**CLEAN DEVELOPMENT MECHANISM**
**PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-CPA-DD)**
**Version 01**

**CONTENTS**



**Annexes**



NOTE:

(i) This form is for the submission of CPAs that apply a large scale methodology using provisions of the proposed PoA.

(ii) The coordinating/managing entity shall prepare a CDM Programme Activity Design Document (CDM-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the PoA DD. At the time of requesting registration the PoA DD must be accompanied by a CDM-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the PoA must submit a completed CDM-CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

## SECTION A. General description of CDM programme activity (CPA)

Note: this template contains bracketed grey text. Only these fields shall be revised for each CPA.

### A.1. Title of the CPA:

[CPA Identification number and Project title]
Version: [Two digit version number]
Date: [DD/MM/YYYY]

### A.2. Description of the CPA:

>>
The proposed CDM Programme activity "[Project title]" (hereafter referred to as the "**The CPA**") is developed by the [Name of CPA implementer] (hereafter referred to as the "**The CPA implementer**" or "**CPA Operator**"), The CPA is a landfill gas recovery project located in [Description of District, City, Province]. The CPA will [description of the capacity of generators or flaring equipment].

The CPA complies with the following project scenario as described in the PoA-DD:

| Project Scenario | Description of scenario |
|---|---|
| ☐ 1 | Landfill gas capture and flaring |
| ☐ 2 | Landfill gas capture and utilization for electricity generation |

**Table A.2.1 – project scenario**

**Technology / measures employed:** a new landfill capture system and [flaring/utilization for electricity generation] of landfill gas.
**Type:** Waste handling and disposal
**Category: ACM0001:** "Consolidated baseline and monitoring methodology for landfill gas project activities"; Version 12, EB 63, Sectoral Scope 13.

The CPA will contribute to climate change mitigation efforts through the reduction of Green House Gases (GHG) emissions through destruction of methane emitted from the landfill in a flare [and through displacement from of more carbon intensive power generation in the grid].

**Technology description**
[Provide here a description of the technology employed, including capacity of equipment. Insert diagrams and pictures where applicable.]

### A.3. Entity/individual responsible for CPA:

| No | Entity | Project participant |
|---|---|---|
| [CPA identification number] | [Name of CPA implementer] | No |

### A.4. Technical description of the CPA:

### A.4.1. Identification of the CPA:

The operational and management arrangements established by the CME for the implementation of the PoA are described as below:

Record keeping system for the CPA is as follows:

| Parameter | Value |
|---|---|
| CPA ID | [CPA identification number] |
| CPA Operator | [Name of CPA implementer] |
| Technology Scenario | [Technology scenario number] |
| Landfill name | [Name of landfill] |
| Landfill service area | [Area that disposes waste into landfill] |
| Landfill description | [Description of landfill] |
| Address of equipment installation | [Location information where equipment is installed] |
| City/town/village/district | [Specification of city/town/village where project is located] |
| Province | [Specification of province where project is located] |
| GPS coordinates: | [GPS coordinates with four decimals] |
| **Flare information** | |
| Number of flare systems installed | [Two digit number] |
| Flare type | [Enclosed/open flare] |
| Commissioning date (expected) | [Date flare is expected to start operations] |
| Model | [Model of flaring system(s)] |
| Serial number(s) | [Serial number(s) of flaring system(s)] |
| Make | [Name of manufacturer of flaring system(s)] |
| **Power plant information** | |
| Number of electricity generators installed | [Two digit number] |
| Commissioning date (expected) | [Date each genset is expected to start operations] |
| Capacity | [Rated capacity of each generator(s)] |
| Frequency | [Rated frequency of generator(s)] |
| Grid connection: | [Name of grid electricity is exported to] |

**Table A.4.1. Identification of the CPA**

The above unique information for this CPA will avoid double counting of emission reduction.

### A.4.1.1. Host Party:

Indonesia

### A.4.1.2. Geographic reference of other means of identification allowing the unique identification of the CPA (maximum one page):

As per PoA section A.4.4.1, the identification parameters as per table A.4.1.2.1 are required for each CPA.

| Component | Details |
|---|---|
| Project Entity | [Name of CPA implementer] |
| Project Identification Number | [CPA identification number] |
| Village/city | [Specification of city/town/village where project is located] |
| District | [Specification of district where project is located] |
| Province | [Specification of province where project is located] |
| Country | Indonesia |
| GPS coordinates | [GPS coordinates with four decimals] |

[Map of project location]
Figure 4.1.1 Map of the project Location.

### A.4.2. Duration of the CPA:

#### A.4.2.1. Starting date of the CPA:

>>
[DD/MM/YYYY] ([event with reference to source documentation])

#### A.4.2.2. Expected operational lifetime of the CPA:

The expected operational lifetime of this CPA is [amount of years, with reference to source documentation].

### A.4.3. Choice of the crediting period and related information:

Fixed credit period

#### A.4.3.1. Starting date of the crediting period:

>>
[DD/MM/YYYY]
The starting date of the crediting period of the CPA shall be the date of its inclusion in the registered PoA, or any date thereafter which-ever is later. The duration of the crediting period shall not exceed the end date of the PoA.

#### A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

>>
The length of the crediting period for this CPA is [10 years] (fixed crediting period). Duration of the crediting period of this CPA shall be limited to the end date of the PoA regardless of when the CPA was added.

### A.4.4. Estimated amount of emission reductions over the chosen crediting period:

>>
The table below demonstrates the total emission reduction estimated for the crediting period for this proposed CPA.

| Year | Annual estimation of emission reductions in tonnes of $CO_2e$ |
|---|---|
| [Year 1] | [Value of ER calculation] |
| [Year 2] | [Value of ER calculation] |
| [Year 3] | [Value of ER calculation] |
| [Year 4] | [Value of ER calculation] |
| [Year 5] | [Value of ER calculation] |
| [Year 6] | [Value of ER calculation] |
| [Year 7] | [Value of ER calculation] |
| [Year 8] | [Value of ER calculation] |
| [Year 9] | [Value of ER calculation] |
| [Year 10] | [Value of ER calculation] |
| **Total estimated reductions** (tonnes of **$CO_2e$**) | [Value of ER calculation] |
| **Total number of crediting years** | [Value of ER calculation] |
| **Annual average of the estimated reductions over the crediting period of estimated reductions** | [Value of ER calculation] |

**A.4.5. Public funding of the CPA:**

>>

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

**A.4.6. Confirmation that CPA is neither registered as an individual CDM project activity nor is part of another Registered PoA:**

>>

The proposed CPA is not registered as an individual CDM project and is not part of another PoA.

**B.1. Title and reference of the Registered PoA to which CPA is added:**

>>

BWC Sustainable Landfill Gas Recovery Programme of Activities in Indonesia
Version: [Version of latest registered PoA-DD]
Date: [DD/MM/YYYY of latest registered PoA-DD]

**B.2. Justification of the why the CPA is eligible to be included in the Registered PoA :**

>>

A CPA to be included in the proposed PoA shall meet the criteria as imposed by EB 65 meeting annex 03 and additional criteria as imposed by CME:

[The remainder of this page is left blank intentionally.]

A CPA to be included in the proposed PoA shall meet the criteria as imposed by EB 65 meeting annex 03 and additional criteria as imposed by CME:

Please adjust ☐ to ✔ in case document specified under "information requirement" has been provided and assess whether or not the criterion has been met.

| Nr. | Eligibility criteria description | Information requirement | Justification | Criterion met? |
|---|---|---|---|---|
| A. | The CPA is aware of its participation in the PoA and has provided a declaration to confirm/accept relevant terms and conditions in relation to inclusion in the PoA. | The following document shall be provided:<br>• Declaration from the CPA Implementer confirming its participation in the PoA and affirmation of relevant terms and conditions. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |
| B. | CME has permitted participation and inclusion of the CPA implementer into the PoA. | The following document shall be provided:<br>• Declaration by CME to permit participation of the CPA Implementer into the PoA. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |
| C. | The CPA shall confirm to one or both of the two scenarios described in section A.4.2 of the PoA-DD.<br><br>Projects that (partial) utilize LFG for generation of heat in a boiler, air heater or kiln (brick firing only) and/or supplying the LFG to consumers through a natural gas distribution network are not eligible for inclusion | The following document shall be provided:<br>• Confirmation by the CME regarding the applicable project scenario of the CPA.<br>• Third party evidence on the situation that existed at the landfill site prior to implementation of the CPA. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |

| | | | | |
|---|---|---|---|---|
| | under this PoA.) | Any of the following documents shall be provided:<br>• Purchase order of equipment<br>• Feasibility Study / Project Proposal of the project that describes the project technology. | | |
| D. | The CPA shall be located in Indonesia | All of the following documents shall be provided:<br>• Business license of the CPA Implementer issued by Indonesian local authorities.<br>• Declaration from the CPA implementer confirm that the boundary of the implemented CPA is within the geographical territory of Indonesia, including information regarding geographic reference (latitude and longitude), name and address of the CPA. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |
| E. | The CPA shall meet the applicability and other requirements of the methodology ACM0001 Version 12. | As described in section E.2 of the PoA DD, the CPA shall meet relevant requirement of the meth and the required document shall be supplied to the DOE at the time of inclusion. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |

| | | | | |
|---|---|---|---|---|
| F. | Confirmation that the CPA is not registered or being registered as a stand-alone CDM project outside of this PoA, a bundled CDM Project Activity or another registered PoA.<br><br>The CPA shall not lead to double counting of emission reductions. | The following document shall be provided:<br>• Declaration from the CPA Implementer confirming that the project is not registered or in the process of being registered as a stand-alone CDM project, outside of the PoA, a bundled CDM Project Activity or another registered PoA.<br><br>And:<br>• Confirmation described in the CPA-DD that states that the project is not registered or in the process of being registered as a stand-alone CDM project, outside of the PoA.<br>• Confirmation check by reviewing the website of the UNFCCC. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |
| G. | Confirmation on involvement of public funding or ODA from Annex I Parties in CPA | The following document shall be provided:<br>• Declaration from the CPA Implementer regarding the no involvement of public funding or ODA from Annex I Parties.<br><br>And: | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |

| | | | | |
|---|---|---|---|---|
| | | • Confirmation in the CPA-DD regarding no involvement of public funding or ODA from Annex I Parties. | | |
| H. | The start date of the CPA shall not be before the commencement of validation of the PoA as a whole (the date the PoA was published for global stakeholders consultation). | One of the following documents shall be provided:<br>• In case available, the earliest signed equipment or (sub) contractor agreement with a total contract value that is significant to the project activity (the date of signing the purchase order by CPA Implementer shall constitute the starting date of the CPA).<br>• Declaration of from the CPA Implementer that no contracts have been signed with a total contract value that is significant to the project activity | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |
| I. | A CPA level local stakeholder's consultation and environmental impact assessment (if appicabile) has to be carried out prior to inclusion. | The following documents shall be provided:<br>• Meeting minutes of the stakeholder consultation.<br>• Attendance list<br><br>If available:<br>• Relevant other documentation, | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |

| | | | | |
|---|---|---|---|---|
| | | *for example*, pictures, feedback forms of the stakeholder meeting.<br><br>If an environmental impact assessment is required:<br>• Copy of the environmental impact assessment<br>• Approval document of the environmental impact assessment<br><br>If an environmental impact assessment is not required:<br>Justification described in the CPA-DD to explain why an environmental impact assessment has not been conducted. | | |
| J. | The CPA implementer shall be duly registered by the Indonesian authorities prior to inclusion | The following document shall be provided:<br>• Business license of the CPA Implementer issued by Indonesian local authorities. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |
| K. | The CPA shall be in conformance to statutory requirements of Indonesia. | The following document shall be provided:<br>• Approval document from the Indonesian local authorities for relevant statutory clearances. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |

| | | | | |
|---|---|---|---|---|
| L. | Confirmation on the crediting period of the CPA which shall not exceed the length of the PoA (28 years) regardless of the time of inclusion of CPA in the PoA | Confirmation described in the CPA-DD that states that the crediting period of the CPA shall not exceed the length of the PoA. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |
| M. | Demonstration of additionality of the scenario implemented under the CPA in accordance with the "*Tool for the Demonstration and Assessment of Additionality"* and relevant information provided in section E.5.1 of the PoA-DD. | The following documents shall be provided:<br>• Investment analysis including relevant supporting evidence<br>• Description in the CPA-DD detailing the technology employed under the CPA, the identified baseline scenario and information to demonstrate the additionality of the CPA. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |
| N. | At the start date of the CPA, no law/regulation has been issued or contract has been signed that forces the entity in charge of the management of the landfill to capture, destroy or use LFG or if such law/regulation exists, it can be still demonstrated that such law/regulation/contract is systematically not enforced. The baseline scenario is total atmospheric release of the LFG). | The following document shall be provided:<br>• Declaration from the CPA implementer to confirm the baseline scenario and confirmation that no law/regulation has been issued or contract has been signed that forces the entity in charge of the management of the landfill to capture, destroy or use LFG<br>• Third party evidence on the situation that existed at the | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |

| | | | | |
|---|---|---|---|---|
| | | landfill siteprior to implementation of the CPA, confirming that there is no (partial) capture of the LFG.<br>• Confirmation described in the CPA-DD that states that no law/regulation has been issued or contract has been signed that forces the entity in charge of the management of the landfill to capture, destroy or use LFG and a description of the baseline scenario. | | |
| O. | CPA shall involve the installation a new LFG capture system in an existing solid waste disposal site | The following document shall be provided:<br>• Declaration from the CPA implementer to confirm the baseline scenario and confirmation that no law/regulation has been issued or contract has been signed that forces the entity in charge of the management of the landfill to capture, destroy or use LFG<br>• Third party evidence on the situation that existed at the landfill site prior to implementation of the CPA with | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |

| | | | | |
|---|---|---|---|---|
| | | information to determine if the landfill is existing or new.<br><br>AND Any of the following documents shall be provided:<br>• Purchase order of equipment<br>Feasibility Study / Project Proposal of the project that describes the project technology. | | |

