/Parameter	η_{PJ}
Data unit	Dimensionless
Description	Efficiency of the LFG capture system that will be installed in the project activity
Source of data	ACM0001 / Technical specifications of the LFG capture system
Value(s) applied	Technical specifications of the LFG capture system to be installed (if available) or a default value of 50 per cent
Choice of data or measurement methods and procedures	Default value specified in methodology
Purpose of data	Calculation of Baseline emissions
AdditionalAny comment:	

Data/Parameter	$F_{CH4,BL,y}$

Data unit	t CH_4/yr
Description	Amount of methane in the LFG which is flared in the baseline in year y
Source of data	Regulatory requirements as specified in the Tender document and follow-up documents
Value(s) applied	Levels for $\mathbf{F_{CH4,BL,y}}$ are set *ex-ante* by contractual requirements and given under the $\mathbf{F_{CH4,BL,y}}$ tab in the ER calculator
Choice of data or measurement methods and procedures	The Tender document[16] specifies that the operator should "combust > 75% of the estimated and acc``epted gas yield for >95% of its operating time". An additional letter from the government[17] sets the "estimated and accepted gas yield" and corresponding methane yield to the annual levels given under the $\mathbf{F_{CH4,BL,y}}$ tab in the ER calculator . Baseline levels are those calculated in Table 6and are directly used as $\mathbf{F_{CH4,BL,y}}$.See section B.6.1, page 17 for details.
Purpose of data	Calculation of Baseline emissions
Additional comment	

Tool: Baseline, project and/ or leakage emissions from electricity consumption and monitoring of electricity generation:

Data / Parameter:	$\boldsymbol{PP_{CP,j}}$ **and** $\boldsymbol{PP_{CP,i}}$
Data unit	MW
Description	Rated capacity of the captive power plant(s) that provide the project or leakage consumption source(s) *i* or *j* with electricity
Source of data	Name plate capacity of the captive power plant, manufacturer's specifications or catalogue references
Value to be applied	180kW
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of Baseline emissions
Any comment:	

Data / Parameter:	$\boldsymbol{EF_{grid,CM,y}}$
Data unit	tCO_2/MWh
Description	Combined margin emission factor for the grid in year y
Source of data	ASB 0019
Value to be applied	0.864
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of Baseline emissions
Any comment:	Shall be updated at the renewal of crediting period

[16]Tender document (12/2004)(named as Document D.2.1 in CP1)

[17] Letter from Mauritius government confirming minimum gas flaring requirements (11/2008)(named as Document D.2.3 in CP1)

Data/Parameter	$EF_{EL,j,y}$
Data unit	tCO_2/MWh
Description	Emission factor for captive power plant
Source of data	Tool: *Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation*"
Value(s) applied	1.3
Choice of data or measurement methods and procedures	Option B2 (a)(i)
Purpose of data	Calculation of project emissions
Additional comment	

Tool: "Emissions from solid waste disposal sites"

Data/Parameter	$\Phi_{default}$
Data unit	-
Description	Default value for Model correction factor to account for model uncertainties
Source of data	*Tool: Emissions from solid waste disposal sites*
Value(s) applied	0.75
Choice of data or measurement methods and procedures	Application A of the tool
Purpose of data	Baseline emission calculation
Additional comment	this parameter is required only for determination of ex-ante $BE_{CH4,SWDS,y}$ as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

Data/Parameter	**OX**
Data unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
Source of data	*Tool: Emissions from solid waste disposal sites*
Value(s) applied	0.1
Choice of data or measurement methods and procedures	Application A of the tool. The SWDS is a managed site covered with oxidizing material such as soil or compost, hence a default value of 0.1 is applied
Purpose of data	Calculation of Baseline Emission
Additional comment	this parameter is required only for determination of ex-ante $BE_{CH4,SWDS,y}$ as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

Data/Parameter	F
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	*Tool: Emissions from solid waste disposal sites*
Value(s) applied	0.5
Choice of data or measurement methods and procedures	Application A of the tool.
Purpose of data	Calculation of Baseline Emission
Additional comment	this parameter is required only for determination of ex-ante $\mathbf{BE_{CH4,SWDS,y}}$ as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

Data/Parameter	$\mathbf{DOC_{f,default}}$
Data unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that decompose in the SWDS
Source of data	*Tool: Emissions from solid waste disposal sites*
Value(s) applied	0.5
Choice of data or measurement methods and procedures	Application A of the tool.
Purpose of data	Calculation of Baseline Emission
Additional comment	this parameter is required only for determination of ex-ante $\mathbf{BE_{CH4,SWDS,y}}$ as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

Data/Parameter	$\mathbf{MCF_{default}}$
Data unit	-
Description	Methane correction factor
Source of data	*Tool: Emissions from solid waste disposal sites*
Value(s) applied	1.0
Choice of data or measurement methods and procedures	Application A of the tool. The site is an anaerobic managed solid waste disposal site having a controlled placement of waste, cover material, mechanical compacting and leveling of the waste.
Purpose of data	Calculation of Baseline Emission
Additional comment	this parameter is required only for determination of ex-ante $\mathbf{BE_{CH4,SWDS,y}}$ as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

Data/Parameter	$\mathbf{DOC_j}$
Data unit	-
Description	Fraction of degradable organic carbon (by weight) in the waste type *j*.
Source of data	*Tool: Emissions from solid waste disposal sites*

Value(s) applied	The following values for the different waste types *j* are applied: **Default values for DOC_j** **Waste type *j*** / ***DOC_j (% wet waste)*** Wood and wood products: 43 Pulp, paper and cardboard (other than sludge): 40 Food, food waste, beverages and tobacco (other than sludge): 15 Textiles: 24 Garden, yard and park waste: 20 Glass, plastic, metal, other inert waste: 0
Choice of data or measurement methods and procedures	Default values as given under the Methodological Tool: Emissions from solid waste disposal sites (version 08.0)
Purpose of data	Calculation of Baseline Emission
Additional comment	The values applied are for wet waste as this is the basis also used to determine the proportion of each type of waste ($p_{n,j,x}$). This parameter is required only for determination of ex-ante $\mathbf{BE_{CH4,SWDS,y}}$ as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

Data/Parameter	$\mathbf{k_j}$
Data unit	1/yr
Description	Decay rate for the waste type *j*
Source of data	*Tool: Emissions from solid waste disposal sites*
Value(s) applied	The following decay rate for the different waste type j are applied Default values for k_j **Waste type *j*** / **Tropical (MAT > 20°C)** / **Wet (MAP > 1,000 mm)** Slowly degrading: Pulp, paper, cardboard (other than sludge), textiles: 0.07 Slowly degrading: Wood, wood products and straw: 0.035 Moderately degrading: Other (non-food) organic putrescible garden and park waste: 0.17 Rapidly degrading: Food, food waste, sewage sludge, beverages and tobacco: 0.40
Choice of data or measurement methods and procedures	As per Methodological Tool*"Emissions from solid waste disposal site" (version 08.0),*the values applied are for tropical (MAT > 20° C) and wet (MAP >1000mm) conditions, as confirmed by the Meteorological Services office of Mauritius[18].
Purpose of data	Calculation of Baseline Emission
Additional comment	This parameter is required only for determination of ex-ante $\mathbf{BE_{CH4,SWDS,y}}$ as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

[18] Refer "Mauritius Met Office confirmation of Temperature and Precipitation (03/2008)". (named as D.6.1. in CP1)

Data/Parameter	f_y
Data unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
Source of data	N/A
Value(s) applied	0
Choice of data or measurement methods and procedures	As per ACM0001: "As this is already accounted in ER calculations via monitoring of $F_{CH4,BL,y}$, "f_y" in the tool has been assigned a value of 0"
Purpose of data	Calculation of Baseline Emission
Additional comment	This parameter is required only for determination of ex-ante **$BE_{CH4,SWDS,y}$** as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

Data/Parameter	$W_{j,x}$
Data unit	tonnes
Description	Total amount of waste disposed in a SWDS in year x
Source of data	Measurements by project participants
Value(s) applied	531,144 (for detail refer ex-ante ER calculations)
Choice of data or measurement methods and procedures	Data for 1997 to Nov 2018 is taken from historical records of landfill operation and aggregated annually. Data from Nov 2018onwards is forecasted based on 2018 data.
Purpose of data	Calculation of Baseline Emission
Additional comment	This parameter is required only for determination of ex-ante **$BE_{CH4,SWDS,y}$** as per the tool "*Emissions from solid waste disposal sites"* and may not be listed in the monitoring report subsequently.

Data/Parameter	$P_{n,jx}$
Data unit	-
Description	Weight fraction of the waste type j
Source of data	Waste composition studies[19]
Value(s) applied	See inner table below
Choice of data or measurement methods and procedures	According to ACM0001 (section 5.4.1.2, para 39 c) page 17): "Sampling to determine the different waste types is not necessary. The waste composition can be obtained from previous studies".
Purpose of data	Calculation of Baseline Emission
Additional comment	This is determined once ex-ante for the purpose of estimating emission reductions.

Waste Type	Wood and Wood Products	Paper waste	Food waste	Textiles waste	Yard waste	Glass, Plastic, Metal + Miscellaneous
waste %	0.0%	15.0%	27.0%	5.0%	27.0%	26.0%

Tool:"Project emissions from flaring"

[19]Refer document "IEM Journal September 2016, page 35 - 54

Data/Parameter	$\rho_{CH4,m}$
Data unit	kg/m^3
Description	Density of methane gas at reference conditions
Source of data	Tool: “Project emissions from flaring”
Value(s) applied	0.716
Choice of data or measurement methods and procedures	Constant as per Table 1 Methodological tool: “Project emissions from flaring” (version 02.0)
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	T_{ref}
Data unit	K
Description	Temperature at reference conditions
Source of data	Tool: “Project emissions from flaring”
Value(s) applied	273.15
Choice of data or measurement methods and procedures	Constant as per Table 1 Methodological tool: “Project emissions from flaring” (version 02.0)
Purpose of data	Calculation of baseline emissions
Additional comment	This is same as T_n

Data/Parameter	P_{ref}
Data unit	Pa
Description	Atmospheric pressure at reference conditions
Source of data	Tool: “Project emissions from flaring”
Value(s) applied	101,325
Choice of data or measurement methods and procedures	Constant as per Table 1 Methodological tool: “Project emissions from flaring” (version 02.0)
Purpose of data	Calculation of baseline emissions
Additional comment	This is same as P_n