**Table B.2.1 Justification of the why the CPA is eligible to be included in the Registered PoA**

**Table B.2.2 - Applicability conditions of methodology ACM0001 Version 12.0.0**

| Applicability Conditions | Documentation required | CPA Status | Criterion met? |
|---|---|---|---|
| *This methodology is applicable to landfill gas capture project activities, where the baseline scenario is the partial or total atmospheric release of the gas and the project activities include situations such as:* | | | |
| (a) Install a new LFG capture system in a new or existing SWDS | Per eligibility criteria C of the PoA, the PoA is only open for inclusion of CPA that involves installation of a new LFG capture system at an existing landfill.<br>The following document shall be provided:<br>• Declaration from the CPA implementer to confirm the baseline scenario and confirmation that no law/regulation has been issued or contract has been signed that forces the entity in charge of the management of the landfill to capture, destroy or use LFG<br>• Third party evidence on the situation that existed at the landfill site prior to | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

| | | | |
|---|---|---|---|
| | implementation of the CPA<br>• CME assessment report of the pre-project activity situation, including existing practice of LFG recovery (if any).<br><br>AND Any of the following documents shall be provided:<br>• Purchase order of equipment<br>• Feasibility Study / Project Proposal of the project that describes the project technology. | | |
| (b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that:<br>(i) The captured LFG was only vented or flared and not used prior to the implementation of the project activity; and<br>(ii) In the case of an existing active LFG capture system for which the amount of LFG can not be collected separately | Not applicable since the PoA only allows CPA that install a new LFG recovery system at an existing landfill site to be included as CPA under the PoA (refer to eligibility criteria "O" of the PoA. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

| | | | |
|---|---|---|---|
| from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available. | | | |
| (c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways:<br>(i) Generating electricity;<br>(ii) Generating heat in a boiler, air heater or kiln (brick firing only); and/or<br>(iii) Supplying the LFG to consumers through a natural gas distribution network. | Any of the following documents shall be provided:<br>• Purchase order of equipment<br>• Feasibility Study / Project Proposal of the project that describes the project technology.<br>• Power Purchase agreement (if available). | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |
| (d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity. | The following documents shall be provided:<br>• CME assessment report of the pre-project activity situation including arrangement of recycling of organic waste and quantities thereof in the pre-project situation (if any). | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |
| *ACM0001 is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is:* | | | |
| (e) Partial or total release of the LFG from the SWDS; and | The following document shall be provided: | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No |

| | | | |
|---|---|---|---|
| | • Declaration from the CPA implementer to confirm the baseline scenario and confirmation that no law/regulation has been issued or contract has been signed that forces the entity in charge of the management of the landfill to capture, destroy or use 100% of the LFG<br>• Third party evidence on the baseline scenario prior to implementation of the CPA<br>• Confirmation described in the CPA-DD that states that no law/regulation has been issued or contract has been signed that forces the entity in charge of the management of the landfill to capture, destroy or use 100% of the LFG and a description of the baseline scenario. | | ☐ Not applicable |
| (f) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heat or kiln;<br>(i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or | Any of the following documents shall be provided:<br>• Purchase order of equipment<br>• Feasibility Study / Project Proposal of the project that describes the project technology.<br>• Power Purchase agreement (if available).<br>• Electricity purchase invoice(s)<br>• Electricity sales invoice(s)/receipts | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

| | | | |
|---|---|---|---|
| (ii) For heat generation: that heat would be generated using fossil fuels in on-site equipment. | | | |
| ACM0001 is not applicable: | | | |
| (g) 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, where that purpose of the CDM project activity is to implement energy efficiency measures at the kiln; | Not applicable. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |
| (h) If the management of the SWDS in the project activity is deliberately changed in order to increase methane generation compared to the situation prior to the implementation of the project activity (e.g. other to meet a technical or regulator requirement). For example, this may apply to the addition of liquids to a SWDS, pre- treating waste to seed it with bacteria for the purpose of increasing the anaerobic degradation environment of the SWDS or changing the shape of the SWDS | Any of the following documents shall be provided:<br>• Purchase order of equipment<br>• Feasibility Study / Project Proposal of the project that describes the project technology.<br>AND:<br>• Site visit of validation team during time of inclusion. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

| | | | |
|---|---|---|---|
| to increase that methane Correction Factor. | | | |

Applicability of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01):

**Table B.2.3 -: Tool to calculate baseline, project and/or leakage emissions from electricity consumption**

| Applicability Conditions | Documentation required | CPA Status | |
|---|---|---|---|
| Scenario The tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption:<br>Scenario A: Electricity consumption from the grid. The electricity is purchased form the grid only. Either no captive power plant is installed at the site of electricity consumption or, if any on-site captive power plant exists, it is not operating or it can physically not provide electricity to the source of electricity consumption.<br><br>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 | The following documents shall be provided:<br>• Feasibility Study / Project Proposal of the project that describes the project technology.<br>• CME assessment of the pre-project activity situation. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

| | | | |
|---|---|---|---|
| installed at the site of the electricity consumption source and supply the source with electricity. The captive power plant(s) is/are not connected to the electricity grid.<br><br>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 consumption source. The captive power plant(s) can provide electricity to the electricity consumption source. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumption source can be provided with electricity from the captive power plant(s) and the grid. | | | |
| This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO2 | Any of the following documents shall be provided:<br>• Feasibility Study / Project Proposal of the project that describes the project technology. | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

| | | | |
|---|---|---|---|
| emission. | | | |

**Table B.2.4: Applicability of "Emissions from disposal of waste at a solid waste disposal site" (version 06.0.1):**

| Applicability Conditions | | CPA Status | Criterion met? |
|---|---|---|---|
| Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS.<br>Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. | Any of the following documents shall be provided:<br>• Purchase order of equipment<br>• Feasibility Study / Project Proposal of the project that describes the project technology.<br>AND:<br>• Third party evidence on the situation that existed at the landfill site prior to implementation of the CPA | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

**Table B.2.5: Applicability of "Tool to calculate the emission factor for an electricity system" Version 2.2.1:**

| Applicability Conditions | Documentation required | CPA Status | Criterion met? |
|---|---|---|---|
| The tool is not applicable if the project electricity system is located partially or totally in an Annex-I country. | Any of the following documents:<br>• (Pre) Power Purchase Agreement,<br>• Letter from grid operator on acceptance of purchase of electricity from CPA.<br>• Feasibility Study /<br>• Technical Proposal of the project | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

**Table B.2.6: Applicability of "Tool to determine project emission from flaring gases containing methane" (version 01):**

| Applicability Conditions | Documentation required | CPA Status | Criterion |
|---|---|---|---|

| | | | met? |
|---|---|---|---|
| The residual gas stream to be flared contains no other combustible gases than methane, carbon monoxide and hydrogen; | Any of the following documents:<br>• Feasibility Study /<br>• Technical Proposal of the project | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |
| The residual gas stream to be flared shall be obtained from decomposition of organic material (through landfills, bio-digesters or anaerobic lagoons, among others) or from gases vented in coal mines (coal mine methane and coal bed methane). | Any of the following documents:<br>• Feasibility Study /<br>• Technical Proposal of the project | [explanation/justification to be further elaborated here] | ☐ Yes<br>☐ No<br>☐ Not applicable |

The remainder of this page is left blank intentionally.

**B.3. Assessment and demonstration of additionality of the CPA, as per eligibility criteria listed in the Registered PoA:**

>>

The assessment and demonstration of additionality is determined based on the PoA-DD section E.4. which refers to methodology ACM0001 version 12.0.0 and the baseline scenario of the project activity is identified through the following steps of the "*Combined tool to identify the baseline scenario and demonstrate additionality*" (Version 04.0.0):

***Step 0: Demonstration whether the proposed project activity is the First-of-its-kind***

This step is not applied as it is assumed that none of the CPA under this PoA are first-of-its-kind.

***Step 1: Identification of alternatives to the project activity consistent with current laws and regulations***

***Step 1a: Define alternatives to the project activity:***

According to the "Combined tool to identify the baseline scenario and demonstrate additionality – Version 4.0.0" alternatives must be realistic and credible alternative(s) available to the project participants that provide outputs or services comparable with the proposed CDM project activity.

Alternatives for the treatment of landfill gas in the absence of the CPA to be analysed should include, *inter alia:*

LFG1. The project activity implemented without being registered as a CPA (i.e. capture and flaring or use of LFG);
LFG2. Atmospheric release of the LFG or partial capture of LFG and destruction to comply with regulations or contractual requirements, or to address safety and odour concerns;
[DEFINE OTHER PLAUSIBLE ALTERNATIVES AS LFG3, LFG4 ETC]

In addition to the alternative baseline scenarios identified for the destruction of LFG, alternative scenarios for the use of LFG shall also be identified (if this is an aspect of the project activity):

☐ CPA DOES NOT include power generation. Alternative scenarios for power generation do not have to be determined.

☐ CPA Includes power generation. Realistic and credible alternative(s) shall be determined that may include, *inter alia*:
For power generation:
• E1: Electricity generation from LFG, undertaken without being registered as CPA project activity;
• E2: Electricity generation in existing or new on-site or off-site renewable based captive power plant(s);
• E3: Electricity generation in existing and/or new grid-connected power plants.
[DEFINE OTHER PLAUSIBLE ALTERNATIVES AS E4, E5 ETC]

Alternative LFG 1

[REVIEW AND REVISE WHERE APPROPRIATE:
This alternative is the same as the implementation CPA without CDM revenue. This is a credible alternative. The barriers that prevent this alternative from being implemented are further discussed in step 3 (below).]

Alternative LFG 2
[REVIEW AND REVISE WHERE APPROPRIATE:
This scenario corresponds to the continuation of the current situation (no CPA implemented or other alternatives undertaken).]

[DEFINE MORE ALTERNATIVES IF REQUIRED]
Alternative LFG X
[Assessment of alternative]

Electricity Generation alternatives

☐ CPA DOES NOT include power generation. Alternative scenarios for power generation do not have to be determined.

The remaining realistic and credible alternatives for power generation are listed in Table B.3.1 below.

**Table B.3.1 – Realistic and credible alternatives for power generation**

| Scenario | Description | Justification |
|---|---|---|
| E1 | Power generated from landfill gas undertaken without being registered as CDM project activity; | [Assessment of alternative] |
| E2 | Existing or construction of a new on-site or off-site renewable based captive power plant; | [Assessment of alternative] |
| E3 | Existing and/or new grid-connected power plants. | [Assessment of alternative] |

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

[Alternatives LFG1 and LFG2 comply with mandatory laws and regulations.]

[Assessment of consistency with mandatory laws and regulations of remaining alternatives]

Outcome of Sub-step 1b): the alternatives to be taken into consideration are [summary of remaining alternatives].

[Description of alternatives]

***Step 2: Barrier analysis***

***Step 2a: Identify barriers that would prevent the implementation of alternative scenarios.***

There are no realistic and credible barriers (other than insufficient financial returns and barrier due to prevailing practice) that prevent the alternative scenarios to occur.

**Outcome of Step 2a***:* No barrier (other than insufficient financial returns and barrier due to prevailing practice) is identified.

***Step 2b: Eliminate alternative scenarios which are prevented by the identified barrier.***

None of the scenarios is eliminated as there are no realistic and credible barriers (other than insufficient financial returns and barrier due to prevailing practice) that prevent the alternative scenarios to occur.

**Outcome of Step 2b***:*

It can be concluded that the combination of possible baseline options and scenarios is as in table B.3.2

**B.3.2. Baseline options as a result of step 2**

| **Baseline Scenario** | **Alternatives** | | **Description** |
|---|---|---|---|
| | Power generation | Landfill gas | |
| **Combination I** | [Description of alternatives] | [Description of alternatives] | [Description of alternatives] |
| **Combination II** | [Description of alternatives] | [Description of alternatives] | [Description of alternatives] |
| [Add more rows are required] | | | |

**Outcome of Step 2***:* As there are still several alternative scenarios remaining, including the proposed project activity undertaken without being registered as a CDM project activity, the investment analysis is carried out to demonstrate that the proposed CDM project activity is not financially attractive option.

***STEP 3: Investment analysis***
For the investment analysis the methodology refers to Step 2 and/or Step 3 of the "Tool for demonstration and assessment of additionality" version 6.0.0 to assess which of the remaining alternatives should be excluded from further consideration.

***Sub-step 2a. Determine appropriate analysis method***
**Technology scenario 1 (flaring of landfill gas):**
[Description of selection of appropriate analysis method]

**Technology scenario 2 (utilization of landfill gas):**
[Description of selection of appropriate analysis method]

***Sub-step 2b. Option III. Apply benchmark analysis***
[Description of selection of appropriate benchmark]

***Sub-step 2c. Calculation and comparison of financial indicators***

Benchmark
[Determination of benchmark]

**Table B.3.3 – Financial assumptions project activity**

| Financial assumption | Value |
|---|---|
| [Listing of main financial parameters for project] | [listing of values with references] |
| [Listing of main financial parameters for project] | [listing of values with references] |
| [Listing of main financial parameters for project] | [listing of values with references] |
| [Listing of main financial parameters for project] | [listing of values with references] |
| [Listing of main financial parameters for project] | [listing of values with references] |
| [Listing of main financial parameters for project] | [listing of values with references] |
| [Listing of main financial parameters for project] | [listing of values with references] |
| [Listing of main financial parameters for project] | [listing of values with references] |

[Description of outcome of financial analysis]

**Table B.3.4 - Comparison of economic indicators**

| Proposed Project Activity | |
|---|---|
| [financial indicator] | [result of calculation] |
| [result of financial calculation] | [result of financial calculation] |

Table B.3.4 clearly indicates that the return on equity of the project activity is below the sectoral benchmark without taking into account CDM revenues. This demonstrates that the proposed project activity is not a commercially attractive option without the support of CDM.

***Sub-step 2d: Sensitivity analysis***

A sensitivity analysis based on the variation of +/- 10% of [description of parameters included in the sensitivity analysis]. The chosen parameters are considered to have a significant impact on the return on the cost of investment:

**Table B.3.4 – sensitivity of [IRR/NPV] of CPA without CDM**

| [parameter] | Variation | [parameter] | [parameter] | [parameter] | [parameter] |
|---|---|---|---|---|---|
| [parameter] | -10% | [result] | [result] | [result] | [result] |
| [parameter] | base | [result] | [result] | [result] | [result] |
| [parameter] | +10% | [result] | [result] | [result] | [result] |

[Overall, this alternative is not realistic for financial/economic reasons, without the revenue from CDM]

**Outcome of step 3**

[We can conclude that the [IRR/NPV] without CDM is negative and therefore that the project is also not financially attractive. This demonstrates that CPA would not be implemented without the CDM.]

***STEP 4. Common practice analysis***

***Sub-step 4a. Analyze other activities similar to the proposed project activity***

[description of the common practice]

***Sub-step 4b. Discuss any similar options that are occurring:***

[description of similar options that are occurring]

***Outcome of step 4a and 4b:***
[Based on the common practice analysis, it can be reconfirmed that the proposed project activity is additional.]

**B.4. Description of the sources and gases included in the project boundary and proof that the CPA is located within the geographical boundary of the registered PoA.**

>>
Following ACM0001, the following sources and gases are included in the CPA boundary

[Insert diagram describing the project boundary]

**Figure B.4.1: Flow chart of project boundaries (staggered line indicates boundaries)**

**Table B.4.1: sources and gases are included in the CPA boundary**

| | Source | Gas | Included? | Justification / Explanation |
|---|---|---|---|---|
| **Baseline** | Emissions from decomposition of waste at the SDWS 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 landfills. Exclusion of this gas is conservative. |
| | | $CO_2$ | No | $CO_2$ emissions from the decomposition of organic waste are not accounted |
| | Emissions from electricity generation | $CO_2$ | Yes | Electricity may be consumed from the grid or generated onsite/offsite in the baseline scenario |
| | | $CH_4$ | No | Excluded for simplification. This is conservative. |
| | | $N_2O$ | No | Excluded for simplification. This is conservative. |
| | Emissions from heat generation | $CO_2$ | No | Projects that involve heat generation are not eligible for inclusion under this PoA. Hence, these emissions are not accounted for. This is conservative. |
| | | $CH_4$ | 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 the use of natural gas | $CO_2$ | No | Projects that involve supply of LFG through a natural gas distribution network are not eligible for inclusion under this PoA. Hence, these emissions are not accounted for. This is conservative. |
| | | $CH_4$ | 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. |

| | Source | Gas | Included? | Justification / Explanation |
|---|---|---|---|---|
| | Emissions from fossil fuel consumption for purposes other than electricity generation or transportation 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. |
| **Project Activity** | Emissions from fossil fuel consumption for purposes other than electricity generation or transportation 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 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. |

The CPA is approved for development in XXX Province in Indonesia, therefore, the CPA is located within the geographical boundary of the registered PoA.

## B.5. Emission reductions:

### B.5.1. Data and parameters that are available at validation:

The following data and parameters are defined in ACM0001 version 12 and are available at validation:

| 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 used: | *Default value as per ACM0001 (ver. 12.0.0), "Emissions from solid waste disposal sites" (version 6.0.1)* |
| Value applied: | 0.1 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | *Applicable to Step A.* |
| Any comment: | *Applicable to Step A of approved methodology ACM0001 (ver. 12.0.0), ex ante estimation of BECH4,SWDS,y in accordance with "Emissions from solid waste disposal sites" (version 6.0.1).* |

| Data / Parameter: | $D_{CH4}$ |
|---|---|
| Data unit: | $tCH_4/m^3CH_4$ |
| Source of data used: | Methane density |
| Value applied: | "Tool to determine project emissions from flaring gases containing methane". Version 1.0 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | 0.0007168 |
| Any comment: | At standard T and P (0 degrees C and 1,013 bar) |

| Data / Parameter: | **f** |
|---|---|
| Data unit: | - |
| Description: | Fraction of methane captured at the SWDS and flared, combusted or used in another manner |
| Source of data used: | According to the "Emissions from solid waste disposal sites" –Version 6.0.1 |
| Value applied: | 0 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | All the methane generated was directly vented to the atmosphere prior to the CPA implementation, as per eligibility criteria. |
| Any comment: | |

| Data / Parameter: | $\eta_{PJ}$ |
|---|---|
| Data unit: | Dimensionless |

| | |
|---|---|
| Source of data used: | Efficiency of the LFG capture system that will be installed in the project activity |
| Value applied: | To be specified for each CPA |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Technical specifications of the LFG capture system to be installed (if available) or a default value of 50%. |
| Any comment: | Applicable to Step A.1.1 |

| | |
|---|---|
| **Data / Parameter:** | φdefault |
| Data unit: | - |
| Description: | Default value for the model correction factor to account for model uncertainties |
| Source of data used: | as per Methodological Tool Emissions from solid waste disposal sites (Version 06.0.1) |
| Value applied: | For project or leakage emissions: φdefault = 1.<br>For baseline emissions: CPa apply Application A. Thus: |

| | Humid/wet conditions | Dry conditions |
|---|---|---|
| Application A | 0.75 | 0.75 |

| | |
|---|---|
| Justification of the choice of data or description of measurement methods and procedures actually applied : | |
| Any comment: | - |

| | |
|---|---|
| **Data / Parameter:** | OX |
| Data unit: | - |
| Description: | Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) |
| Source of data used: | Conduct a site visit at the solid waste disposal site in order to assess the type of cover of the solid waste disposal site. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied |
| Value applied: | Use 0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. Use 0 for other types of solid waste disposal sites |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | When methane passes through the top-layer, part of it is oxidized by methanotrophic bacteria to produce CO2. The oxidation factor represents the proportion of methane that is oxidized to CO2 This should be distinguished from the methane correction factor (MCF) which is to account for the situation that ambient air might intrude into the SWDS and prevent methane from being formed in the upper layer of SWDS |

| | |
|---|---|
| Any comment: | |

| | |
|---|---|
| **Data / Parameter:** | F |
| Data unit: | - |
| Description: | Fraction of methane in the SWDS gas (volume fraction) |
| Source of data used: | IPCC 2006 Guidelines for National Greenhouse Gas Inventories |
| Value applied: | 0.5 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | |
| Any comment: | This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC |

| | |
|---|---|
| **Data / Parameter:** | $DOC_{f,default}$ |
| Data unit: | Weight fraction |
| Description: | Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS |
| Source of data used: | IPCC 2006 Guidelines for National Greenhouse Gas Inventories |
| Value applied: | 0.5 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | |
| Any comment: | This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, in the SWDS. This default value can only be used for<br>i) Application A; |

| | |
|---|---|
| **Data / Parameter:** | $MCF_{default}$ |
| Data unit: | - |
| Description: | Methane correction factor |
| Source of data used: | IPCC 2006 Guidelines for National Greenhouse Gas Inventories |
| Value applied: | In case that the SWDS does not have a water table above the bottom of the SWDS and in case of application A, then select the applicable value from the following:<br>• 1.0 for anaerobic managed solid waste disposal sites. These must have controlled placement of waste (i.e. waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste; |

| | |
|---|---|
| | • 0.5 for semi-aerobic managed solid waste disposal sites. These must have controlled placement of waste and will include all of the following structures for introducing air to the waste layers: (i) permeable cover material; (ii) leachate drainage system; (iii) regulating pondage; and (iv) gas ventilation system;<br>• 0.8 for unmanaged solid waste disposal sites – deep. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters;<br>• 0.4 for unmanaged-shallow solid waste disposal sites or stockpiles that are considered SWDS. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 meters. This includes stockpiles of solid waste that are considered SWDS (according to the definition given for a SWDS) |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | |
| Any comment: | The MCF accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS. |

| **Data / Parameter:** | **Wj,x** |
|---|---|
| Data unit: | t |
| Description: | Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x |
| Source of data used: | Estimated based on total amount of waste prevented from disposal and average weight fraction of the waste type collected |
| Value applied: | [Values are provided at CPA level] |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Estimated once based on total amount of waste prevented from disposal and average weight fraction of the waste type collected: $W_{j,x} = W_x \times p_{j,x}$ |
| Any comment: | The MCF accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS. |

| **Data / Parameter:** | DOCj |
|---|---|
| Data unit: | |
| Description: | Fraction of degradable organic carbon (by weight) in the waste type *j* |
| Source of data used: | IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5) |

<table>
<tr><td>Value applied:</td><td>Apply the following values for the different waste types j:
<table>
<tr><th>Waste type j</th><th>DOCj (% wet waste)</th></tr>
<tr><td>Wood and wood products</td><td>43</td></tr>
<tr><td>Pulp, paper and cardboard (other than sludge)</td><td>40</td></tr>
<tr><td>Food, food waste, beverages and tobacco (other than sludge)</td><td>15</td></tr>
<tr><td>Textiles</td><td>24</td></tr>
<tr><td>Garden, yard and park waste</td><td>20</td></tr>
<tr><td>Glass, plastic, metal, other inert waste</td><td>0</td></tr>
</table>
If a waste type is not comparable to MSW and can not clearly be described as a combination of waste types in the table above, project participants should measure DOCj in an ignition loss test according to the procedure in EN 15169 or similar national or international standards. This measurement is only required once for each waste type j and the value determined for DOCj remains valid during the crediting period<br>
For disposal of residual wastes, DOCj will need to be measured in most situations, with the following default values available for some types of residual wastes:<br>
• Empty fruit brunches (EFB), as their characteristics are similar to garden waste, the parameter value correspondent of garden shall be used;<br>
• Industrial sludge, a value of 9% (% wet sludge) shall be used, assuming an organic dry matter content of 35 percent;<br>
• Domestic sludge, a value of 5% (wet sludge) shall be used, assuming an organic dry matter content of 10 percent</td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures actually applied :</td><td></td></tr>
<tr><td>Any comment:</td><td>The procedure for the ignition loss test is described in BS EN 15169:2007 Characterization of waste. Determination of loss on ignition in waste, sludge and sediments. The percentages listed in Table 4 are based on a wet waste basis which are concentrations in the waste as it is delivered to the SWDS. The IPCC Guidelines also specify DOC values on a dry waste basis, which are the concentrations after complete removal of all moist from the waste, which is not believed practical for this situation</td></tr>
</table>

| **Data / Parameter:** | $k_j$ |
|---|---|
| Data unit: | - |
| Description: | Decay rate for the waste type *j* |
| Source of data used: | IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from |