Data/Parameter	$SPEC_{flare}$
Data unit	Temperature - ^{O}C Flow rate – m^3/h
Description	Manufacturer's flare specifications for temperature and flow rate
Source of data	Flare specifications
Value(s) applied	Minimum flare 1 flow (Nm^3/h) - 150 Minimum flare 2 flow (Nm^3/h) - 300 Maximum flare flow (Nm^3/h) - 1500 (for both flares) Minimum Temperature of Combustion (ºC) – 1000 (for both flares) Maximum Temperature of Combustion (ºC) – 1200 (for both flares)
Choice of data or measurement methods and procedures	Manufacturer's flare specifications
Purpose of data	Calculation of baseline emissions
Additional comment	Maintenance schedule is not applicable as Option A has been selected

Data/Parameter	$\eta_{flare,m}$
Data unit	%
Description	The flare efficiency for the minute m
Source of data	Tool: "Project emissions from flaring"
Value(s) applied	80% when $SPEC_{flare}$ is met and flame is detected in minute m 0% otherwise
Choice of data or measurement methods and procedures	Option A: Apply a default value for flare efficiency from thetool.
Purpose of data	Calculation of baseline emissions
Additional comment	The installed flares are low height enclosed flares hence the value applied is taken as 80% in line with page 3 of the tool

B.6.3. Ex ante calculation of emission reductions

>>

Baseline emission BEy	Units	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
ACM001 & Methane Tool															
Baseline emission $BE_{CH4,SWDS,y}$	tCO_2e	1,90,747	1,96,946	2,02,175	2,06,651	2,10,530	2,13,926	2,16,926	1,79,768	1,51,369	1,29,260	1,11,729	97,581	85,972	76,300
LFG volume collected per year	m3/year	2,13,12,565	2,20,05,137	2,25,89,435	2,30,89,524	2,35,22,867	2,39,02,334	2,42,37,558	2,00,85,764	1,69,12,687	1,44,42,437	1,24,83,728	1,09,02,914	96,05,770	85,25,170
Total LFG volume to be combusted in power generation	m3/year	1,30,08,600	1,30,08,600	1,30,08,600	1,30,08,600	1,30,08,600	1,30,08,600	1,30,08,600	1,30,08,600	1,30,08,600	1,30,08,600	1,24,83,728	1,09,02,914	96,05,770	85,25,170
Total LFG volume to be flared	m3/year	83,03,965	89,96,537	95,80,835	1,00,80,924	1,05,14,267	1,08,93,734	1,12,28,958	70,77,164	39,04,087	14,33,837	0	0	0	0
Methane combusted in power generation	tCH4	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,657	4,469	3,903	3,439	3,052
Project Emissions from flaring	tCO2e	14,864	16,104	17,150	18,045	18,821	19,500	20,100	12,668	6,988	2,567	0	0	0	0
Methane destroyed by the flare	tCH4	2,378	2,454	2,613	2,750	2,868	2,971	3,063	1,930	1,065	391	0	0	0	0
Total Methane Destroyed in Project	tCH4	7,035	7,111	7,270	7,407	7,525	7,628	7,720	6,587	5,722	5,048	4,469	3,903	3,439	3,052
Methane Destroyed in Baseline	tCH4	1,490	1,391	1,297	1,212	1,132	1,056	984	917	859	801	747	698	698	698
Emission reductions from methane destruction	tCO_2e	1,21,050	1,25,213	1,31,147	1,36,342	1,41,014	1,45,245	1,49,091	1,25,289	1,07,269	93,563	81,878	70,375	59,926	51,222
Installed capacity	MW	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
Electricity generation	MWh/year	21,681	21,681	21,681	21,681	21,681	21,681	21,681	21,681	21,681	21,681	20,806	18,172	16,010	14,209
Emission reductions from Grid displacement	tCO2e	18,732	18,732	18,732	18,732	18,732	18,732	18,732	18,732	18,732	18,732	17,977	15,700	13,832	12,276
Baseline emissions	tCO2e	1,39,782	1,43,945	1,49,880	1,55,074	1,59,747	1,63,977	1,67,824	1,44,021	1,26,002	1,12,296	99,854	86,075	73,759	63,498
Project emission PEy															
Electricity consumption	MWh/year	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Project emissions	tCO2e	260	260	260	260	260	260	260	260	260	260	260	260	260	260
Emission reduction ERy															
Emission reduction	tCO2e	1,39,522	1,43,685	1,49,620	1,54,814	1,59,487	1,63,717	1,67,564	1,43,761	1,25,742	1,12,036	99,594	85,815	73,499	63,238

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2019 (April-December)	115,475	195	0	115,280
2020	147,861	260	0	147,601
2021	147,953	260	0	147,693

2022	145,486	260	0	145,226
2023	152,791	260	0	152,531
2024	167,422	260	0	167,162
2025	179,569	260	0	179,309
2026 (Januray - March)	38,063	65	0	37,998
Total	**1,094,620**	**1,820**	**0**	**1,092,800**
Total number of crediting years	7			
Annual average over the crediting period	**156,374**	**260**	**0**	**156,114**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

No specific table has been included for the following parameters listed in the methodology/tools:

- From ACM0001:
  - $F_{CH4,BL,R,y}$, $\rho_{reg,y}$-this is needed only in the case of *ex-post* determination of $F_{CH4,BL,y}$, which is being fixed ex-ante and is referred form tender issued by MoLG.
  - $\eta_{HG,PJ,j,y}$, $F_{CH4,NG-cons,y}$, $F_{CH4,NG\ TR,y}$, $F_{CH4,NG,y}$, "Revenue from the sale of heat/savings based on the heat generated and consumed on site" – the project does not involved any heat generation or NG component.
- From the Tool: *"Project emissions from flaring"*:
  - $F_{CH4,EG,t}$, $v_{i,RG,m}$, $V_{RG,m}$, $M_{RG,m}$, $v_{O2,EG,m}$, $fc_{CH4,EG,m}$, Maintenance -*flare efficiency is not continuously monitored*
- From the Tool: *"Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity consumoption*":
  - $EF_{grid,CM,y}$ – this has been fixed ex-ante using ASB0019
  - $FC_{n,i,t}$, $EG_{n,t}$, $HG_{n,t}$, $\eta_{boiler,y}$, $NCV_{i,t}$ and $EF_{CO2,i,t}$-option B1of the Tool is not used
  - $EC_{BL,k,y}$ – not relevant
- From the Tool: *"Emissions fromsolid waste disposal sites*":
  - f_y, W_x – Fixed ex-ante as Application A approach has been used
  - $W_{org,x}$, $p_{n,j,x}$, z_x, d_y, $h_{w,y}$, "a,b,c,d,e,g"- Application A approach has been used.
- From the *"Tool to determine the mass flow of greenhouse gas in a gaseous stream"*:
  - $V_{t,db}$, $v_{i,t,db}$, $M_{t,wb}$, $M_{t,db}$, $C_{H2O,t,db,m}$, $p_{H2O,t,SAT}$, $v_{k,t,db}$, $v_{k,t,wb}$, "status of biogas destruction device" – not applicable to option C of the tool being applied.

ACM0001 (Data / Parameters):

Data/Parameter	Management of SWDS
Data unit	-
Description	Management of SWDS
Source of data	Use different sources of data (as applicable): (a) Original design of the landfill; (b) Technical specifications for the management of the SWDS; (c) Local or national regulations
Value(s) applied	-
Measurement methods and procedures	Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications
Monitoring frequency	Annually
QA/QC procedures	Not applicable
Purpose of data	To calculate baseline emissions

Additional comment	-

Data/Parameter	**$F_{CH4,sent\_flare,y}$**
Data unit	tCH4 / yr
Description	Amount of methane in the LFG which is sent to the flare in year y
Source of data	Site Records
Value(s) applied	Refer ER calculator
Measurement methods and procedures	Calculated in accordance with Tool to determine the mass flow of a greenhouse gas in a gaseous stream option C by measuring $\mathbf{V_{LFG,sent_flare,t}}$and $\mathbf{V_{CH4,t,wb}}$(refer tables below)
Monitoring frequency	Calculated parameter (at least annually)
QA/QC procedures	Flow meter will be subject to a regular maintenance and testing regime to ensure accuracy as per manufacturer specifications
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**$F_{CH4,EL,y}$**
Data unit	tCH4 / yr
Description	Amount of methane in the LFG which is used for electricity generation in year y
Source of data	Site Records
Value(s) applied	Refer ER calculator
Measurement methods and procedures	Calculated in accordance with Tool to determine the mass flow of a greenhouse gas in a gaseous stream option by measuring $\mathbf{V_{LFG,EL,t}}$ and $\mathbf{V_{CH4,t,wb}}$(refer tables below)
Monitoring frequency	Calculated parameter (at least annually)
QA/QC procedures	Flow meter will be subject to a regular maintenance and testing regime to ensure accuracy as per manufacturer specifications
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**$Op_{j,h}$**
Data unit	Hours
Description	Operation of the equipment that consumes the LFG
Source of data	Site Records
Value(s) applied	6,570
Measurement methods and procedures	For each equipment unit *j* using *the LFG* monitor that the plant is operating in hour *h* by the monitoring any one or more of the following three parameters: (a) Temperature -Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment. Document and justify the location and minimum threshold in the PDD; (b) Flame -Flame detection system is used to ensure that the equipment is in operation; (c) Products generated – Electricity Generated by the power plant (kWh) $Op_{j,h}$=0 when: (a) One of more temperature measurements are missing or below the minimum threshold in hour *h* (instantaneous measurements are made at least every minute); (b) Flame is not detected continuously in hour *h* (instantaneous measurements are made at least every minute); (c) No products are generated in the hour *h.* Otherwise, $Op_{j,h}$=1
Monitoring frequency	Hourly