<table>
<tr><td></td><td>Volume 5, Table 3.3)</td></tr>
<tr><td>Value applied:</td><td>Apply the following default values for the different waste types j
<table>
<tr><th colspan="2" rowspan="2">Waste type j</th><th colspan="2">Boreal and Temperate (MAT≤20°C)</th><th colspan="2">Tropical (MAT>20°C)</th></tr>
<tr><td>Dry (MAP/PET <1)</td><td>Wet (MAP/PET >1)</td><td>Dry (MAP< 1000mm)</td><td>Wet (MAP> 1000mm)</td></tr>
<tr><td rowspan="2">Slowly degrading</td><td>Pulp, paper, cardboard (other than sludge), textiles</td><td>0.04</td><td>0.06</td><td>0.045</td><td>0.07</td></tr>
<tr><td>Wood, wood products and straw</td><td>0.02</td><td>0.03</td><td>0.025</td><td>0.035</td></tr>
<tr><td>Moderately degrading</td><td>Other (non-food) organic putrescible garden and park waste</td><td>0.05</td><td>0.10</td><td>0.065</td><td>0.17</td></tr>
<tr><td>Rapidly degrading</td><td>Food, food waste, sewage sludge, beverages and tobacco</td><td>0.06</td><td>0.185</td><td>0.085</td><td>0.40</td></tr>
</table>
NB: MAT . mean annual temperature, MAP . Mean annual precipitation, PET . potential evapotranspiration. MAP/PET is the ratio between the mean annual precipitation and the potential evapotranspiration.<br><br>If a waste type, prevented from disposal by the proposed CDM project activity, can not clearly be attributed to one of the waste types in the table above, project participants should choose, among the waste types that have similar characteristics, the waste type where the values of DOCj and kj result in a conservative estimate (lowest emissions), or request a revision of/deviation from this methodology. In the case of empty fruit bunches (EFB), as their characteristics are similar to garden waste, the parameter values correspondent of garden waste shall be used. In case of sludge from pulp and paper industry, a conservative value of 0.03 shall be used for all precipitation and temperature combinations</td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures actually applied :</td><td></td></tr>
<tr><td>Any comment:</td><td>Document in the CDM-PDD the climatic conditions at the SWDS site (temperature, precipitation and, where applicable, evapotranspiration). Use long-term averages based on statistical data, where available. Provide references</td></tr>
</table>

| **Data / Parameter:** | $GWP_{CH4}$ |
|---|---|
| Data unit: | t CO2e / t CH4 |
| Description: | Global Warming Potential of methane |

| | |
|---|---|
| Source of data used: | IPCC |
| Value applied: | 21 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | |
| Any comment: | For the first commitment period. Shall be updated for future commitment periods according to any future COP/MOP decisions |

| **Data / Parameter:** | $P_n$ |
|---|---|
| Data unit: | Pa |
| Description: | Total pressure at normal conditions |
| Source of data used: | Methodology ACM0001 (Version 12.0.0) and As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |
| Value applied: | 101,325 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | - |
| Any comment: | - |

| **Data / Parameter:** | $T_n$ |
|---|---|
| Data unit: | K |
| Description: | Temperature at normal conditions |
| Source of data used: | Methodology ACM0001 (Version 12.0.0) and As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |
| Value applied: | 273.15 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | - |
| Any comment: | - |

| **Data / Parameter:** | $R_u$ |
|---|---|
| Data unit: | $Pa.m^3/kmol.K$ |
| Description: | Universal ideal gases constant |
| Source of data used: | As per Methodological tool "Tool to determine the mass flow of a greenhouse |

| | |
|---|---|
| | gas in a gaseous stream" (Version 02.0.0) |
| Value applied: | 8,314 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | - |
| Any comment: | |

| **Data / Parameter:** | $MM_i$ |
|---|---|
| Data unit: | kg/kmol |
| Description: | Molecular mass of greenhouse gas *i* |
| Source of data used: | As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |
| Value applied: | > |

| Compound | Structure | Molecular mass (kg / kmol) |
|---|---|---|
| Carbon dioxide | $CO_2$ | 44.01 |
| Methane | $CH_4$ | 16.04 |
| Nitrous oxide | $N_2O$ | 44.02 |
| Sulfur hexafluoride | $SF_6$ | 146.06 |
| Perfluoromethane | $CF_4$ | 88.00 |
| Perfluoroethane | $C_2F_6$ | 138.01 |
| Perfluoropropane | $C_3F_8$ | 188.02 |
| Perfluorobutane | $C_4F_{10}$ | 238.03 |
| Perfluorocyclobutane | c-$C_4F_8$ | 200.03 |
| Perfluoropentane | $C_5F_{12}$ | 288.03 |
| Perfluorohexane | $C_6F_{14}$ | 338.04 |

| | |
|---|---|
| | > |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | |
| Any comment: | - |

| **Data / Parameter:** | $MM_k$ |
|---|---|
| Data unit: | kg/kmol |
| Description: | Molecular mass of gas *k* |
| Source of data used: | As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |
| Value applied: | For gases *k* that are greenhouse gases apply values for $MM_i$. |

| | |
|---|---|
| | <table><tr><th>Compound</th><th>Structure</th><th>Molecular mass (kg / kmol)</th></tr><tr><td>Nitrogen</td><td>$N_2$</td><td>28.01</td></tr><tr><td>Oxygen</td><td>$O_2$</td><td>32.00</td></tr><tr><td>Carbon monoxide</td><td>CO</td><td>28.01</td></tr><tr><td>Hydrogen</td><td>$H_2$</td><td>2.02</td></tr><tr><td>Nitric oxide</td><td>NO</td><td>30.01</td></tr><tr><td>Nitrogen dioxide</td><td>$NO_2$</td><td>46.01</td></tr><tr><td>Sulfur dioxide</td><td>$SO_2$</td><td>64.06</td></tr></table> |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | |
| Any comment: | - |

| | |
|---|---|
| **Data / Parameter:** | $MM_{H2O}$ |
| Data unit: | kg/kmol |
| Description: | Molecular mass of water |
| Source of data used: | As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |
| Value applied: | 18.0152 kg/kmol |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | - |
| Any comment: | - |

| | |
|---|---|
| **Data / Parameter:** | $\mathbf{EF_{el,j,y}}$ |
| Data unit: | $tCO_2/MWh$ |
| Description: | Emission factor for electricity consumption by project activity in year y |
| Source of data used: | Calculated in accordance with the version 02.2.1 of the "Tool to calculate the emission factor for an electricity system" |
| Value applied: | [Values are provided at CPA level] |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | [Values/description are provided at CPA level] |

| | |
|---|---|
| Any comment: | All data used to calculate the emission factor is described in section B.6.1.<br><br>The grid emission factor applied ex-ante is fixed for the entire crediting period.<br><br>[Values/description are provided at CPA level] |

| **Data / Parameter:** | **$EF_{Co2,j,y}$** |
|---|---|
| Data unit: | $tCO_2/GJ$ |
| Description: | CO2 emission factor of the fossil fuel *j* |
| Source of data used: | 2006 IPCC Guidelines for National Greenhouse Gas Inventories, volume 2, chapter 2, table 2.2, page 2.16, CO2 emission factor 95% at upper level of confidence interval for fuel type j |
| Value applied: | [Values are provided at CPA level] |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | In case CO2 emission factor information is available from the fuel supplier, this value will be used. In other cases the default IPCC value will be used at the upper level of the 95% confidence interval.<br>[Values/description are provided at CPA level] |
| Any comment: | Used to calculate emission from using fossil fuel<br>[Values/description are provided at CPA level] |

### B.5.2. Ex-ante calculation of emission reductions:

>>

**Baseline emissions**

Baseline emissions associated with heat generation and natural gas usage are not included in the PoA.

Baseline emissions are determined according to equation 1 and comprise the following sources:
(A) Methane emissions from the SWDS in the absence of the project activity;
(B) Electricity generation using fossil fuels or supplied by the grid in the absence of the project activity;

$BE_y = BE_{CH4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y}$ ACM0001 version 12.0.0 equation **(1)**

Where:

| **Parameter** | **Explanation / Source** | **Value** | **Unit** |
|---|---|---|---|
| $BE_y$ | Baseline emissions in year *y* | [Value] | $tCO_2e$ |
| $BE_{CH4,y}$ | Baseline emissions of methane from the SWDS in year *y* | [Value] | $tCO_2e$ |
| $BE_{EC,y}$ | Baseline emissions associated with electricity generation in year *y* | [Value] | $tCO_2e$ |
| $BE_{HG,y}$ | Baseline emissions associated with heat generation and natural gas usage are not included in the PoA. Hence, this parameter is not calculated and the value is 0 for each CPA. | 0 | $tCO_2e$ |
| $BE_{NG,y}$ | Baseline emissions associated with heat generation and natural gas usage are not included in the PoA. Hence, this parameter | 0 | |

| | | | |
|---|---|---|---|
| | is not calculated and the value is 0 for each CPA. | | |

[insert additional comment / information / table (if any) here]

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

$$\mathbf{BE_{CH4,y} = (1\text{-}OXt_{op\_layer}) \cdot (F_{CH4,PJ,y} - F_{CH4,BL,y}) \cdot GWP_{CH4}}$$ ACM0001 version 12.0.0 equation **(2)**

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $BE_{CH4,y}$ | Baseline emissions of LFG from the SWDS in year *y* | [Value] | t $CO_2$e/yr |
| $OX_{top\_layer}$ | Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline | [Value] | dimensionless |
| $F_{CH4,PJ,y}$ | Amount of methane in the LFG which is flared and/or used in the project activity in year *y* | [Value] | t $CH_4$/yr |
| $F_{CH4,BL,y}$ | Amount of methane in the LFG that would be flared in the baseline in year *y* | [Value] | t $CH_4$/yr |
| $GWP_{CH4}$ | Global warming potential of $CH_4$ | [Value] | t $CO_2$e/t $CH_4$ |

[insert additional comment / information / table (if any) here]

***Step A.1: Ex post determination of $F_{CH4,PJ,y}$***

During the crediting period, $F_{CH4,PJ,y}$ is determined as the sum of the quantities of methane flared and used in power plant(s), boiler(s), air heater(s), kiln(s) and natural gas distribution network, as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y}$$ ACM0001 version 12.0.0 equation **(3)**

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $F_{CH4,PJ,y}$ | Amount of methane in the LFG which is flared and/or used in the project activity in year *y* | [Value] | (t $CH_4$/yr) |
| $F_{CH4,flared,y}$ | Amount of methane in the LFG which is destroyed by flaring in year *y* | [Value] | (t $CH_4$/yr) |
| $F_{CH4,EL,y}$ | Amount of methane in the LFG which is used for electricity generation in year *y* | [Value] | (t $CH_4$/yr) |
| $F_{CH4,HG,y}$ | Amount of methane in the LFG which is used for heat generation in year *y* | 0 | t $CH_4$/yr |
| $F_{CH4,NG,y}$ | Amount of methane in the LFG which is sent to the natural gas distribution network in year *y* | 0 | t $CH_4$/yr |

[insert additional comment / information / table (if any) here]

Since the CPA under this PoA involve flaring and/or power generation, only $F_{CH4,flared,y}$ and $F_{CH4,EL,y}$ need to be determined.

The equation can therefore be simplified as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y}$$ **(3.1)**

The working hours of the power plant(s), should be monitored and no emission reduction should be claimed for methane destruction during non-working hours.

$F_{CH4,EL,y}$, is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". The following requirements apply:

- The gaseous stream the tool shall be applied to is the LFG delivery pipeline to each item of electricity generation equipment *j*
- $CH_4$ is the greenhouse gases for which the mass flow should be determined;
- The flow of the gaseous stream should be measured on continuous basis;
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 or 17 in the tool); and
- The mass flow should be summed to a yearly unit basis (t $CH_4$/yr).