QA/QC procedures	Monitoring equipment (as applicable) will be subject to a regular maintenance and testing regime to ensure accuracy as per manufacturer specifications
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$EG_{PJ,y} = EC_{PJ,grid,y}$
Data unit	MWh
Description	Amount of net electricity generated using LFG by the project activity in year *y*
Source of data	Site Meter Records
Value(s) applied	21,681
Measurement methods and procedures	Calculated using energy meters, the electricity exported to grid and electricity imported from grid shall be measured and accounted as per $EG_{PJ,grid,y} = EG_{PJ,export,grid,y} - EG_{PJ,import,grid,y}(1 + TDL_y)$
Monitoring frequency	Continuous (aggregated and recorded monthly)
QA/QC procedures	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. The readings will be double checked by the electricity distribution company
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$EG_{EC,y} = EC_{PJ,j,y}$
Data unit	MWh
Description	Amount of electricity consumed by the project activity in year *y* from captive power plant (DG)
Source of data	Site Meter Records
Value(s) applied	200
Measurement methods and procedures	The electricity meter will be subject to regular maintenance and testing in accordance with stipulation of the meter supplier to ensure accuracy
Monitoring frequency	Continuous (Aggregated and recorded monthly)
QA/QC procedures	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter:	**CAPEX and OPEX**
Data unit	Currency (USD, EUR, etc.)
Description	Total investment to implement the project and total cost to operate the project
Source of data	Engineering, procurement and construction contracts; and maintenance contracts
Value(s) applied	-
Measurement methods and procedures	Not applicable
Monitoring frequency	At the first issuance request after each phase of the project is fully implemented

QA/QC procedures	Audited by professional, independent financial auditors. The DOE should only verify that the data provided corresponds to the data from independent financial auditors
Purpose of data	To calculate baseline emissions
Additional comment	The information provided for CAPEX shall indicate the investment made: (i) in the collection and flaring system; (ii) in the power plant and connection to the grid (if applicable); The information supplied for OPEX shall indicate the costs for: (i) staff and maintenance involved in the operation of the collection and flaring system; and (ii) staff and maintenance involved in the operation of the collection and power generation system. The monitoring of this parameter is only required for projects applying the simplified procedures to identify the baseline scenario and demonstrate additionality

Data / Parameter	**Tariff of electricity exported**
Data unit	Currency (USD, EUR, etc.)
Description	Tariff of the electricity exported
Source of data	Power purchase agreement
Value(s) applied	-
Measurement methods and procedures	Not applicable
Monitoring frequency	At the first issuance request after each phase of the project is fully implemented
QA/QC procedures	Audited by professional, independent financial auditors. The DOE should only verify that the data provided corresponds to the data from independent financial auditors or from invoices issued to / payment made by CEB
Purpose of data	To calculate baseline emissions
Additional comment	The monitoring of this parameter is only required for projects applying the simplified procedures to identify the baseline scenario and demonstrate additionality

Tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation:

Data/Parameter	**$TDL_{grid,y}$**
Data unit	%
Description	Average technical transmission and distribution losses in the grid in year *y* for the voltage level at which electricity is obtained from the grid at the project site.
Source of data	Annual Report of Grid Operator / Electricity Board
Value(s) applied	6.59%
Measurement methods and procedures	Mauritius Central Electricity Board generally publishes this value in their annual report at frequent intervals. However, if this figure is older than 5 years, then the default value of 20% shall be used
Monitoring frequency	Annual
QA/QC procedures	Not applicable
Purpose of data	Calculation of baseline emissions
Additional comment	If/when electricity consumption is already directly deducted from the net amount of electricity generated (EL_{LFG}), then $EC_{PJ,y}$ does not need to be monitored separately and TDL_y becomes irrelevant.

Tool:"Project emissions from flaring"

Data/Parameter	**$T_{EG,m}$**

Data unit	˚C
Description	Temperature in the exhaust gas of the enclosed flare in minute m
Source of data	Plant Records
Value(s) applied	N/A
Measurement methods and procedures	Continuous measurement of the temperature in the exhaust gas with a type S thermocouple
Monitoring frequency	Once per minute (at least)
QA/QC procedures	should be replaced or calibrated in accordance with manufacture specifications.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**$Flame_m$**
Data unit	Flame Off/On
Description	Flame detection of flare in the minute m
Source of data	Plant Records
Value(s) applied	N/A
Measurement methods and procedures	Measured using a fixed installation optical flame detector: Ultra Violet / Infra Red / both
Monitoring frequency	Once per minute (at least)
QA/QC procedures	should be replaced or calibrated in accordance with manufacture specifications.
Purpose of data	Calculation of baseline emissions
Additional comment	

Tool: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"

Data/Parameter	**$V_{LFG,sent\_flare,t}$**
Data unit	m^3 LFG / h
Description	Volumetric flow of LFG sent to flare in time interval t, on a wet basis, at normal conditions
Source of data	Site Records
Value(s) applied	Refer ER Calculator
Measurement methods and procedures	Data will be measured continuously with a flow meter by the Project Developer. The flow meter will be maintained and calibrated regularly in line with the manufacturer's requirements.
Monitoring frequency	Continuously (recorded hourly at least)
QA/QC procedures	Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy.
Purpose of data	Calculation of baseline emissions
Additional comment	The flow meter will express gas flow in normalised cubic meters, therefore no separate monitoring of pressure (P) and temperature (T) of LFG is necessary.