For a typical CPA temperature of gaseous streams ($T_t$) of a typical CPA is lower than 333.15K (60°C) at flow measurement points. According to the measurement options in "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Option A can be used. However, in case a CPA cannot demonstrate that the gaseous stream is dry, then the flow measurement shall be assumed to be on a wet basis and option B shall be applied (i) for the relevant time interval in which it cannot be demonstrated that the gaseous stream is dry only, or (ii) continuously.

| Option | Flow of gaseous system | Volumetric fraction |
|---|---|---|
| A | Volume flow – dry basis | Dry or wet basis |
| B | Volume flow – wet basis | dry basis |

Option A:
Flow measurement on a dry basis is not doable for a wet gaseous stream. Therefore, it is necessary to demonstrate that the gaseous stream is dry to use this option. There are two ways to do this:

a) Measure the moisture content of the gaseous stream ( ) and demonstrate that this is less or equal to 0.05 kg $H_2O/m^3$ dry gas; or
b) Demonstrate that the temperature of the gaseous stream ($T_t$) is less than 60°C (333.15 K) at the flow measurement point.

CPA under this PoA shall apply method B and demonstrate that the temperature of the gaseous stream ($T_t$) is less than 60°C (333.15 K) at the flow measurement point.

$$F_{i,t} = V_{t,db} \times v_{i,t,db} \times \rho_{i,t} \quad \textbf{(5)}^{3}$$

[3] Numbered as per Tool to determine the mass flow of a greenhouse gas in a gaseous stream

With:

$$\rho_{i,t} = \frac{P_t * MM_i}{R_u * T_t} \quad \textbf{(6)}^4$$

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $F_{i,t}$ | Mass flow of greenhouse gas *i* in the gaseous stream in time interval *t* | [Value] | kg gas/h |
| $V_{t,db}$ | Volumetric flow of the gaseous stream in time interval *t* on a dry basis | [Value] | m³ dry gas/h |
| $v_{i,t,db}$ | Volumetric fraction of greenhouse gas *i* in the gaseous stream in a time interval *t* on a dry basis | [Value] | m³ gas *i*/m³ dry gas |
| $\rho_{i,t}$ | Density of greenhouse gas *i* in the gaseous stream in time interval *t* | [Value] | kg gas *i*/m³ gas *i* |
| $P_t$ | Absolute pressure of the gaseous stream in time interval *t* | [Value] | Pa |
| $MM_i$ | Molecular mass of greenhouse gas *i* | [Value] | kg/kmol |
| $R_u$ | Universal ideal gases constant | [Value] | $Pa.m^3/kmol.K$ |
| $T_t$ | Temperature of the gaseous stream in time interval *t* | [Value] | K |

$CH_4$ is the greenhouse gases for which the mass flow should be determined; therefore $F_{i,t} = F_{CH4,t}$ and $\rho_{i,t} = \rho_{CH4,t}$

[insert additional comment / information / table (if any) here]

Option B:
Option B shall be applied if in a particular time interval the temperature of the LFG exceeds 60°C and therefore it cannot be demonstrated that the volumetric flow of the LFG is monitored on a dry basis.

The mass flow of the CH4 shall be determined using equations (5) and (6) above. The volumetric flow of the gaseous stream in time interval t on a dry basis ($V_{t,db}$) shall be determined by converting the measured volumetric flow from wet basis to dry basis as follows:

$$V_{t,tb} = V_{t,wb} / (1 + v_{H2O,t,db}) \quad (7)$$

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $V_{t,db}$ | Volumetric flow of the gaseous stream in time interval *t* on a dry basis | [Value] | m³ dry gas/h |
| $V_{t,wb}$ | Volumetric flow of the gaseous stream in time interval *t* on a wet basis | [Value] | (m³ wet gas/h) |

[4] Numbered as per Tool to determine the mass flow of a greenhouse gas in a gaseous stream

| | | | |
|---|---|---|---|
| $v_{H2O,t,db}$ | Volumetric fraction of $H_2O$ in the gaseous stream in time interval *t* on a dry basis | [Value] | ($m^3$ $H_2O$/$m^3$ dry gas) |

[insert additional comment / information / table (if any) here]

The volumetric fraction of H2O in time interval t on a dry basis ($v_{H2O,t,db}$) is estimated according to the following equation[5]:

$$v_{H2O,t,db} = \frac{m_{H2O,t,db} * MM_{t,db}}{MM_{H2O}} \quad \textbf{(8)}$$

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $v_{H2O,t,db}$ | Volumetric fraction of $H_2O$ in the gaseous stream in time interval *t* on a dry basis | [Value] | ($m^3$ $H_2O$/$m^3$ dry gas) |
| $m_{H2O,t,db}$ | Absolute humidity in the gaseous stream in time interval *t* on a dry basis | [Value] | (kg $H_2O$/kg dry gas) |
| $MM_{t,db}$ | Molecular mass of the gaseous stream in time interval *t* on a dry basis | [Value] | (kg dry gas/kmol dry gas) |
| $MM_{H2O}$ | Molecular mass of $H_2O$ | [Value] | (kg $H_2O$/kmol $H_2O$) |

[insert additional comment / information / table (if any) here]

The absolute humidity of the gaseous stream ($mH2O,t,db$) is determined using either Option 2[6] specified below:

$$m_{H2O,t,db,Sat} = \frac{p_{H2O,t,Sat} * MM_{H2O}}{(P_t - p_{H2O,t,Sat}) * MM_{t,db}} \quad \textbf{(4)}$$

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $m_{H2O,t,db,sat}$ | Saturation absolute humidity in time interval *t* on a dry basis | [Value] | (kg $H_2O$/kg dry gas) |
| $p_{H20,t,Sat}$ | Saturation pressure of $H_2O$ at temperature $T_t$ in time interval t | [Value] | (Pa) |
| $T_t$ | Temperature of the gaseous stream in time interval *t* | [Value] | (K) |
| $P_t$ | Absolute pressure of the gaseous stream in time interval *t* | [Value] | (Pa) |
| $MM_{H2O}$ | Molecular mass of $H_2O$ | [Value] | (kg $H_2O$/kmol $H_2O$) |
| $MM_{t,db}$ | Molecular mass of the gaseous stream in a time | [Value] | (kg dry gas/kmol dry |

[5] Numbered as per Tool to determine the mass flow of a greenhouse gas in a gaseous stream

[6] Numbered as per Tool to determine the mass flow of a greenhouse gas in a gaseous stream

| | | | |
|---|---|---|---|
| | interval *t* on a dry basis | | gas) |

Parameter $MM_{t,db}$ is estimated using equation (3) [7]

$$MM_{t,db} = \sum_{k} (v_{k,t,db} * MM_{k}) \quad \textbf{(3)}$$

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $MM_{t,db}$ | Molecular mass of the gaseous stream in time interval *t* on a dry basis | [Value] | (kg dry gas/kmol dry gas) |
| $v_{k,t,db}$ | Volumetric fraction of gas *k* in the gaseous stream in time interval *t* on a dry basis | [Value] | ($m^3$ gas k/$m^3$ dry gas) |
| $MM_k$ | Molecular mass of gas *k* | [Value] | (kg/kmol) |
| k | All gases, except $H_2O$, contained in the gaseous stream See available simplification below | [Value] | (e.g. $N_2$, $CO_2$, O2, CO, H2, $CH_4$, $N_2O$, NO, NO2, $SO_2$, $SF_6$ and PFCs ). |

[insert additional comment / information / table (if any) here]

As a simplification, the project participants shall monitor only the volumetric fraction of CH4 , which is the only greenhouse gas in LFG that is considered in the emission reduction calculation by the underlying methodology (ACM0001) and assume that the difference to 100% is pure nitrogen. This simplification is valid under ACM0001.

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

$F_{CH4,flared,y}$ is determined as the difference between the amount of methane supplied to the flare(s) and any methane emissions from the flare(s), as follows:

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

ACM0001 version 12.0.0 equation **(12)**

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $F_{CH4,flared,y}$ | Amount of methane in the LFG which is destroyed by flaring in year *y* | [Value] | t $CH_4$/yr |
| $F_{CH4,sent\_flare,y}$ | Amount of methane in the LFG which is sent to the flare in year *y* | [Value] | t $CH_4$/yr |
| $PE_{flare,y}$ | Project emissions from flaring of the residual gas stream in year *y* | [Value] | t $CO_2$e/yr |
| $GWP_{CH4}$ | Global warming potential of $CH_4$ | [Value] | t $CO_2$e/t $CH_4$ |

$F_{CH4,sent\_flare,y}$ is determined directly using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". For a typical CPA the temperature of gaseous streams ( $T_t$) is lower than 333.15K

[7] Numbered as per Tool to determine the mass flow of a greenhouse gas in a gaseous stream

(60°C) at flow measurement points, the equation of Option A for $F_{CH4,EL,y}$, above is used to calculate $F_{CH4,sent\_flare,y}$. Alternatively, option B can be applied as explained above if it cannot be demonstrated that the temperature of the gaseous stream is less than 60°C.

$PE_{flare,y}$ shall be determined using the "Tool to determine project emissions from flaring gases containing methane". If LFG is flared through more than one flare, then $PE_{flare,y}$ is the sum of the emissions for each flare determined separately. The *ex post* emission reduction will be calculated as per "Tool to determine project emissions from flaring gases containing methane" by using actual monitored data.

Methane may be released as a result of incomplete combustion in the flare. To calculate project emissions from flaring of the landfill gas ($PE_{flare}$), the "Tool to determine project emissions from flaring gases containing methane" (version 01 approved at EB28) is applied.

Note that either an open or enclosed flare may be employed by the CPA. For determination of the flare efficiency, a default value of 50% will be used for the calculation of project emissions from flaring gases if the CPA uses an open flare and a default flare efficiency of 90% will be employed if the CPA uses an enclosed flare.

The tool specifies 7 steps for calculation.

Step 1: Determination of the mass flow rate of the residual gas that is flared

This step calculates the residual gas mass flow rate in each hour h, based on the volumetric flow rate and the density of the residual gas. The density of the residual gas is determined based on the volumetric fraction of all components in the gas.

This step calculates the residual gas mass flow rate in each hour h, based on the volumetric flow rate and the density of the residual gas. The density of the residual gas is determined based on the volumetric fraction of all components in the gas. Alternatively, the tool provides a simplified approach to only measure the volumetric fraction of methane and to consider the deference to 100% as being nitrogen. The proposed project activity adopts this simplified approach.

Step 2 is not applicable because of the simplified approach taken where only the volumetric fraction of methane is measured.

Steps 3 & 4 are only applicable if the combustion efficiency of the flare is continuously monitored and are therefore not considered.

Step 5: Determination of methane mass flow rate in the residual gas on a dry basis

The quantity of methane in the residual gas flowing into the flare is the product of the volumetric flow rate of the residual gas ($FV_{RG,h}$), the volumetric fraction of methane in the residual gas ($fv_{CH4,RG,h}$) and the density of methane ($\rho_{CH4,n,h}$) in the same reference conditions (normal conditions and dry or wet basis).

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n}$$ **Eq. 13 of Flaring Tool Version 01**

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $TM_{RG,h}$ | Mass flow rate of methane in the residual gas in the hour *h* | [Value] | kg/h |
| $FV_{RG,h}$ | Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour *h* | [Value] | $m^3/h$ |
| $fv_{CH4,RG,h}$ | Volumetric fraction of methane in the residual gas on dry basis in hour *h* | [Value] | $m^3/h$ |
| $\rho_{CH4,n}$ | Density of methane at normal conditions | [Value] | $kg/m^3$ |

Step 6: Determination of the hourly flare efficiency

In case the project uses an open flare, the flare efficiency in the hour h ($\eta_{flare,h}$) according to the tool is:

- 0% if the flame is not detected for more than 20 minutes during the hour *h*.
- 50%, if the flare is detected for more than 20 minutes during the hour *h*.

In case the project uses an enclosed flare, the flare efficiency in the hour h ($\eta_{flare,h}$) according to the tool is:

- 0% if the temperature in the exhaust gas of the flare ($T_{flare}$) is below 500 °C for more than 20 minutes during the hour *h* .
- 50%, if the temperature in the exhaust gas of the flare ($T_{flare}$) is above 500 °C for more than 40 minutes during the hour *h*, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour *h*.
- 90%, if the temperature in the exhaust gas of the flare ($T_{flare}$) is above 500 °C for more than 40 minutes during the hour *h* and the manufacturer's specifications on proper operation of the flare are met continuously during the hour *h*.

[insert additional comment / information / table (if any) here]

Step 7: Calculation of annual project emissions from flaring

Project emissions from flaring are calculated as the sum of emissions from each hour *h*, based on the methane flow rate in the residual gas ($TM_{RG,h}$) and the flare efficiency during each hour *h* ($\rho_{flare,h}$), as follows:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times (1 - \eta_{flare,h}) \times \frac{GWP_{CH4}}{1000}$$ **Eq. 15 of Flaring Tool Version 01**

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|

| | | | |
|---|---|---|---|
| $PE_{flare,y}$ | Project emissions from flaring of the residual gas stream in year *y* | [Value] | $tCO_2e/yr$ |
| $TM_{RG,h}$ | Mass flow rate of the methane in the residual gas in the hour *h* | [Value] | kg/h |
| $\eta_{flare,h}$ | Flare efficiency in hour *h* | [Value] | fraction |

[insert additional comment / information / table (if any) here]

***Step A.1.1: Ex ante estimation of $F_{CH4,PJ,y}$***

An *ex ante* estimate of $F_{CH4,PJ,y}$ is required to estimate baseline emission of methane from the SWDS (according to equation 2) in order to estimate the emission reductions of the proposed project activity in the CDM-PDD. It is determined as follows:

$$F_{CH4,PJ,y} = \eta_{PJ} \cdot BE_{CH4,SWDS,y}/GWP_{CH4}$$ ACM0001 version 12.0.0 equation **(5)**

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)

$BE_{CH4,SWDS,y}$ = Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year *y* (t $CO_2$e/yr)

$\eta_{PJ}$ = Efficiency of the LFG capture system that will be installed in the project activity

$GWP_{CH4}$ = Global warming potential of $CH_4$ (t $CO_2$e/t $CH_4$)

$BE_{CH4,SWDS,y}$ is determined using the methodological tool "Emissions from solid waste disposal sites". The following guidance should be taken into account when applying the tool:

- $f_y$ in the tool shall be assigned a value of 0 because the amount of LFG that would have been captured and destroyed is already accounted for in equation 2 of this methodology;
- In the tool, x begins with the year that the SWDS started receiving wastes (e.g. the first year of SWDS operation); and
- Sampling to determine the fractions of different waste types is not necessary because the waste composition can be obtained from previous studies.

**Determination of $BE_{CH4,SWDS,y}$**

According to the adopted methodology, $BE_{CH4,SWDS,y}$ is determined using the tool "Emissions from solid waste disposal sites". CPAs will mitigate methane emissions by capturing and combusting the methane emitted by an existing landfill. Therefore, CPAs belong to "Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS".

The emissions are calculated as follows:

$$\left.\begin{matrix} BE_{CH4,SWDS,y} \\ PE_{CH4,SWDS,y} \\ LE_{CH4,SWDS,y} \end{matrix}\right\} = \varphi_y \cdot (1 - f_y) \cdot GWP_{CH4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC_{f,y} \cdot MCF_y \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot \left(1 - e^{-k_j}\right) \quad \textbf{(1)}$$

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $BE_{CH4,SWDS,y}$ $PE_{CH4,SWDS,y}$ $LE_{CH4,SWDS,y}$ | Baseline, project or leakage methane emissions occurring in year *y* generated from waste disposal at a SWDS during a time period ending in year *y* | [Value] | [Value] |
| x | Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period ($x = 1$) to year *y* ($x = y$). | [Value] | [Value] |
| y | Year of the crediting period for which methane emissions are calculated (*y* is a consecutive period of 12 months) | [Value] | [Value] |
| $DOC_{f,y}$ | Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction) | [Value] | [Value] |
| $W_{j,x}$ | Amount of solid waste type *j* disposed or prevented from disposal in the SWDS in the year *x* (t) | [Value] | [Value] |
| $\varphi_y$ | Model correction factor to account for model uncertainties for year *y* | [Value] | [Value] |
| $f_y$ | Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year *y* | [Value] | [Value] |
| $GWP_{CH4}$ | Global Warming Potential of methane | [Value] | [Value] |
| OX | Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste) | [Value] | [Value] |
| F | Fraction of methane in the SWDS gas (volume fraction) | [Value] | [Value] |
| $MCF_y$ | Methane correction factor for year *y* | [Value] | [Value] |
| $DOC_j$ | Fraction of degradable organic carbon in the waste type *j* (weight fraction) | [Value] | [Value] |
| $k_j$ | Decay rate for the waste type *j* (1 / yr) | [Value] | [Value] |
| j | Type of residual waste or types of waste in the MSW | [Value] | [Value] |

[insert additional comment / information / table (if any) here]

**Determining the parameters required to apply the first order decay (FOD) model**

Overview of the applied parameters

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|

| | | | |
|---|---|---|---|
| $\varphi_y$ | Project or leakage emission: default values<br>Baseline emissions: default values or project specific | [Value] | [Value] |
| OX | Default value | [Value] | [Value] |
| F | Default value | [Value] | [Value] |
| $DOC_{f,y}$ | Default value | [Value] | [Value] |
| $MCF_y$ | Default value (based on SWDS type) | [Value] | [Value] |
| $k_j$ | Default value (based on waste type) | [Value] | [Value] |
| $W_{j,x}$ | Estimated once | [Value] | [Value] |
| $DOC_j$ | Default value (based on waste type) | [Value] | [Value] |
| $F_y$ | Estimated once | [Value] | [Value] |

[insert additional comment / information / table (if any) here]

**Determining the model correction factor ($\varphi_y$)**

The model correction factor ($\varphi_y$) depends on the uncertainty of the parameters used in the FOD model.

As baseline emissions are being calculated, then project participants may choose between two options to calculate ($\varphi_y$). Option 1: Use a default value; Option 2: Determine $\varphi_y$ based on specific situation of the project activity. Since the specific situation of each CPA cannot be identified at PoA level, Option 1 is chosen for all CPAs.

*Option 1: Use a default value*

Use a default value: $\varphi_y = \varphi_{default}$. Default values for different applications and climatic conditions are provided in the section "Data and parameters not monitored" below.

*Determining the amounts of waste types j disposed in the SWDS ($W_{j,x}$)*

The landfill provided the evaluations of total amount of solid waste disposed in every year of its lifetime and average fractions of different waste types in the waste, which are used to calculate $W_{j,x}$.

The equation of Application B is used as reference.

$$W_{j,x} = W_x \cdot p_{j,x} \quad \textbf{(5)}$$

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $W_{j,x}$ | Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t) | [Value] | [Value] |
| $W_x$ | Total amount of solid waste disposed or prevented from disposal in the SWDS in year *x* (t) | [Value] | [Value] |
| $p_{j,x}$ | Average fraction of the waste type *j* in the waste in year *x* (weight fraction) | [Value] | [Value] |

| | | | |
|---|---|---|---|
| j | Types of solid waste | [Value] | [Value] |
| x | Years in the time period for which waste is disposed at the SWDS, extending from the first year in the time period (x = 1) to year y (x = y) | [Value] | [Value] |

[insert additional comment / information / table (if any) here]

***Step A.2: Determination of $F_{CH4,BL,y}$***

This step provides a procedure to determine the amount of methane that would have been captured and destroyed (by flaring) in the baseline due to regulatory or contractual requirements, or to address safety and odour concerns (collectively referred to as *requirement* in this step). The four cases in Table 2 are distinguished. The appropriate case should be identified and the corresponding instructions followed.

**Table 2: Cases for determining methane captured and destroyed in the baseline**

| Situation at the start of the project activity: | Requirement to destroy methane | Existing LFG capture system |
|---|---|---|
| Case 1 | No | No |
| Case 2 | Yes | No |
| Case 3 | No | Yes |
| Case 4 | Yes | Yes |

As per eligibility criteria, only CPA that are implemented at facilities where there is no requirement to destroy methane and where no existing LFG capture system is present are eligible for inclusion under this PoA. Therefore:

*Case 1: No requirement to destroy methane exists and no existing LFG capture system*

In this situation:

$$F_{CH4,BL,y} = 0$$

***Step B: Baseline emissions associated with electricity generation ($BE_{EC,y}$)***

The baseline emissions associated with electricity generation in year *y* ($BE_{EC,y}$) shall be calculated using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". When applying the tool:

- The electricity sources *k* in the tool correspond to the sources of electricity generated identified in the selection of the most plausible baseline scenario; and
- $EC_{BL,k,y}$ in the tool is equivalent to the net amount of electricity generated using LFG in year *y*.

$$BE_{EC,y} = \sum_j EC_{BE,k,y} \times EF_{EL,k,y} \times \left(1 + TDL_{k,y}\right) \qquad \textbf{Eq. 1 of the Tool}^{8}$$

[8] Equation numbering maintained as shown in "Tool to calculate baseline, project and/or leakage emission from electricity consumption" (version 01)

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $BE_{EC,y}$ | Baseline emissions from electricity generation in year y ($tCO_2e/yr$) | [Value] | [Value] |
| $EC_{BE,k,y}$ | Quantity of electricity generated by the project electricity consumption source k in year y (MWh/yr) | [Value] | [Value] |
| $EF_{EL,k,y}$ | Emission factor for electricity generation for source k in year y ($tCO_2/MWh$) | [Value] | [Value] |
| $TDL_{k,y}$ | Average technical transmission and distribution losses for providing electricity to source k in year y | [Value] | [Value] |

Under scenario A of the tool, option A1 is being used to calculate the $CO_2$ emission factor of grid electricity. As per scenario A1, the emission factor is the combined margin emission factor of the grid, calculated as per the guidelines provided under the latest version of "Tool to calculate emission factor for an electricity emission".

Scenario B: In case the electricity consumption is from an off-grid captive power plant: The emission factor $EF_{EL,k,y}$ is determined as zero if all equipment/devices in the project treatment facility are powered with power gained from landfill gas. Else and corresponding to option B2 offered by the tool an emission factor of 0.4 $tCO_2e/MWh$ will be assumed.

Scenario C: In case of baseline electricity consumption from the grid and (a) fossil fuel fired captive power plant(s): The emission factor $EF_{ELk,y}$ is determined according to Scenario A, if the project activity only affects the quantity of electricity that is supplied from the grid and not the operation of the captive power plant or according to Scenario B, if the project activity only affects the quantity of electricity that is supplied from the captive power plant and not the quantity of electricity that is supplied from the grid. Else, i.e. both sources are affected by the project activity, the more conservative value between Scenario A and Scenario B is determined as $EF_{EL,k,y}$. Under current conditions this is the value from Scenario B: $EF_{ELk,y} = 1.3\ tCO_2e/MWh$

General: In the CPA-DD the scenario which applies to the project activity will be clearly described and relevant evidence will be provided to the DOE. In case of doubts the more conservative value among the values of Scenarios A and B shall be adopted.

In line with Scenario B, when all project equipment is powered with power from captured landfill gas this project emission source can be neglected as long as the electricity export to the grid is the net electricity export or CERs are not claimed for the electricity export.

CPAs of the PoA shall calculate the combined margin emission factor at the time of inclusion and that emission factor shall be fixed ex-ante for the CPA.

For the Average technical transmission and distribution losses for providing electricity to source j in year y ($TDL_{k,y}$), CPAs of the PoA shall consider the default value as mentioned in the tool, as a conservative and simplified approach.

***Step C: Baseline emissions associated with heat generation ($BE_{HG,y}$)***

Baseline emissions associated with heat generation in year *y* ($BE_{HG,y}$) are not eligible for inclusion under this PoA.

Therefore, $BE_{HG,y}$ = 0 t $CO_2$/yr.

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

Baseline emissions associated with natural gas use in year ($BE_{NG,y}$) is not included under this PoA, therefore

$BE_{NG,y}$ = 0 t $CO_2$/yr.

**Project Emissions**

The project emissions consist of emissions related to consumption of electricity of each CPA. Those will be calculated following the Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01) and/or the Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (Version 02). In case of flaring of LFG the project emissions related to flaring will be determined ex-post using the Tool to determine project emissions from flaring gases containing methane (Version 01).