Data/Parameter	**$V_{LFG,EL,t}$**
Data unit	m^3 LFG / h
Description	Volumetric flow of LFG sent to power plant in time interval t, on a wet basis, at normal conditions
Source of data	Site Records
Value(s) applied	Refer ER Calculator
Measurement methods and procedures	Data will be measured continuously with a flow meter by the Project Developer. The flow meter will be maintained and calibrated regularly in line with the manufacturer's requirements.
Monitoring frequency	Continuous (recorded hourly at least)

QA/QC procedures	Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy as per manufacturer specifications
Purpose of data	Calculation of baseline emissions
Additional comment	The flow meter will express gas flow in normalised cubic meters, therefore no separate monitoring of pressure (P) and temperature (T) of LFG is necessary.

Data/Parameter	$V_{CH4,t,wb}$
Data unit	m^3CH_4 / m^3LFG
Description	Volumetric fraction of CH_4 in time interval t on a wet basis
Source of data	Site records
Value(s) applied	50%
Measurement methods and procedures	Methane content will be measured directly with a continuous gas analyser by the Project Proponent.
Monitoring frequency	Continuous (recorded hourly at least)
QA/QC procedures	The gas analyser will be subject to a regular maintenance and testing regime to ensure accuracy and calibrated according to manufacturer's recommendation.
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.7.2. Sampling plan

>>
Not applicable

B.7.3. Other elements of monitoring plan

>>
The Monitoring Plan for this project has been developed to ensure that from the start, the project is well organised in terms of the collection and archiving of complete and reliable data.

Data collection and record keeping arrangements
Monitored data will be measured & collected as detailed in section B.7.1. All data required for verification and issuance will be backed-up and kept for at least two years after the end of the crediting period or the last issuance of CERs of this project, whichever occurs later. Data collected on site will be compiled in an electronic format which will be used for preparation of monitoring reports.

Data Quality Control and Quality Assurance
All data collected on site will be checked internally before being compiled in an electronic format to assure it is complete and of an appropriate quality. Data quality will also be checked in the electronic file itself.

Maintenance and Calibration of monitoring equipment
All equipment will be maintained and calibrated in line with manufacturer's recommendations. This will assure that the equipment operates at the stated level of accuracy.

Staff training
Training is conducted on site, whenever necessary, to ensure that staff is capable to perform their designated tasks at high standards. This will include CDM specific training to warrant that they understand the importance of complete and accurate data and records for CDM monitoring.

In addition, training is provided by the equipment suppliers in the operation and maintenance of the plant.

CDM monitoring organisation and management

Prior to the start of the crediting period, the organisation of the monitoring team will be finalised. Clear roles and responsibilities will be assigned to all staff involved in the CDM project. The Project Developer will have a designated CDM Monitoring Manager on site who will be responsible for monitoring emissions reductions of the project activity. All staff involved in the collection of data and records will be coordinated by the CDM Monitoring Manager.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>
12/09/2007 (date when the gas collection stations were ordered (please refer to end of section B.5 and supporting Document D.3.7)

C.2. Expected operational lifetime of project activity

>>
Until 2033[20]

C.3. Crediting period of project activity

C.3.1. Type of crediting period

>>
Renewable crediting period (Second)

C.3.2. Start date of crediting period

>>
01/04/2019

C.3.3. Duration of crediting period

>>
7 years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The project will actively collect and combust LFG, thereby improving overall landfill management and reducing adverse global and local environmental effects of uncontrolled releases of landfill gas. Whilst the main global environmental concern over gaseous emissions of methane, is the fact that it is a potent greenhouse gas, and thus contributes importantly to global warming, emissions of LFG can also have significant health and safety implications at the local level. For example:

- Risk of explosions and/or fires either within the landfill or outside its boundaries, although the majority of LFG emissions are quickly diluted in the atmosphere;
- Asphyxiation and/or toxic effects to humans from concentrated emissions of LFG;
- Local and global environmental effects such as odour nuisances, stratospheric ozone layer depletion, and ground-level ozone creation due to over 150 trace components contained in landfill gas.

Through both the installation of a well-designed LFG collection and a destruction/utilisation system and its proper operation, LFG will be captured and combusted in a controlled way, thereby removing safety risks from the surrounding community, reducing the risks of toxic effects on the

[20]Refer letter from Scomat (manufacturer) certifying the lifetime of the LFG engine generators

local community and the local environment as well as reducing the emissions of a potent greenhouse gas.

It is worth noting that the Project Developer will install a flare and electricity generation units which comply with stringent UK emission standards, thereby minimising the environmental impact from this particular source and suggesting that these emissions are significantly less harmful than the continued uncontrolled release of LFG. The Project will significantly reduce odour and greenhouse gas emissions.

Thus, the project activity can be referred as environmentally ameliorative, and the installation of the LFG collection and combustion system is part of a broader effort by the landfill operator to continue to improve waste management practices.

D.2. Environmental impact assessment

>>

An Environmental Impact Assessment was required only for the electricity generation plant. It was completed in 2007[21] and EIA licence was granted by Mauritius government on 21/01/2008[22], in accordance with part IV of the Environmental Protection Act 2002.