Project emissions are calculated as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y}$$ ACM0001 version 12.0.0 equation **(21)**

*Where:*

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $PE_y$ | Project emissions in year *y* (t $CO_2$/yr) | [Value] | [Value] |
| $PE_{EC,y}$ | Emissions from consumption of electricity due to the project activity in year *y* (t $CO_2$/yr) | [Value] | [Value] |
| $PE_{FC,y}$ | Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year *y* (t $CO_2$/yr) | [Value] | [Value] |

Project emissions may occur due to CPA that consumes electricity from the grid or due to the usage of fossil fuels (for example, in order to operate electricity generators due to grid power outages). These are accounted for using the appropriate tools, as shown below:

***$CO_2$ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion".***

Since fossil fuel may be consumed for the operation of diesel generators in case of grid power failure or operation of other auxiliaries, $CO_2$ emission from fossil fuel combustion ($PE_{FC,y}$) should be calculated using the latest approved version of the "*Tool to calculate project or leakage $CO_2$ emissions from fossil fuel combustion*" Version 02 (EB41, Annex 11), hereafter referred to as the "Fossil Fuel Tool". According to this Tool, $CO_2$ emissions from fossil fuel combustion in process *j* are calculated based on the quantity of fuels combusted and the $CO_2$ emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \qquad \text{(Fossil Fuel Tool:1)}$$

Where

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $PE_{FC,j,y}$ | Are the $CO_2$ emissions from fossil fuel combustion in process j during year *y* | [Value] | (t $CO_2$e/yr) |
| $FC_{i,j,y}$ | Is the quantity of fuel type *i* combusted in process *j* during year *y* | [Value] | (mass or volume unit/year) |
| $COEF_{i,y}$ | Is the $CO_2$ coefficient of fuel type *i* in year *j* | [Value] | (t $CO_2$/mass or volume unit) |
| *i* | Are the fuel types combusted in process *j* during the year *y* | [Value] | [Value] |

[insert additional comment / information / table (if any) here]

As the data on the chemical composition of the fossil fuel type *i* used by the project activity is not available. Thus, the option B of the Tool is adopted for calculation of the $CO_2$ emission coefficient $COEF_{i,y}$ . The $COEF_{i,y}$ is calculated based on net calorific value and $CO_2$ emission factor of the fuel type *i* , as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \qquad \text{(Fossil Fuel Tool: 4)}$$

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $COEF_{i,y}$ | Is the $CO_2$ coefficient of fuel type *i* in year *j* | [Value] | (t $CO_2$/mass or volume unit) |
| $NCV_{i,y}$ | Is the weighted average net calorific value of the fuel type *i* in year *j* | [Value] | (GJ/mass or volume unit) |
| $EF_{CO2,i,y}$ | Is the weighted average $CO_2$ emission factor of fuel type *i* in year *y* | [Value] | (t $CO_2$/GJ) |
| *I* | Are the fuel types combusted in process *j* | [Value] | [Value] |

| | | | |
|---|---|---|---|
| | during the year *y* | | |

***$CO_2$ emissions from electricity consumption by the project activity using the latest version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".***

A typical CPA of the PoA will consume electricity at the project site to run various equipment. The emission on the account of electricity consumption has been designed to calculate in accordance with the "Tool to calculate baseline, project and/or leakage emission from electricity consumption" (version 01).

[insert additional comment / information / table (if any) here]

The tool is applicable if one out of the following three scenarios applies to the sources of electricity consumption:

- Scenario A: Electricity consumption from the grid
- Scenario B: Electricity consumption from (an) off grid fossil fuel fired captive power plant
- Scenario C: Electricity consumption from the grid and fossil fuel fired captive power plant.

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times \left(1 + TDL_{j,y}\right)$$ **Eq. 1 of the Tool [9]**

Where:

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $PE_{EC,y}$ | Project emissions from electricity consumption in year y (tCO2e/yr) | [Value] | [Value] |
| $EC_{PJ,j,y}$ | Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr) | [Value] | [Value] |
| $EF_{EL,j,y}$ | Emission factor for electricity generation for source j in year y ($tCO_2$/MWh) | [Value] | [Value] |
| $TDL_{j,y}$ | Average technical transmission and distribution losses for providing electricity to source j in year y | [Value] | [Value] |

Under scenario A of the tool, option A1 is being used to calculate the $CO_2$ emission factor of grid electricity. As per scenario A1, the emission factor is the combined margin emission factor of the grid, calculated as per the guidelines provided under the latest version of "Tool to calculate emission factor for an electricity emission".

[9] Equation numbering maintained as shown in "Tool to calculate baseline, project and/or leakage emission from electricity consumption" (version 01)

Scenario B: In case the electricity consumption is from an off-grid captive power plant: The emission factor $EF_{EL,j,y}$ is determined as zero if all equipment/devices in the project treatment facility are powered with power gained from landfill gas. Else and corresponding to option B2 offered by the tool an emission factor of 0.4 $tCO_2e/MWh$ will be assumed.

Scenario C: In case of baseline electricity consumption from the grid and (a) fossil fuel fired captive power plant(s): The emission factor $EF_{EL,j,y}$ is determined according to Scenario A, if the project activity only affects the quantity of electricity that is supplied from the grid and not the operation of the captive power plant or according to Scenario B, if the project activity only affects the quantity of electricity that is supplied from the captive power plant and not the quantity of electricity that is supplied from the grid. Else, i.e. both sources are affected by the project activity, the more conservative value between Scenario A and Scenario B is determined as $EF_{EL,j,y}$. Under current conditions this is the value from Scenario B: $EF_{EL,j,y} = 1.3\ tCO_2e/MWh$

General: In the CPA-DD the scenario which applies to the project activity will be clearly described and relevant evidence will be provided to the DOE. In case of doubts the more conservative value among the values of Scenarios A and B shall be adopted.

In line with Scenario B, when all project equipment is powered with power from captured landfill gas this project emission source can be neglected as long as the electricity export to the grid is the net electricity export or CERs are not claimed for the electricity export.
CPAs of the PoA shall calculate the combined margin emission factor at the time of inclusion and that emission factor shall be fixed ex-ante for the CPA.

For the Average technical transmission and distribution losses for providing electricity to source j in year y($TDL_{j,y}$), CPAs of the PoA shall consider the default value as mentioned in the tool, as a conservative and simplified approach.

**Leakage**
With reference to the methodology ACM0001 (Version 12.0.0) no leakage effects need to be accounted for each of the CPAs.

**Emission Reduction**

[insert additional comment / information / table (if any) here]

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$ ACM0001 version 12.0.0 equation **(22)**

*Where:*

| Parameter | Explanation / Source | Value | Unit |
|---|---|---|---|
| $ER_y$ | Emission reductions in year *y* ($tCO_2e/yr$) | [Value] | tCO2e/yr |
| $BE_y$ | Baseline emissions in year *y* (tCO2e/yr) | [Value] | tCO2e/yr |
| $PE_y$ | Project emissions in year *y* ($tCO_2/yr$) | [Value] | tCO2e/yr |

[insert additional comment / information / table (if any) here]

### B.5.3. Summary of the ex-ante estimation of emission reductions:

>>

| Year | Estimation of project activity emissions (tonnes of $CO_2$ e) | Estimation of baseline emissions (tonnes of $CO_2$ e) | Estimation of leakage (tonnes of $CO_2$ e) | Estimation of overall emission reductions (tonnes of $CO_2$ e) |
|---|---|---|---|---|
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| [Value] | [Value] | [Value] | [Value] | [Value] |
| **Total** (tonnes of $CO_2$ e) | [Value] | [Value] | [Value] | [Value] |

## B.6. Application of the monitoring methodology and description of the monitoring plan:

### B.6.1. Description of the monitoring plan:

>>

[The monitoring plan is described in detail in the monitoring plan manual developed in conjunction with the PoA. Each of the CPA activities will develop an operations plan that defines a standard against which the project performance will be measured in terms of its emission reductions (ER) and conformance with all standards and criteria under the PoA. The objective of the monitoring plan is to:

- Establish and maintain a reliable and accurate monitoring system
- Provide guidance for the participants on the implementation of necessary measurement and record management operations
- Guidance for meeting CDM requirements for verification and certification purposes

The monitoring plan covers:

- responsibility of members of the monitoring team;
- routine reminders for site staff;
- QA/QC procedures;
- service forms for data reporting;
- corrective action plans;
- maintenance plans; and
- monitoring schedules.

**Responsibilities of operational and management structure for each CPA**

In order to ensure all CPAs are monitored and verified as per the applied monitoring methodology, the CME prepares a comprehensive monitoring plan for all the CPAs to be included in the PoA. Each CPA implementer will implement the respective monitoring plan, that is subject to continuous improvement, based on insights by CPA implementer and CME.

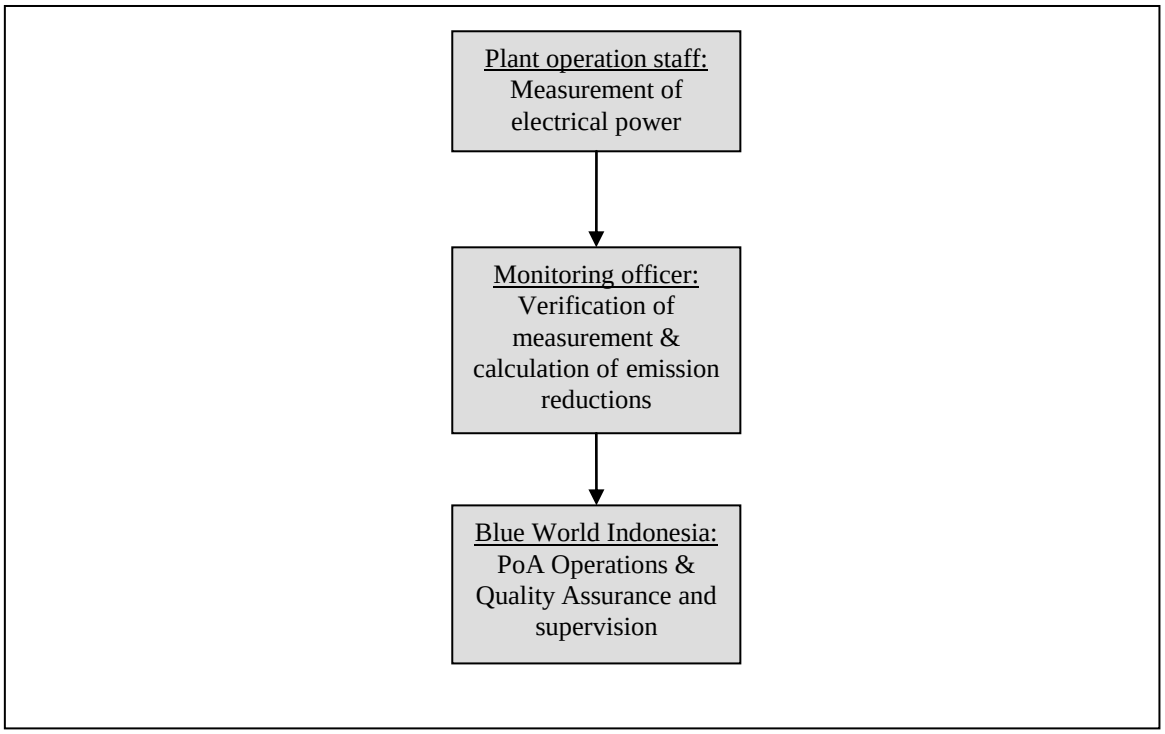


**Figure E.7.2.1 Management structure in order to monitor emission reductions**

At CPA level, a monitoring team is formed that reports to general management: the team sets out the responsibility of everyone in the monitoring system, and establishes the related documents. The general management ensures that staff in the monitoring system has the ability to deal with the assigned tasks.

For monitoring at CPA level, CDM Managers/coordinators are appointed for respective CPAs, specifically responsible for training, checking the daily operation, reporting forms and archiving emergency situation reports. The CDM managers will also be responsible for aggregating the monitored data monthly and yearly, archiving and keeping data during the crediting period and two years after.

The respective operators of the CPA will be in charge of data supervision, filling operation report forms and, checking and inspecting the system. If necessary, they will have the responsibility for executing the emergency plan and drafting emergency situation reports.

The relevant data will be recorded by the CPA implementers and provided to the CME at regular intervals. The data received will be archived electronically for computations of emission reductions on annual basis. Such archived data will be kept until two years after the end of the crediting period or the issuance of CERs whichever is later. Each small scale CPA shall follow all the provision of the PoA

including that related to monitoring. Only those CPA implementers who confirm to sign an agreement in this context shall be included in the PoA, as this is a part of eligibility criteria.

In section E7.2 of each CPA-DD a figure indicating the monitoring points, as well as a table indicating details for the monitoring equipment will be provided.

The CME, as the carbon finance intermediary and project participant, will take responsibility for the collection of monitored data, the emission reduction estimates, producing the monitoring reports and reporting to the DOE. The data will be checked for completeness and quality and placed in a central database located at the CME Office that includes all projects under the PoA.