The Environmental Impact Assessment identified no serious environmental effects from the project activity. The EIA further concluded that the project was environmentally sustainable, in line with government regulations and does not encroach or affect any environmentally critical resources. In particular, the EIA concluded that:

- As required in the contract, the operator will re-profile the whole exploited landfill surface and place a final capping layer. This would limit the uncontrolled release of landfill gas into the environment and minimise odour nuisance, thus improving the environment around the landfill.
- The engines which are to be used to generate electricity have the most advanced lean-burn combustion system and as such are environmentally friendly.
- The undertaking will have a positive impact on the local population. Odours from the landfill have been a major source of complaints from the villagers, the project activity will greatly reduce odour.
- The operator has already put in place an environmental monitoring programme and it will be extended to cover the activities of the electricity generating programme.
- Using landfill gas to generate electricity converts waste into a resource. At a landfill-gas-to-energy site, the fuel is ready to be used and a pollution source already exists in the form of a flare.
- There is no alternative to improving the existing gas collection system. The only alternative to electricity production is gas flaring alone. This alternative would deprive the country of an energy resource.

The EIA licence is however conditional on two approvals being obtained:

- Clearance from the Department of Civil Aviation about chimney height. This was obtained on 11/11/2008[23].
- Clearance from the Fire services about emergency access to the site. This will be obtained once the final detailed plans of the electricity plant have been agreed.

The licence was granted on the following conditions:

[21] Refer “Environmental Impact Assessment” (2007) (named as D.7.1 in CP1)

[22] Refer “EIA licence granted by the Mauritius Government (01/2008) (named as D.7.2 in CP1)

[23] Refer “Clearance from Civil Aviation (1/2008)” (named as D.7.3 in CP1)

- No waste of any type shall be disposed of or allowed access to any drain or watercourse. Leachate may only be removed from site in authorised vehicles to be taken to treatment facilities managed by the Mauritian Government.
- Noise generating machines and equipment shall be housed in a soundproof enclosure so that noise will be maintained within permissible limits in compliance with the Environment Protection Regulations 1997, promulgated under the Environment Protection Act.
- All emissions shall be in compliance with the Environment Protection Regulations 1998 promulgated under the Environment Protection Act.
- Precautions shall be taken to avoid public hazards due to electric and magnetic fields arising from high voltage transmission lines.
- The operation of the plant shall not give rise to any form of nuisance by way of noise, odour, dust and smoke nuisance.
- All precautions shall be taken to prevent fire outbreaks. Provisions shall be made for necessary fire fighting measures as per the recommendations of Government Fire Services.
- A contingency plan shall be set up for any emergency. The contingency plan, as provided for under section 30 (3) (a) of the Environment Protection Act 2002, shall be submitted to the Director of Environment prior to the start date of operation.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>

A Stakeholders' Meeting was held in the Gold Crest Hotel in Quatre Bornes, on 24/07/2009, from 13:00 to 15:00. The city of Quatre Bornes was chosen because it offers a central venue point on the island.

Stakeholders, when formally identified by the project developer, were invited by letter[24]. For all those stakeholders that the company did not formally identify but that feel concerned by the project, the JV posted ads during two consecutive weeks (11-12th and 18-19th July) in the two most popular newspapers of Mauritius, namely Le Week-End and Le Mauricien[25]. In total, 35 persons attended the event.

The meeting started late, at 13:15 due to the late arrival of some stakeholders who had confirmed attendance but were not yet present at 13:00. Pierre Ah Sue, Sotravic's CEO welcomed all stakeholders with a speech that lasted between 5-10 minutes. Mr. Chris Nairac, from carbon consultant Rhizome Limited., delivered the presentation that took the audience from the global picture down to the project at hand:

- Climate Change, GHGs and consequences
- Answer by International Community – The Kyoto Protocol
- The CDM
- The JV's CDM project

The presentation was delivered in 25-30 minutes. Questions and comments (60-70 minutes) were asked from the public and are recorded in section 2. All stakeholders were then invited by Pierre Ah Sue for refreshments (15-20 minutes).

E.2. Summary of comments received

>>

Comments related to the project activity are given below. These comments as well as all other comments received (e.g. related to the general operation of the landfill, waste composition,

[24] See Attachment 2, Annex 7.

[25] See Attachment 2, Annex 3 for newspaper ads and Annex 4 for proofs of payment to newspapers.

leachate treatment, capping etc.) are included in the comprehensive transcript provided in PDD Attachment 2.

The initials of the persons responding to the comments are:
Chris Nairac (CN), from carbon consultant Rhizome Limited.
Pierre Ah Sue (PAS), Chairman of Sotravic Limited

1. Question Mr. Anthony from Riche enEau sugar estate

- What about the time to have project online?

Answer CN:

- The time to get the CDM Registered, at present, on average, is about 18 months. This includes validation and registration – when all goes smoothly that is. CERs are generated only after registration.

2. Question: Dr Naarai

- "The question is about the long-term planning and profitability: do you have an idea, over how many years your activities will span, and second whether we can foresee, as it is right now, priority to employ local people, if any highly profitable venture is to take place?"

Answer (first part of question): CN

- "I can start answering and leave the "employment question" to Sotravic management?"

- We don't know yet what would be the profitability in terms of carbon credits and everything, for the good reason that base on the current extraction data we cannot estimate exactly the yield that we will get. I mean, the estimate of the gas coming out from the ground. If we look on a well by well basis, on one well we can say "wow, we have so much gas coming out", and in some others nothing. Furthermore, the government is requesting Sotravic to extract "X" amount of gas in the contract. Sotravic needs to go beyond this minimum, to extract more than was requested, in order to get the credits. The credit is the difference between the baseline and what has been effectively extracted for the client. So in that case it depends, for the gas yield will vary due to rain pattern, the gas generated depends on the waste type dumped on site, the quantity, and as we don't know that, we can't say what the extraction will be for sure – and therefore say whether the project will be profitable, very profitable or extremely lucrative.