BWC will conduct periodical checks to verify procedures are being followed as per the prescribed procedures.]

| **Data / Parameter:** | $LFG_{total,y}$ |
|---|---|
| Data unit: | $m^3$ |
| Description: | Total amount of landfill gas captured at Normal Temperature and Pressure |
| Source of data to be used: | Onsite measurements |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values/description are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Continuous Measured by a flow meter. Data to be aggregated monthly and yearly (average value in a time interval not greater than an hour shall be used in the calculations of emission reductions) |
| QA/QC procedures to be applied: | Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy |
| Any comment: | [Values/description are provided at CPA level] |

| **Data / Parameter:** | $LFG_{flare,y}$ |
|---|---|
| Data unit: | $m^3$ |
| Description: | Amount of landfill gas flared at Normal Temperature and Pressure |
| Source of data to be used: | Onsite measurements |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be | Continuous Measured by a flow meter. Data to be aggregated monthly and yearly for each flare (average value in a time interval not greater than an hour shall be used in the calculations of emission reductions) |

| | |
|---|---|
| applied: | |
| QA/QC procedures to be applied: | Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy |
| Any comment: | Equipment used to monitor this parameter is the same as the equipment used to monitor $FV_{RG,h}$ |

| **Data / Parameter:** | $LFG_{electricity,y}$ |
|---|---|
| Data unit: | $m^3$ |
| Description: | Amount of landfill gas combusted in power plant at Normal Temperature and Pressure |
| Source of data to be used: | Onsite measurements |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Continuous Measured by a flow meter. Data to be aggregated monthly and yearly for each power plant (average value in a time interval not greater than an hour shall be used in the calculations of emission reductions) |
| QA/QC procedures to be applied: | Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy |
| Any comment: | [Values/description are provided at CPA level] |

| **Data / Parameter:** | $w_{CH4}$ |
|---|---|
| Data unit: | $m^3$ $CH_4/m^3$ LFG |
| Description: | Methane fraction in the landfill gas |
| Source of data to be used: | To be measured continuously by project participants using certified equipment |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Shall be measured Continuous (average value in a time interval not greater than an hour shall be used in the calculations of emission reductions) using equipment that can directly measure methane content in the landfill gas, estimation of methane content of landfill gas based on measurement of other constituents of the landfill gas such as $CO_2$ is not permitted. Measured by continuous gas quality analyser |
| QA/QC procedures to be applied: | The gas analyser should be subject to a regular maintenance and testing regime to ensure accuracy |

| | |
|---|---|
| Any comment: | The equipment to monitor this parameter is the same as the monitoring equipment for Parameter: $Fv_{CH4,RG,h}$<br>[Values/description are provided at CPA level] |

| **Data / Parameter:** | $T_t$ |
|---|---|
| Data unit: | °C |
| Description: | Temperature of the landfill gas |
| Source of data to be used: | Project participants |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Continuous Measured to determine the density of methane $D_{CH4}$.<br>No separate monitoring of temperature is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters |
| QA/QC procedures to be applied: | Measuring instruments should be subject to a regular maintenance and testing regime in accordance to appropriate national/international standards. |
| Any comment: | [Values/description are provided at CPA level] |

| **Data / Parameter:** | $P_t$ |
|---|---|
| Data unit: | Pa |
| Description: | Pressure of the landfill gas |
| Source of data to be used: | Project participants |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Continuous Measured to determine the density of methane $D_{CH4}$.<br>No separate monitoring of temperature is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters |
| QA/QC procedures to be applied: | Measuring instruments should be subject to a regular maintenance and testing regime in accordance to appropriate national/international standards |
| Any comment: | [Values/description are provided at CPA level] |

| Data / Parameter: | $EL_{LFG}$ |
|---|---|
| Data unit: | MWh |
| Description: | Net amount of electricity generated using LFG |
| Source of data to be used: | Project participants |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Continuous using Electricity meter |
| QA/QC procedures to be applied: | Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy |
| Any comment: | Required to estimate the emission reductions from electricity generation from LFG, if credits are claimed.<br>[Values/description are provided at CPA level] |

| Data / Parameter: | Operation of the energy plant |
|---|---|
| Data unit: | Hours |
| Description: | Operation of the energy plant |
| Source of data to be used: | Project participants |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Annually<br><br>[Values/description are provided at CPA level] |
| QA/QC procedures to be applied: | [Values/description are provided at CPA level] |
| Any comment: | This is monitored to ensure methane destruction is claimed for methane used in electricity plant when it is operational.<br>[Values/description are provided at CPA level] |

| Data / Parameter: | $EC_{BL,k,y}$ |
|---|---|
| Data unit: | MWh/y |
| Description: | Net amount of electricity generated using LFG in year y |
| Source of data to be used: | The actual data will be monitored ex post and be recorded by project participants |

| | |
|---|---|
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Measured continuously by electricity meter(s). This parameter represents the total electricity exported to the grid. Import from the grid ( $EC_{PJ,j,y}$ ) is monitored separately. The data is measured and recorded hourly, and aggregated monthly. |
| QA/QC procedures to be applied: | [Values/description are provided at CPA level] |
| Any comment: | Data will be archived during the crediting period and kept until two years after. [Values/description are provided at CPA level] |

| **Data / Parameter:** | $EC_{PJ,j,y}$ |
|---|---|
| Data unit: | MWh/y |
| Description: | Quantity of electricity consumed by the project activity from the grid in year y |
| Source of data to be used: | Onsite measurements |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Continuously measured by electricity meter(s), aggregated at least annually. |
| QA/QC procedures to be applied: | [Values/description are provided at CPA level] |
| Any comment: | [Values/description are provided at CPA level] |

| **Data / Parameter:** | $FV_{RG,h}$ |
|---|---|
| Data unit: | $m^3$/month |
| Description: | Flow rate of the landfill gas entering the flare. |
| Source of data to be used: | Measured |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be | [provided for each CPA] |

| | |
|---|---|
| applied: | |
| QA/QC procedures to be applied: | [provided for each CPA] |
| Any comment: | [Values/description are provided at CPA level] |

| **Data / Parameter:** | $Fv_{CH4,RG,h}$ |
|---|---|
| Data unit: | - |
| Description: | Volumetric fraction of methane in the residual gas in the hour *h* |
| Source of data to be used: | Measured |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | [provided for each CPA] |
| QA/QC procedures to be applied: | [provided for each CPA] |
| Any comment: | [Values/description are provided at CPA level] |

| **Data / Parameter:** | Other flare operation parameters – Flame detector |
|---|---|
| Data unit: | On/Off or numeric value indicating On/Off |
| Description: | Detection unit |
| Source of data to be used: | Measured |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values/description are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | [provided for each CPA] |
| QA/QC procedures to be applied: | [provided for each CPA] |
| Any comment: | [Values/description are provided at CPA level] |

| **Data / Parameter:** | Other flare operation parameters |
|---|---|
| Data unit: | [Values/description are provided at CPA level] |
| Description: | [Values/description are provided at CPA level] |
| Source of data to be used: | [Values/description are provided at CPA level] |

| | |
|---|---|
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values/description are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | [provided for each CPA] |
| QA/QC procedures to be applied: | [provided for each CPA] |
| Any comment: | [Values/description are provided at CPA level] |

| **Data / Parameter:** | Vt,wb |
|---|---|
| Data unit: | $m^3$ wet gas/h |
| Description: | Volumetric flow of the gaseous stream in time interval *t* on a wet basis |
| Source of data to be used: | [Values are provided at CPA level] |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Volumetric flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required. Continuous if not specified in the underlying methodology. |
| QA/QC procedures to be applied: | Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. Calibration and frequency of calibration is according to manufacturer's specifications |
| Any comment: | Data will be kept for at least two years after the end of the crediting period.<br><br>As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |

| **Data / Parameter:** | Vt,db |
|---|---|
| Data unit: | $m^3$ dry gas/h |
| Description: | Volumetric flow of the gaseous stream in time interval *t* on a dry basis |
| Source of data to be used: | [Values are provided at CPA level] |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |

| | |
|---|---|
| Description of measurement methods and procedures to be applied: | Volumetric flow measurement should always refer to the actual pressure and temperature. Calculated based on the wet basis flow measurement plus water concentration measurement. Continuous measurement if not specified in the underlying methodology |
| QA/QC procedures to be applied: | Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. Calibration and frequency of calibration is according to manufacturer's specifications |
| Any comment: | This parameter will be monitored in Options A As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |

| **Data / Parameter:** | $v_{i,t,db}$ |
|---|---|
| Data unit: | $m^3$ gas *i*/$m^3$ dry gas |
| Description: | Volumetric fraction of greenhouse gas *i* in a time interval *t* on a dry basis |
| Source of data to be used: | [Values are provided at CPA level] |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values/descriptions are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | Continuous gas analyser operating in dry-basis. Volumetric flow measurement should always refer to the actual pressure and temperature. Continuous measurement if not specified in the underlying methodology. |
| QA/QC procedures to be applied: | Calibration should include zero verification with an inert gas (e.g. $N_2$) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period |
| Any comment: | This parameter will be monitored in Options C and F and may be monitored in Options A and D As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |

| **Data / Parameter:** | $C_{H2O,t,db,n,}$ |
|---|---|
| Data unit: | mg $H_2O/m^3$ dry gas |
| Description: | Moisture content of the gaseous stream at normal conditions, in time interval *t* |
| Source of data to be used: | [Values/descriptions are provided at CPA level] |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values/descriptions are provided at CPA level] |
| Description of | Measurements according to the USEPA CF42 method 4 – Gravimetric |

| | |
|---|---|
| measurement methods and procedures to be applied: | determination of water content The mean value among three consecutive measurements performed in the same day (at least 2 hours each) shall be considered. Measurements should coincide with the Annual Surveillance Test (associated with requirements of the EN 14181 standard) or the calibration of the flow meter for the gaseous stream |
| QA/QC procedures to be applied: | According to the USEPA CF42 method 4 |
| Any comment: | Monitoring is required if Option 1 described in the "Determination of the absolute humidity of the gaseous stream" section of the tool is applied, or as one of the ways of proving that the gaseous stream is dry (necessary for Options A or D) As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |

| **Data / Parameter:** | pH20,t,Sat |
|---|---|
| Data unit: | Pa |
| Description: | Saturation pressure of $H_2O$ at temperature $T_t$ in time interval *t* |
| Source of data to be used: | [Values/descriptions are provided at CPA level] |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values/descriptions are provided at CPA level] |
| Description of measurement methods and procedures to be applied: | This parameter is solely a function of the gaseous stream temperature $T_t$ and can be found at reference [1] for a total pressure equal to 101,325 Pa |
| QA/QC procedures to be applied: | [Values/descriptions are provided at CPA level] |
| Any comment: | [1] Fundamentals of Classical Thermodynamics; Gordon J. Van Wylen, Richard E. Sonntag and Borgnakke; 4º Edition 1994, John Wiley & Sons, Inc.<br><br>As per Methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) |

| **Data / Parameter:** | $FC_{i,j,y}$ |
|---|---|
| Data unit: | Mass or volume unit per year (e.g. ton / yr or m3 / yr) |
| Description: | Is the quantity of fuel type i combusted in process j during year y |
| Source of data to be used: | On-site measurements |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | [Values are provided at CPA level] |
| Description of | • Use either mass or volume meters. In cases where fuel is supplied |

| | |
|---|---|
| measurement methods and procedures to be applied: | from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift);<br>• Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance;<br>• In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. |
| QA/QC procedures to be applied: | The consistency of metered fuel consumption quantities should be cross checked by an annual energy balance that is based on purchased quantities and stock changes.<br><br>Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records. |
| Any comment: | Data will be kept for at least two years after the end of the crediting period |

## SECTION C. Environmental analysis

>>

### C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

### C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

[Local regulations do not require a full-fledged environmental impact assessment for this project. A simplified environmental impact assessment has been carried out and approved by the relevant authorities (EPA). There are no trans-boundary environmental impacts.]

### C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

>>

[A complete Environmental Impact Assessment is not required for the CPA as per Regulation of the Minister of Environment number 11 of 2006 regarding the type of business plans and activities that require an environmental impact analysis.]

## SECTION D. Stakeholders' comments

>>

| D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice: |
|---|

☐ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

| D.2. Brief description how comments by local stakeholders have been invited and compiled: |
|---|

>
A consultation with stakeholders was conducted at [DD/MM/YYYY] at [location]

[Brief description of stakeholder meeting.]

| D.3. Summary of the comments received: |
|---|

[Brief description of stakeholder meeting.]

| D.4. Report on how due account was taken of any comments received: |
|---|

[Brief description of stakeholder meeting.]

**Annex 1**

**CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE CPA**

| | |
|---|---|
| Organization: | [value] |
| Street/P.O.Box: | [value] |
| Building: | [value] |
| City: | [value] |
| State/Region: | [value] |
| Postfix/ZIP: | [value] |
| Country: | [value] |
| Telephone: | [value] |
| FAX: | [value] |
| E-Mail: | [value] |
| URL: | [value] |
| Represented by: | [value] |
| Title: | [value] |
| Salutation: | [value] |
| Last Name: | [value] |
| Middle Name: | [value] |
| First Name: | [value] |
| Department: | [value] |
| Mobile: | [value] |
| Direct FAX: | [value] |
| Direct tel: | [value] |
| Personal E-Mail: | [value] |

**Annex 2**

**INFORMATION REGARDING PUBLIC FUNDING**

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

## Annex 3

[Baseline data]

## Annex 4

## MONITORING INFORMATION

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