- On the lifetime of this project part of the question we know that it depends how long we put waste in it. We know that cell 6 can operate for about 3 more years, so you can put 3 more years at 400,000 tonnes of waste per annum, which is the average today, you would therefore have 3 years of operation. But nobody knows what tomorrow is made of… maybe there will be more cells built… I don't know, this is a big question mark. But anyway, 3 years of domestic waste into the landfill would mean that you would have to extract the gas at least for 5 to 7 years afterwards because the decomposition of the waste is not instantaneous, it happens with time and it will keep on generating gas for a longer period of time. So even if it is 3 years the landfill will be there for at least 7, 8, 9 years. We will need to be monitored and gas extraction managed… that will keep on going for a long time. As for the question about employment…"

Answer (second part – on employment) PAS:

- "I think, first of all, what I would like to say is that, since we took over Mare Chicose, if my memory is right, I haven't seen a single article that targets a problem in Mare Chicose, right? So, this is an important thing, since we took over Mare Chicose in December 2007, it

took us only 3 to 4 months to tackle all the problems and to ensure that Mare Chicose is being managed in a proper manner. The inhabitants there, as far as I know, haven't had any complaints, we have welcomed all the queries through the District Council, through the, other organisations, comment ças'appelle ? (= "what is its name?") "Forces Vives" (= "citizens' organisations") and all the ---, we try to resolve all the problems that may arise, concentrate our CSR, our Corporate Social Responsibility, vis-à-vis the people, whether the schools, whether the inhabitants. Well, you might call it employment, whatever you call it, it does not matter. We have done our bit somehow.

- Now, as far as, how many employees we can employ? Since we took over, we have added more employees to our force, including the people of Mare Chicose, St Hubert, and all the villages around. How many jobs can we create? It is difficult to say at the moment, it all depends on the policy of the government, we don't know. As far as the landfill will stay, as far as we shall manage the site, as far as the gas is going to come out, and if, may god help us, we can transform that into electricity, obviously, the people in the region will have priority. How many people? I cannot answer just now. We will just do as we are doing now."

3. Question: Bashir Cassimally from GIBB consulting (landfill auditors):

- "My question is on the CDM methodology. You made an exposé of the project. What I want to know… can the project… is it dynamic? Can it evolve with time? Is there room for improvement, or is the project fixed? For example, if we find there is scope to capture more gas, for example, through horizontal wells, can CDM consider this?

Answer: CN

- "…CDM tells you: OK, you have to extract gas. Now you tell them how you do it, you describe the technology that you are going to be using and you give the "big lines" about the technology you will be using. But you do have leeway to improve your system because at the end of the day, what CDM wants is that you get as much gas out as you can, and that is final. Now on the other hand, let's say that we apply the methodology which says that we extract gas to make electricity and then you come afterwards and tell the UN you want to put some gas in bottles for kitchen cooking, you can't do that. You can do it if it is economically viable, but the CDM framework you have applied for will not recognise that activity as being part of the CDM activity. So you have a limit which you can't go beyond. If you are going to do extraction and energy as a CDM activity, then that is what you are going for {and what will give you credits}

4. **Question:** Bashir Cassimally from GIBB consulting (auditors of the landfill):

- "But what about horizontal wells, can we use them if they yield good results?"

Answer: CN

- "No problem. Actually, you can do that, if you find a way to do something better, you can do anything you want, because it is still extraction. You have to tell them how you plan to do it, but then you can manage your site as you want in order to maximise the extraction of the gas."

E.3. Consideration of comments received

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Responses to the comments related to the project activity have already been given above. These responses as well as those to all other comments received are all included in the comprehensive transcript provided in PDD Attachment 2.

SECTION F. Approval and authorization

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The project has received approval vide approval letter dated 01/03/2011

Appendix 1. Contact information of project participants

Organization name	Sotravic Limited
Country	Mauritius
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Telephone	+230 233 7557/7673
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Website	www.sotravic.com
Contact person	Mr. Pierre Jose Ah Sue, Plant Manager, Sotravic Limited

Organization name	Rhizome Ltd.
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Telephone	+230 421 71 72
Fax	
E-mail	info@rhizome.mu
Website	www.rhizome.mu
Contact person	Mr. Christophe Laurence Nairac

Appendix 2. Affirmation regarding public funding

The project does not involve any public funding

Appendix 3. Applicability of methodologies and standardized baselines

Not applicable

Appendix 4. Further background information on ex ante calculation of emission reductions

Not applicable

Appendix 5. Further background information on monitoring plan

Not applicable

Appendix 6. Summary report of comments received from local stakeholders

Not applicable

Appendix 7. Summary of post-registration changes

Not applicable

Appendix 8. Person/entity responsible for completing the CDM-PDD-FORM (additional)

Organization name	Climate-Secure Services
Address	65, Pragati Apartments, Club Road, PaschimVihar, West Delhi, Delhi – 110063
Country	India
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Contact person	Rohit Lohia

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Document information

Version	*Date*	*Description*
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.

Version	*Date*	*Description*
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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